SRK INSTITUTE OF TECHNOLOGY
VIJAYAWADA

22nd GOVERNING BODY MEETING

ACADEMIC YEAR 2025-2026

08TH NOVEMBER 2025 (SATURDAY)
11:00 AM
CONFERENCE HALL
ONLINE AND HYBRID MODE

Inspiring Innovation,
Nurturing Excellence

MINUTES OF THE 22nd GOVERNING BODY MEETING – A.Y. 2024–25

Date of Meeting: 8th November 2025

Venue: Chairman's Chamber, SRK Institute of Technology, Vijayawada

Chairpersons:

1. Mr. Boyapati Srinivasa Appa Rao, Chairman, SRK Foundation,
2. Mr.Boyapati Srinivasa Sri Krishna, Secretary, SRK Foundation,

Member Secretary: Dr. Kookutla Ramesh, Principal, SRK Institute of Technology

Name	Designation	Signature
Sri.. Boyapati Srinivasa Appa Rao	Chairman, Governing Body	
Sri.Boyapati Srinivasa Sri Krishna	Secretary, Governing Body	
Dr.A.S.N.Chakravarthy	University Nominee	
Sri.T.Raghava Prasad, MD-Krishna Engg.Works	Industry Representative	
Dr.M.Vijaya Saradhi	Principal, Government Polytechnic	
Dr.S.Sri Gowri	Professor, ECE, Faculty Representative	S. Sri Gowri
Dr.A.Radhika	Professor, CSE, Faculty Representative	Radhika
Dr.P.Kishore kumar	Professor, Mechanical Engineering, Faculty Representative	
Dr.G.D.K.Kishore	Associate Professor, IT, Faculty	

	Representative	
Dr. Kookutla Ramesh	Principal / Member Secretary	K. Ramesh 8/11/2025

Preamble

The Governing Body of SRK Institute of Technology, Vijayawada, convened its meeting on 8th November 2025 to deliberate upon and ratify various academic, administrative, financial, and developmental matters recommended by the Academic Council and respective statutory bodies for the Academic Year 2024–25. The Chairperson welcomed the members and appreciated the institution's efforts toward academic excellence, research promotion, and holistic student development. Each agenda item (1–34) was presented by the Member Secretary for discussion, deliberation, and formal ratification.

Agenda Item No. GB/SRKIT/22/01: Review and Ratification of Resolutions Passed in the Previous Governing Body Meeting

Agenda Note: The Governing Body reviewed the resolutions passed in the previous meeting to evaluate their implementation status and outcomes. It was reported that all resolutions and recommendations have been fully implemented in accordance with the Governing Body's directives, with no pending actions. This demonstrates the institution's strong commitment to effective governance, systematic monitoring, and continual enhancement of academic and administrative practices.

Resolution No. 1: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the implementation of all resolutions passed during the previous Governing Body meeting, having verified that all directives have been duly executed and that no items remain pending.*

Resolution Status: *Approved and Ratified Unanimously.*

"The Governing Body recorded its appreciation for the effective administrative execution and the institution's sustained commitment to transparency, accountability, and academic excellence.

Agenda Item No. GB/SRKIT/22/02: Ratification of Results of Various Examinations Conducted During the Academic Year 2024–25 and Approval of the Provisional Certificate Format.

Agenda Note: The Governing Body reviewed the examination results of various UG and PG programs conducted during the academic year 2024–25. All examinations were held as per the approved academic regulations, ensuring transparency, fairness, and timely declaration of results. The following examinations were successfully completed and verified by the Examination Cell:

- II B.Tech I Semester (SRK23) Regular Examinations
- I B.Tech I & II Semester Regular and Supplementary Examinations
- Revaluation Results of all UG and PG Programs

- M.Tech, MBA, IMBA, and MCA III Semester Regular Examinations (December 2024) and PG I & IV Semester Revaluation Results (January 2025)
- II B.Tech II Semester Regular Examinations (April 2025)
- Revaluation Results of II B.Tech II Semester (SRK23) and PG IV Semester (SRK23) (May 2025)
- I B.Tech II Semester Regular Examinations (June 2025)
- I M.Tech, MBA, IMBA, and MCA II Semester Regular Examinations
- Supplementary Examinations of I and II B.Tech I Semester (July 2025)

The finalized **Provisional Certificate (PC)** format prepared by the Examination Cell was presented for approval. The Governing Body recommended that the format retain the official **JNTUK logo** as displayed on the University website, maintaining its color fidelity and incorporating **RFID security features**. It was further advised that the title **"Jawaharlal Nehru Technological University"** be printed in **bold letters** for prominence.

The Principal placed on record appreciation for the Examination Cell and faculty for their exemplary commitment to maintaining academic integrity, transparency, and efficiency in examination and result processing.

Resolution No. 2: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) ratifies the results of all examinations conducted during the academic year 2024–25, as presented, and approves the finalized Provisional Certificate (PC) format with the recommended specifications regarding the JNTUK logo, color integrity, RFID feature, and bold presentation of the University name.*

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the transparent and systematic functioning of the Examination Cell and faculty in upholding institutional academic standards.*

Agenda Item No. GB/SRKIT/22/03: Approval and Ratification of the List of Eligible Candidates for the Issue of Provisional Certificates – Postgraduate Programs (Academic Year 2023–2025).

Agenda Note: The Governing Body considered the list of 120 eligible candidates recommended for the issue of **Provisional Certificates (PCs)** for all Postgraduate Programs for the academic year **2023–2025**, as verified by the Controller of Examinations. All candidates have satisfactorily completed the prescribed academic, attendance, and examination requirements in accordance with the approved Autonomous Regulations and University norms.

Program-wise Summary of Eligible Candidates:

- **M.Tech (CSE):** 10 candidates (out of 12 admitted)
- **M.Tech (ECE – VLSID):** 1 candidate (out of 3 admitted)

- **MBA:** 53 candidates (out of 61 admitted)
- **MCA:** 56 candidates (out of 61 admitted)

The Governing Body commended the Examination Section and Departments for their diligence, transparency, and adherence to academic standards in the evaluation and certification process.

Resolution No. 3: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the list of 120 eligible candidates for the issue of Provisional Certificates (PCs) for the Postgraduate Programs of the academic year 2023–2025, as verified and recommended by the Controller of Examinations. The Controller of Examinations is authorized to proceed with the formal issue of the certificates to the approved candidates.*

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Examination Section and Departments for their systematic, transparent, and efficient conduct of the evaluation and certification process.*

Agenda Item No. GB/SRKIT/22/04: Ratification of Academic Regulations (SRK25) for Postgraduate and Integrated Programs — M.Tech, MBA, IMBA, and MCA.

Agenda Note: The Governing Body reviewed and considered the **Academic Regulations (SRK25)** formulated for the Postgraduate and Integrated Programs — **M.Tech, MBA, IMBA, and MCA.** These regulations have been developed in alignment with the **National Education Policy (NEP) 2020** and the guidelines of **UGC, AICTE, and JNTUK,** ensuring compliance with national academic standards and the principles of outcome-based and flexible education.

The revised framework, prepared through extensive consultations with faculty, Boards of Studies, and industry experts, clearly defines the **credit structure, evaluation methods, grading system, and progression rules** for each program.

Key Highlights:

- Strengthened **continuous internal evaluation** for holistic assessment.
- Integration of **skill-based and multidisciplinary learning** components.
- Emphasis on **project-oriented and experiential learning** to enhance employability and innovation.

The Governing Body appreciated the collaborative efforts of the Boards of Studies and Academic Committees for their meticulous work in designing forward-looking and industry-relevant regulations that reinforce academic quality and institutional governance.

Resolution No. 4: *Resolved that the Governing Body of SRK Institute of Technology*

(Autonomous) approves and ratifies the Academic Regulations (SRK25) for Postgraduate and Integrated Programs — M.Tech, MBA, IMBA, and MCA — as developed in accordance with NEP 2020 and the guidelines of UGC, AICTE, and JNTUK. These regulations shall be implemented from the Academic Year 2025–26.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the dedicated efforts of the faculty and committees in formulating comprehensive and future-ready academic regulations aligned with NEP 2020 and institutional goals of excellence.*

Agenda Item No. GB/SRKIT/22/05: Ratification of Course Structures for All Academic Programs — B.Tech (SRK23 – 3rd & 4th Year), M.Tech, MBA, MCA, and IMBA under SRK25 Regulations.

Agenda Note: The Governing Body reviewed and considered the detailed **course structures** for all academic programs — **B.Tech (SRK23 – 3rd & 4th Year), M.Tech, MBA, MCA, and IMBA** — formulated under the **SRK25 Academic Regulations**. Each structure has been meticulously designed in line with the **Outcome-Based Education (OBE)** framework, **CO–PO–PSO mapping**, and the regulatory guidelines of **AICTE, UGC, and JNTUK**.

The course structures encompass:

- Core and Professional Elective Courses
- Laboratory and Skill Development Courses
- Mini-Projects and Capstone Projects
- Internships and Industry-Oriented Training Modules
- Open and Interdisciplinary Electives

These components ensure balanced academic progression, practical exposure, innovation, and strong industry alignment. The frameworks were finalized after detailed deliberations by the **Boards of Studies (BOS)**, incorporating expert inputs from industry, alumni, and faculty to ensure contemporaneity and employability in line with **NEP 2020**.

The Governing Body appreciated the collective efforts of the **Heads of Departments, BOS Members, and Faculty Teams** for their academic rigor and forward-looking approach in structuring these programs.

Resolution No. 5: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the course structures for all academic programs — B.Tech (SRK23 – 3rd & 4th Year), M.Tech, MBA, MCA, and IMBA — as framed and recommended by the respective Boards of Studies under the SRK25 Academic Regulations.*

The Governing Body noted that the course structures are fully aligned with Outcome-Based Education principles, CO–PO–PSO standards, and NEP 2020 objectives, ensuring

flexibility, interdisciplinary learning, and industry relevance.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the dedicated and systematic efforts of the academic teams in developing these robust and contemporary program structures that uphold institutional and national standards of excellence.*

Agenda Item No. GB/SRKIT/25/06: Ratification and Approval of Academic Calendars for All Programs — B.Tech, M.Tech, MBA, IMBA, and MCA for the Academic Year 2025–26

Agenda Note: The Governing Body reviewed the **Academic Calendars** prepared for all programs — **B.Tech, M.Tech, MBA, IMBA, and MCA** — for the academic year **2025–26**. The calendars were meticulously designed by the **Academic and Examination Committees** in consultation with the **Heads of Departments**, ensuring feasibility, inter-departmental coordination, and compliance with **AICTE, UGC, and JNTUK** guidelines.

Each calendar clearly outlines semester schedules, internal assessment timelines, end examination periods, result declaration dates, and institutional events including **workshops, FDPs, holidays, and co-curricular activities.** The structured framework promotes academic uniformity, timely completion of examinations, and effective academic management.

The Governing Body noted that the approved calendars are disseminated through the **ERP portal, official communications, and departmental notice boards**, ensuring transparency and accessibility. Provisions for **mid-semester review and necessary revisions** have also been incorporated to maintain flexibility and regulatory compliance.

The Governing Body commended the coordinated efforts of the committees and departments in formulating comprehensive and practical calendars supporting academic excellence and institutional efficiency.

Resolution No. 6: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the Academic Calendars for all programs — B.Tech, M.Tech, MBA, IMBA, and MCA — for the academic year 2025–26, as prepared and recommended by the Academic and Examination Committees in consultation with the respective Heads of Departments.*

The Governing Body noted that the calendars ensure adherence to academic timelines, compliance with statutory guidelines, effective synchronization of academic and co-curricular activities, and institutional transparency through structured communication and monitoring mechanisms.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Academic and Examination*

Committees and all Heads of Departments for their diligent, coordinated, and systematic planning contributing to the smooth and efficient conduct of academic operations.

Agenda Item No. GB/SRKIT/22/07: Ratification of Boards of Studies (BOS) Proceedings and Resolutions for the Academic Year 2025–26.

Agenda Note: The Governing Body reviewed the **Boards of Studies (BOS)** proceedings and resolutions of all departments for the academic year **2025–26**. The BOS meetings were conducted by the departments of **Civil, Mechanical, EEE, ECE, EVT, CSE, CSE (AI & ML), CSE (Data Science), IT, MCA, MBA, IMBA, M.Tech (CSE, CSM, VLSI), and English** in accordance with institutional academic norms and schedules.

Each BOS, comprising **Heads of Departments, senior faculty, and external experts** from academia, industry, and alumni, deliberated extensively to ensure curricula remain current, industry-relevant, and aligned with **SRK25 Regulations** and **NEP 2020**.

The BOS proceedings included approval of revised syllabi, introduction of new electives, ratification of examiners and paper setters, and recommendations for strengthening research, laboratory infrastructure, and project evaluation mechanisms.

The Governing Body appreciated the academic rigor, interdisciplinary focus, and industry alignment reflected in the proceedings, emphasizing their contribution to continuous quality enhancement and governance.

Resolution No. 7: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the proceedings and resolutions of the Boards of Studies (BOS) conducted during the academic year 2025–26 across all departments, as presented. The approved recommendations on curriculum revision, elective inclusion, examiner ratification, and research and laboratory enhancement are ratified for implementation from the forthcoming academic session.*

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the BOS Chairpersons, faculty, and external experts for their valuable contributions toward curriculum innovation, academic excellence, and institutional advancement.*

Agenda Item No. GB/SRKIT/22/08: Ratification of the List of Paper Setters Approved by the Boards of Studies (BOS) for All Programs

Agenda Note: The Governing Body reviewed the **list of paper setters** approved by the respective **Boards of Studies (BOS)** for all academic programs and departments. Each BOS has carefully constituted a panel of **external subject experts** from reputed academic and professional institutions, selected based on their **academic credentials, teaching experience, and scholarly contributions**, ensuring transparency, integrity, and quality in the assessment process.

The selection process followed a structured and transparent mechanism involving:

1. **BOS Review and Approval** of proposed experts based on qualifications and expertise.
2. **Institutional Verification** by the Examination Cell for authenticity and suitability.
3. **Final Endorsement** and periodic updates to ensure inclusion of experts from emerging and interdisciplinary domains.

This process upholds **Outcome-Based Education (OBE)** principles and ensures that question paper setting aligns with defined **CO–PO–PSO** mapping and prescribed syllabi.

The Governing Body appreciated the diligence of the **BOS Chairpersons, Members, and the Examination Cell** for maintaining academic rigor, impartiality, and transparency in the selection process.

Resolution No. 8: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the list of paper setters as recommended and approved by the respective Boards of Studies (BOS) for all academic programs and departments. The Governing Body noted that the selection and endorsement process adhered to a systematic, transparent, and merit-based mechanism ensuring academic integrity and fairness in evaluation.*

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the concerted efforts of the BOS and Examination Cell in upholding institutional standards of quality, transparency, and academic excellence in examination practices.*

Agenda Item No. GB/SRKIT/22/09: Presentation and Ratification of the Comprehensive Result Analysis for All Programs and Departments – Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **comprehensive semester-wise result analysis** for all undergraduate and postgraduate programs for the academic year **2024–25**, as presented by the Examination Committee. The analysis, generated through **ERP-based analytical tools**, reflects the institution's commitment to **Outcome-Based Education (OBE), data-driven evaluation**, and **continuous quality improvement**.

Each department conducted **detailed course-wise and subject-wise analyses**, identifying trends, strengths, and areas for enhancement in teaching and assessment practices. Targeted interventions implemented include:

- **Remedial and special classes** for academically weak students,
- **Mentoring and counselling** to improve engagement,
- **Enhanced internal assessment mechanisms**, and
- **Innovative pedagogical approaches** to strengthen learning outcomes.

The Governing Body noted that while overall results were satisfactory, **first-year performance requires improvement**, and remedial support should be intensified for slow learners.

The Governing Body appreciated the systematic CO–PO attainment mapping and the effective use of analytics in performance tracking and quality monitoring.

Resolution No. 9: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the comprehensive semester-wise Result Analysis of all Undergraduate and Postgraduate programs for the academic year 2024–25, as verified and recommended by the Examination Committee.*

The Governing Body noted that the analysis incorporated ERP-enabled data insights, detailed departmental metrics, CO–PO attainment mapping, and actionable quality improvement measures. Departments are advised to strengthen remedial and mentoring initiatives, particularly for first-year students, to enhance academic performance.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the Examination Cell, Departmental Coordinators, and Faculty Members for their data-driven, transparent, and outcome-oriented approach toward academic enhancement and institutional excellence.*

Agenda Item No. GB/SRKIT/22/10: Ratification of the List of Students Detained Due to Shortage of Attendance or Non-fulfilment of Academic Credit Requirements — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the list of students detained during the academic year 2024–25 due to **shortage of attendance** or **non-fulfilment of academic credit requirements**, as per the Institution's Autonomous Regulations. A minimum of **75% attendance** in each registered course is mandatory for eligibility to appear in end-semester examinations.

Upon verification by the **Examination Cell** and respective **Heads of Departments**, the following detentions were confirmed:

- **33 B.Tech students** — detained due to shortage of attendance.
- **17 PG students** — detained due to shortage of attendance. It was noted with satisfaction that **no student was detained due to academic credit deficiency**, indicating improved academic engagement across programs.

The institution implemented proactive support measures such as **mentorship programs**, **ERP-based attendance tracking**, **special classes**, and **re-registration options** to help affected students maintain academic continuity.

Resolution No. 10: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the list of students detained during the academic year*

2024–25 due to shortage of attendance, as verified and recommended by the Examination Cell and the respective Heads of Departments.

The Governing Body noted that 33 B.Tech and 17 PG students were detained due to attendance shortage, with none detained for credit deficiency. The Body commended the institution's mentoring and monitoring initiatives and emphasized the need for continued strict adherence to attendance and credit regulations to uphold academic discipline and quality.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Examination Cell, Heads of Departments, and Faculty Advisors for their transparent verification process and commitment to maintaining academic integrity and institutional standards.*

Agenda Item No. GB/SRKIT/22/11: Report and Ratification of Malpractice Cases and Disciplinary Actions Taken During Examinations Conducted Under SRK23 Regulations — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **examination malpractice cases** and **disciplinary actions** taken during the academic year **2024–25** under the **SRK23 Regulations**. It was noted with satisfaction that malpractice instances were minimal, reflecting a growing culture of integrity and ethical conduct among students.

A total of **14 cases** were reported:

- **1 case** during II B.Tech I Semester Examinations
- **13 cases** across other semester examinations

Each case was thoroughly investigated by the **Examination Cell** and the **Malpractice & Disciplinary Committee** through a fair and transparent process. Actions taken included **written warnings, cancellation of examinations**, and **referrals to higher disciplinary authorities** for serious violations.

Preventive measures such as **CCTV surveillance, invigilator sensitization**, and **student awareness programs** have strengthened examination discipline and significantly reduced malpractice incidents.

Resolution No. 11: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the report on malpractice cases and disciplinary actions taken during the examinations conducted under SRK23 Regulations for the academic year 2024–25, as reviewed and recommended by the Examination Cell and the Malpractice & Disciplinary Committee.*

The Governing Body noted that all 14 cases were addressed through due process, with disciplinary actions proportionate to the severity of offenses, and commended the

institution's continued efforts toward maintaining fairness and integrity in examinations.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Examination Cell and the Malpractice & Disciplinary Committee for their transparent handling of cases and sustained initiatives to uphold ethical standards and institutional credibility in the examination system.*

Agenda Item No. GB/SRKIT/22/12: Ratification of the List of Students Readmitted and Re-registered During the Academic Year 2024-25 Under SRK23 and JNTUK Regulations.

Agenda Note: The Governing Body reviewed the list of students **readmitted and re-registered** during the academic year **2024–25** under both **SRK23 Autonomous Regulations** and **JNTUK Regulations**. A total of **12 students** were readmitted — **6 under SRK23** and **6 under JNTUK** — following due verification and compliance with institutional and university norms.

The readmissions were necessitated by reasons such as **academic backlog, medical issues, long-term absence, or personal and financial constraints**. Each case was thoroughly examined by the **Academic Committee** to ensure eligibility, credit equivalence, and regulatory conformity.

To facilitate smooth reintegration, the institution provided **academic counselling, remedial classes, and faculty mentorship**, with all records duly maintained in the **ERP system** for transparency and accountability.

Resolution No. 12: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the list of 12 students readmitted and re-registered during the academic year 2024–25 under SRK23 and JNTUK Regulations, as verified and recommended by the Academic Committee and Examination Cell.*

The Governing Body noted that all readmissions were processed with fairness, transparency, and adherence to institutional and affiliating university norms, ensuring academic continuity and student support.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Academic Committee, Examination Cell, and Faculty Mentors for their systematic handling, documentation rigor, and student-centric support ensuring seamless academic reintegration.*

Agenda Item No. GB/SRKIT/22/13: Presentation and Ratification of Student Activities Conducted During the Academic Year 2024–25

Agenda Note: The Governing Body reviewed the comprehensive report on **student activities** conducted during the academic year **2024–25**, showcasing the institution's commitment to a **vibrant, inclusive, and holistic learning environment** in alignment with

NEP 2020 objectives.

A total of **126 programs** and **events** were organized across **all** departments, covering diverse domains of student growth and engagement, including:

- **Technical & Innovation Events:** Hackathons, technical fests, coding challenges, paper presentations, and project expos.
- **Skill Development Programs:** Expert lectures, industry workshops, and research seminars enhancing employability and analytical skills.
- **Sports & Cultural Activities:** Inter-departmental tournaments, cultural fests, and annual celebrations promoting teamwork and creativity.
- **Community Outreach:** NSS drives, blood donation camps, and environmental campaigns fostering social responsibility and empathy.

These activities contributed significantly to enhancing **student engagement, leadership, creativity, and professional readiness**.

Resolution No. 13: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the report on student activities conducted during the academic year 2024–25, covering academic, technical, co-curricular, extracurricular, and community initiatives across all departments.*

The Governing Body noted that 126 programs were successfully conducted, reflecting alignment with NEP 2020 and the institution's mission of holistic student development through experiential and multidimensional learning.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body recorded its appreciation for the Heads of Departments, faculty coordinators, and student organizers for their dedication, creativity, and commitment in successfully executing these impactful and enriching activities.*

Agenda Item No. GB/SRKIT/22/14: Presentation and Ratification of Placement Statistics and Student Achievements — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **Placement and Student Achievements Report** for the academic year **2024–25**, reflecting SRK Institute of Technology's continued success in producing **industry-ready and employable graduates** through strong industry linkages and skill development initiatives.

Key Highlights:

- **507 students** placed across **41 reputed companies**, achieving a **67.42% placement rate.**
- **Highest package:** ₹6.25 LPA (Infosys); **Average package:** ₹3.2 LPA.
- Major recruiters: **Infosys, TCS, Cognizant, Accenture, Genpact, Virtusa,** and

others.

- Over **40 on-campus drives** conducted spanning core and IT sectors.

In addition to placement success, students achieved distinction in **national hackathons, innovation challenges, research forums, sports, and cultural events**, demonstrating holistic development aligned with **NEP 2020** principles. **The Alumni Mentoring Program and career guidance initiatives** further enhanced employability and professional readiness.

Resolution No. 14: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the Placement Statistics and Student Achievements Report for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted the commendable placement performance, consistent industry engagement, and diverse student achievements across technical, research, and extracurricular domains. The Body encouraged the continued strengthening of career development, entrepreneurship, and industry collaboration initiatives to sustain and enhance employability outcomes.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the Training and Placement Cell, faculty coordinators, and alumni mentors for their dedication, strategic planning, and efforts in achieving exemplary placement results and fostering student excellence.*

Agenda Item No. GB/SRKIT/22/15: Report on Anti-Ragging Measures and Grievance Redressal Mechanisms — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **Anti-Ragging Measures** and **Grievance Redressal Mechanisms** implemented during the academic year **2024–25** at SRK Institute of Technology (Autonomous). The institution continues to uphold a **zero-tolerance policy toward ragging**, ensuring a safe and inclusive campus environment in full compliance with **UGC and AICTE regulations**.

It was noted with satisfaction that no **ragging incidents** were reported during the year, reflecting the effectiveness of institutional vigilance, awareness programs, and student discipline. Preventive initiatives included:

- Regular **inspections and monitoring** by the Anti-Ragging Squad in hostels and public areas,
- **Orientation and awareness sessions** for new students and parents,
- Prominent **anti-ragging campaigns and helpline facilities**, and
- An accessible **online grievance redressal platform** for prompt response.

The **Grievance Redressal Cell**, under the supervision of the Principal, effectively addressed all student concerns with transparency, empathy, and timely resolution. Regular

counseling sessions and wellness programs further strengthened student well-being and campus harmony.

Resolution No. 15: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the report on Anti-Ragging Measures and Grievance Redressal Mechanisms for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted with appreciation that no ragging incidents occurred during the period and commended the proactive functioning of the Anti-Ragging Committee, Squad, and Grievance Redressal Cell in ensuring safety, compliance, and student welfare.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the committees, faculty coordinators, hostel wardens, and student volunteers for their collective efforts in maintaining a safe, respectful, and student-centric campus culture.*

Agenda Item No. GB/SRKIT/22/16: Report on Infrastructure Development and Upgradation Initiatives Implemented During the Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **infrastructure development and modernization initiatives** undertaken during the academic year **2024–25**, reflecting SRK Institute of Technology's commitment to **academic excellence, sustainability, and student-centric growth.**

Key developments included:

- **Academic Infrastructure:** Smart classrooms, upgraded laboratories with advanced equipment and licensed software, establishment of a **DMF Laboratory** in the EVT Department, installation of **140 new high-performance systems** in CSE (AI & ML) and CSE (Data Science), and implementation of the **Microsoft Campus Agreement** for cloud-enabled learning.
- **Library & ICT Upgradation:** Expansion of e-resources and global databases; enhanced ICT systems with high-speed connectivity, integrated ERP, and extended Wi-Fi coverage.
- **Student Amenities & Facilities:** Refurbished hostels and cafeterias, upgraded sports and cultural facilities, **green campus initiatives** (rainwater harvesting, waste management, and tree plantation), and strengthened **safety and security systems** with CCTV and biometric access.

These developments demonstrate the Management's forward-looking vision and the concerted efforts of the administrative and technical teams toward building a **technology-driven and sustainable campus.**

Resolution No. 16: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records its appreciation for the infrastructure*

enhancement and modernization initiatives undertaken during the academic year 2024–25, as presented by the Principal.

The Governing Body noted significant advancements in academic and ICT infrastructure, student amenities, and sustainable campus practices, and suggested pursuing ***"Eat Right Campus" certification from FSSAI*** *along with continued expansion of* ***Green Campus initiatives.***

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Management, Administrative, and Technical Teams for their strategic vision, diligent execution, and commitment to creating a modern, eco-conscious, and learner-focused academic environment.*

Agenda Item No. GB/SRKIT/22/17: Presentation and Acknowledgment of Faculty Profiles, Qualifications, Achievements, and Academic Contributions — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **faculty profiles, qualifications, achievements,** and **academic contributions** across all departments for the academic year **2024–25**, reaffirming that faculty remain the foundation of SRK Institute of Technology's academic excellence and research leadership.

The institution maintains a **diverse and highly qualified faculty base**, with many members holding **Ph.D. degrees** and actively engaged in **research, consultancy, innovation, and student mentorship**.

Key Highlights:

- Significant contributions through **research publications, patents, funded projects, and grants**.
- Faculty **promotions, awards, and recognitions** reflecting excellence in academics and professional service.
- Continuous professional development via **FDPs, workshops, and industry collaborations**.
- Active participation in **mentorship, project guidance, and co-curricular coordination,** fostering holistic student development.

The Governing Body noted the institution's sustained efforts to promote a culture of academic growth, innovation, and industry relevance through faculty empowerment.

Resolution No. 17: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records its appreciation for the faculty members for their qualifications, professional achievements, and academic contributions during the*

academic year 2024–25.

The Governing Body noted the commendable faculty engagement in research, innovation, and mentorship, and congratulated those who received promotions and awards. The Body further appreciated the continued support of the Management, Principal, and Heads of Departments in nurturing a dynamic and excellence-driven academic environment.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its deep appreciation for the faculty's dedication to teaching, research, and institutional development, which continues to enhance SRKIT's academic reputation and impact.*

Agenda Item No. GB/SRKIT/22/18: Presentation and Ratification of the Faculty Ratification Report — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **Faculty Ratification Report** for the academic year **2024–25**, as approved by the **Jawaharlal Nehru Technological University, Kakinada (JNTUK)**. Out of **196 faculty members** serving across various departments, **121 faculty members** — including Professors, Associate Professors, and Assistant Professors — were **successfully ratified** by JNTUK in accordance with **AICTE and university norms.**

The ratification process was carried out with complete **transparency and statutory compliance**, ensuring that all ratified faculty meet the prescribed qualifications, experience, and eligibility standards. This milestone reaffirms the institution's commitment to **academic excellence, regulatory adherence, and faculty development.**

The Governing Body appreciated the efforts of the **Heads of Departments, Academic Audit Committee, and Administrative Staff** for their meticulous coordination, documentation, and timely submission of proposals.

Resolution No. 18: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the Faculty Ratification Report for the academic year 2024–25, as approved by JNTUK, Kakinada, and presented by the Principal.*

The Governing Body noted that 121 out of 196 faculty members were ratified in compliance with AICTE and JNTUK norms, reflecting the institution's sustained commitment to quality assurance, transparency, and academic integrity.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the coordinated efforts of the Academic Audit Committee, Heads of Departments, and Administrative Teams, and commended all faculty — ratified and awaiting ratification — for their continued dedication to teaching, research, and institutional growth.*

Agenda Item No. GB/SRKIT/22/19: Report on Faculty Relieved and Status of Faculty Recruitment — Academic Year 2024–25

Agenda Note: The Governing Body reviewed the report on **faculty members relieved during** the academic year **2024–25** and the corresponding **status of faculty recruitment** across departments.

A total of 22 **faculty members** were relieved due to **resignation, retirement, pursuit of higher studies, or career advancement**, with all separations executed in full compliance with institutional HR policies and service norms. Proper documentation, no-due clearance, and handover procedures were duly completed.

Despite these transitions, **Heads of Departments effectively managed** workload **redistribution** to ensure uninterrupted academic functioning. Meanwhile, the **recruitment process** has been initiated and completed for vacant positions in adherence to **AICTE norms, JNTUK guidelines, and institutional policies**, emphasizing transparency and merit-based selection.

Resolution No. 19: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on faculty relieved during the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that 22 faculty members were relieved after due process, and recruitment to fill the resultant vacancies has been undertaken in accordance with statutory and institutional standards. The Body appreciated the outgoing faculty for their dedicated service and advised the administration to continue timely recruitment to sustain academic quality and compliance.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the outgoing faculty members for their commitment and contributions, and commended the Heads of Departments and Administrative Teams for ensuring smooth academic continuity and effective recruitment management.*

Agenda Item No. GB/SRKIT/22/20: Report on Faculty Development Programs (FDPs), Workshops, and Skill Enhancement Initiatives Conducted and Attended — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **Faculty Development Programs (FDPs), Workshops, and Skill Enhancement Initiatives** organized and attended during the academic year **2024–25**, reaffirming SRK Institute of Technology's strong commitment to **faculty empowerment, academic innovation, and continuous professional development** in alignment with its outcome-based and research-oriented vision.

During the period:

- **71 faculty members** participated in national and international FDPs and training programs.
- **37 in-house FDPs and workshops** were organized across departments, focusing on contemporary academic, technological, and research themes.

Key Focus Areas:

- Artificial Intelligence, Machine Learning, and Data Science
- Internet of Things (IoT) and Industry 4.0
- Renewable Energy and Sustainability
- Research Methodology and Academic Writing
- Pedagogical and OBE-driven assessment innovations

Many of these programs were conducted in collaboration with **IITs, NITs, AICTE-ATAL Academies, ISTE, IEEE, CSI**, and other professional bodies, enhancing teaching quality, research productivity, and interdisciplinary collaboration.

Resolution No. 20: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Faculty Development Programs (FDPs), Workshops, and Skill Enhancement Initiatives conducted and attended during the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that these initiatives have significantly contributed to pedagogical innovation, research enhancement, and academic excellence, further strengthening the institution's professional and outcome-based education ecosystem.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Heads of Departments, FDP Coordinators, and Faculty Members for their active participation, collaboration, and dedication toward continuous learning and institutional growth.*

Agenda Item No. GB/SRKIT/22/21: Report on Research and Development (R&D) Activities and Initiatives — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **Research and Development (R&D) activities** carried out during the academic year **2024–25**, highlighting SRK Institute of Technology's continuous advancement toward becoming **a research-driven and innovation-oriented institution.**

The **R&D Cell** has functioned effectively as the central body promoting research, innovation, consultancy, and collaborations across departments, encouraging faculty and students to engage in **interdisciplinary and socially relevant research** aligned with **Sustainable Development Goals (SDGs).**

Key Highlights:

- **Funded Research Proposals:** Submitted to AICTE, DST, UGC, ANRF, and industry sponsors, demonstrating increased participation in externally funded projects.
- **Interdisciplinary Clusters:** Formed in thrust areas such as **AI, Data Science, Renewable Energy, IoT, and Sustainable Infrastructure**.
- **Publications & Patents:** Notable increase in Scopus/SCI-indexed publications, patent filings, and prototype developments.
- **Collaborations & Consultancy:** Strengthened partnerships with industry and academia to expand research impact.
- **Institutional Support:** Continued provision of **research incentives and seed funding** to encourage faculty and student innovation.

Resolution No. 21: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Research and Development (R&D) Activities and Initiatives undertaken during the academic year 2024–25, as presented by the Principal.*

*The Governing Body noted the commendable progress in funded research, interdisciplinary collaborations, publications, and innovation initiatives, and advised further emphasis on publishing research papers in **SCI, Scopus, and Web of Science (WoS) journals** to enhance global research visibility and impact.*

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the R&D Cell, faculty researchers, and student innovators for their sustained efforts in fostering a productive, interdisciplinary, and impactful research culture that strengthens SRKIT's academic and societal relevance.*

Agenda Item No. GB/SRKIT/21/22: Report on Recognized Research Centres and Ongoing Research Initiatives — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **recognized Research Centres** and **ongoing research initiatives** at SRK Institute of Technology, marking a key milestone in the institution's transformation into a **research-driven** and **innovation-focused autonomous institution**.

SRKIT presently hosts **two JNTUK-recognized Research Centres**:

1. **Computer Science and Engineering (CSE)**
2. **Electronics and Communication Engineering (ECE)**

These centres signify SRKIT's growing commitment to **advanced research, interdisciplinary collaboration, and societal relevance.** Allocation of **Ph.D. scholars** by

JNTUK is underway, with core research domains including **Artificial Intelligence, IoT, Renewable Energy, Sustainable Technologies, Advanced Communication Systems,** and **Data Analytics**.

The **R&D Cell** continues to spearhead research through interdepartmental collaborations, funded projects, consultancy services, and capacity-building programs. Institutional support includes **seed funding, patent and publication assistance,** and **state-of-the-art research infrastructure.**

Regular **FDPs, workshops, and conferences** have strengthened faculty–student research engagement and fostered industry-aligned innovation in tune with **NEP 2020** priorities.

Resolution No. 22: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the establishment of two recognized Research Centres — in Computer Science and Engineering (CSE) and Electronics and Communication Engineering (ECE) — as approved by JNTUK, Kakinada, and the ongoing research initiatives undertaken under their scope.*

The Governing Body noted that these centres represent a major institutional achievement, positioning SRKIT as a research-oriented hub promoting innovation, interdisciplinary collaboration, and national development. It also resolved to extend continued institutional support for expanding research infrastructure and pursuing additional recognitions from funding agencies and regulatory bodies.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the R&D Cell, Research Supervisors, Faculty Coordinators, and Department Heads for their dedicated efforts in nurturing a vibrant and impactful research ecosystem aligned with NEP 2020 and national innovation missions.*

Agenda Item No. GB/SRKIT/22/23: Report on Salary Disbursements and Financial Compliance for Teaching and Non-Teaching Staff — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **salary disbursements and financial compliance** for teaching and non-teaching staff during the academic year **2024–25**, reaffirming SRK Institute of Technology's commitment to **financial discipline, transparency, and employee welfare.**

All salary payments were **disbursed promptly** through the **ERP-integrated online payroll system,** ensuring accuracy, accountability, and secure digital records. The salary framework included **Basic Pay, HRA, DA, PF contributions, performance-based incentives, and statutory deductions,** fully compliant with **UGC/AICTE pay scales** and institutional service rules.

Total Salary Disbursement:

- **Teaching Staff:** ₹7,28,51,803
- **Non-Teaching Staff:** ₹1,99,86,809

Regular **internal and statutory audits** verified payroll accuracy and ensured adherence to financial and statutory norms.

Resolution No. 23: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on salary disbursements and financial compliance for teaching and non-teaching staff during the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that all salary payments were made timely and in compliance with statutory regulations, reflecting the institution's commitment to financial integrity, operational efficiency, and employee satisfaction.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Management, Accounts Department, and HR Department for ensuring prompt disbursement, transparent payroll management, and strong financial governance contributing to institutional stability and trust.*

Agenda Item No. GB/SRKIT/22/24: Report on Central Library Resources, Digital Access, and Academic Support Services — Academic Year 2024–25

Agenda Note: The Governing Body reviewed the report on the **Central Library resources, digital access, and academic support services** for the academic year **2024–25**, reaffirming its role as the intellectual and research hub of SRK Institute of Technology.

The **Central Library**, fully automated with the **Adhokrut Library Management System**, ensures efficient cataloging, circulation, and real-time access to learning resources.

Key Highlights:

- **Collection:** 29,447 volumes, 6,713 titles, and over 5,000 national and international journals across all disciplines.
- **Digital Access:** Connectivity to **DELNET, NDLI, NPTEL, SWAYAM,** and **e-ShodhSindhu**, enabling access to global databases and MOOCs.
- **Facilities:**
  - Dedicated Reference, Periodical, Digital, and Project Report sections.
  - **Book Bank** for economically weaker students.
  - **E-Library** with 20 high-speed computers and internet access.
  - **Reprography and printing** services.
  - **Extended working hours** (9:00 AM–7:00 PM, longer during exams).

- **Academic Engagement:** Regular orientation programs, book exhibitions, and reading competitions encourage reading culture and promote awareness of open access, plagiarism prevention, and research ethics.

Resolution No. 24: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Central Library Resources, Digital Access, and Academic Support Services for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted the library's automation, comprehensive print and digital collection, and its pivotal role in enhancing academic excellence, research engagement, and digital literacy.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

• The Governing Body placed on record its appreciation for the Librarian and Library Staff for their commitment, professionalism, and contribution to maintaining a resource-rich, technologically advanced, and student-focused academic environment.

Agenda Item No. GB/SRKIT/22/25: Report on Eminent Performer Sessions and Distinguished Guest Lectures Conducted — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **Eminent Performer Sessions and Distinguished Guest Lectures** conducted during the academic year **2024–25**, which have significantly contributed to academic enrichment and knowledge exchange at SRK Institute of Technology.

As part of the institution's continuous learning and industry-academia engagement initiatives, **eminent academicians, researchers, and industry leaders** from organizations such as **IITs**, NITs, **IIITs**, **DRDO**, **ISRO**, **Infosys**, **TCS**, **and Accenture** delivered expert lectures and interactive sessions on emerging themes including **Artificial Intelligence**, **Data Science**, **Cybersecurity**, **Renewable Energy**, **Smart Infrastructure**, and **Entrepreneurship**.

All sessions were **digitally recorded and archived** for academic reference, and **mementos and certificates** were presented to speakers as a token of appreciation. These initiatives have strengthened **academia–industry collaboration**, fostered **innovation**, and enhanced **institutional visibility**.

Resolution No. 25: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Eminent Performer Sessions and Distinguished Guest Lectures conducted during the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that these programs effectively enhanced academic engagement, promoted research and innovation culture, and provided valuable exposure to

students and faculty on cutting-edge technological and professional domains. It further encouraged the continuation and expansion of such collaborations with global academic and industrial partners.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Organizing Committees, Faculty Coordinators, and Student Teams for their exemplary efforts in successfully conducting these intellectually enriching and impactful sessions.*

Agenda Item No. GB/SRKIT/22/26: Presentation of the Institutional Strategic Roadmap and Future Development Plan — Academic Year 2025–26 and Beyond.

Agenda Note: The Governing Body reviewed the **Institutional Strategic Roadmap and Future Development Plan for 2025–26 and beyond**, outlining SRK Institute of Technology's long-term vision for **academic excellence, research innovation, and institutional advancement.**

Aligned with the **Vision and Mission** of the institution and the principles of the **National Education Policy (NEP) 2020**, the roadmap aims to position SRKIT as a **globally recognized center of higher learning**, known for innovation, sustainability, and societal impact.

Key Strategic Focus Areas:

1. **Emerging Academic Programs:** Launch of new programs in **AI, Cyber Security, Data Science, and Robotics**; introduction of **B.Tech (Honors)** and **Minor Degree** options for flexibility and employability.
2. **Innovation & Entrepreneurship:** Establishment of **Innovation and Incubation Centers** to promote start-ups, industry collaboration, and student-led ventures.
3. **Global Collaborations:** Expansion of **international partnerships**, exchange programs, and collaborative research with reputed global institutions.
4. **Quality & Accreditation:** Continuous enhancement of **NAAC, NBA, and NIRF** benchmarks through robust OBE-based systems and data-driven governance.
5. **Research & Development:** Greater focus on **funded projects, patents, and technology transfer** through agencies such as ANRF, DST, AICTE, and UGC.
6. **Sustainability & Green Campus:** Strengthening renewable energy initiatives, waste management, and eco-friendly infrastructure development.
7. **Long-Term Vision:** Strategic progression toward **Deemed-to-be University** status under the **SRK Foundation**, enhancing academic autonomy and institutional leadership.

Resolution No. 26: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and endorses the Institutional Strategic Roadmap and Future Development Plan for the Academic Year 2025–26 and beyond, as presented by the*

Principal.

The Governing Body noted that the roadmap aligns with NEP 2020 priorities, emphasizes innovation, research, and global partnerships, and charts a clear path toward institutional excellence and autonomy. The Body advised a phased, outcome-based implementation and periodic review through the IQAC and Academic Planning Committee.

Resolution Status: *Acknowledged, Supported, and Endorsed Unanimously.*

**The Governing Body placed on record its appreciation for the Management, Principal, and Academic Teams for their visionary planning, strategic foresight, and dedication to advancing SRKIT toward global academic prominence and sustainable institutional growth.*

Agenda Item No. GB/SRKIT/22/27: Presentation of the Institutional Development Plan (IDP) and Strategic Vision for the Coming Years.

Agenda Note: The Governing Body reviewed the **Institutional Development Plan (IDP)** — a comprehensive roadmap outlining the strategic direction and long-term vision of SRK **Institute of Technology (Autonomous)** for sustained academic, research, and institutional growth. **The plan aligns with the National Education Policy (NEP) 2020, the objectives of the SRK Foundation,** and the institutional mission of evolving into a **globally recognized, innovation-driven center of excellence.**

The IDP focuses on fostering **academic excellence, research advancement, technological innovation, sustainability, and social responsibility,** ensuring SRKIT's transformation into a **multidisciplinary, research-oriented institution.**

Key Strategic Focus Areas:

1. **Academic Expansion:** Launch of new interdisciplinary programs in **AI, Data Science, Cyber Security, and Robotics,** along with **B.Tech (Honors)** and **Minor Degree** options to enhance flexibility and employability.
2. **Research and Innovation:** Strengthening **R&D Centers,** encouraging **funded projects, consultancy, patents,** and establishing a structured **Innovation and Incubation Ecosystem.**
3. **Infrastructure and Digital Transformation:** Expansion of **smart classrooms, ERP-based systems, ICT infrastructure,** and hybrid learning environments.
4. **Faculty Development:** Continuous **FDPs, doctoral support, global certifications,** and a structured **faculty recognition and reward policy.**
5. **Industry Collaboration:** Establishment of **Centers of Excellence (CoEs),** MoUs with industries, and integration of **industry projects** into the curriculum.
6. **Student Development:** Strengthened career **guidance, entrepreneurship training, and inclusive student support systems.**
7. **Sustainability and Social Responsibility:** Expansion of **green campus initiatives, renewable energy systems,** NSS, and **community outreach** programs.

8. **Long-Term Vision:** Strategic progression toward **Deemed-to-be University** status under the SRK Foundation to enhance academic autonomy and institutional prominence.

Resolution No. 27: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and endorses the Institutional Development Plan (IDP) as presented by the Principal, outlining the strategic roadmap for academic and institutional growth in alignment with NEP 2020 and the vision of SRK Foundation.*

The Governing Body noted that the IDP emphasizes academic innovation, research advancement, faculty empowerment, and sustainability as key drivers of institutional progress. It recommended phased, outcome-based implementation and periodic evaluation through the ***Internal Quality Assurance Cell (IQAC)*** *and* ***Academic Planning Committee*** *to ensure measurable impact and alignment with institutional goals.*

Resolution Status: *Acknowledged, Endorsed, and Approved Unanimously.*

**The Governing Body placed on record its appreciation for the Management, Principal, Faculty, and Staff for their strategic foresight, collaborative effort, and commitment to positioning SRKIT as a nationally distinguished, research-driven, and future-ready institution of excellence.*

Agenda Item No. GB/SRKIT/22/28: Report on Curriculum Revision, Academic Innovation, and Alignment with NEP 2020 and NBA Frameworks — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on curriculum revision and academic innovation undertaken during the academic year 2024–25, reaffirming SRK Institute of Technology's commitment to continuous academic enhancement and alignment with NEP 2020 and NBA quality frameworks.

Comprehensive revisions were implemented across all programs through the respective Boards of Studies (BOS), integrating industry feedback, emerging technologies, and outcome-based education (OBE) principles to ensure relevance, rigor, and global benchmarking.

Key Highlights:

1. Integration of Emerging Technologies: Inclusion of modules in AI, Data Science, Cybersecurity, and IoT, co-designed with industry experts.
2. Skill and Value-Added Courses: Launch of hands-on, employability-oriented, and MOOC-integrated courses (NPTEL, SWAYAM).
3. Strengthened OBE Implementation: Full adoption of CO–PO–PSO mapping and continuous attainment evaluation for NBA readiness.
4. Experiential and Interdisciplinary Learning: Emphasis on project-based learning, interdisciplinary electives, and capstone projects linked to real-world challenges.

5. Ethics, Sustainability, and Innovation: Embedding of SDG principles, ethical frameworks, and entrepreneurship components across curricula.
6. Industry Collaboration: Regular BOS consultations and expert-led reviews ensuring curriculum dynamism and industry relevance.

Resolution No. 28: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Curriculum Revision, Academic Innovation, and Alignment with NEP 2020 and NBA Frameworks for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that the revised curricula reflect NEP 2020 priorities, strengthen OBE implementation, enhance employability, and embed sustainability and innovation as integral educational themes. It advised that annual curriculum reviews continue under Academic Committees with industry and student feedback to ensure continuous improvement and accreditation readiness.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the academic leadership, BOS members, and faculty teams for their vision, collaboration, and commitment to maintaining a dynamic, industry-aligned, and globally competitive curriculum framework.*

Agenda Item No. GB/SRKIT/22/29: Presentation on the Systematic and Transparent Examination Process Implemented at SRK Institute of Technology (Autonomous).

Agenda Note: The Governing Body reviewed the comprehensive presentation on the **systematic, transparent, and quality-assured examination process** implemented at SRK Institute of Technology (Autonomous), reaffirming the institution's commitment to **academic integrity, fairness, and accountability** in alignment with **NBA and NAAC quality assurance frameworks.**

The Examination Cell, functioning under a well-defined autonomous structure, ensures full compliance with institutional regulations, affiliating university norms, and national accreditation standards. The process emphasizes **objectivity, confidentiality, and digital transparency**, thereby strengthening academic credibility and stakeholder trust.

Key Highlights of the Examination System:

1. **Question Paper Setting:**
   - External experts frame question papers ensuring impartiality and academic rigor.
   - Bloom's Taxonomy principles guide assessment design, ensuring balanced cognitive evaluation.
   - Syllabus coverage, CO–PO mapping, and difficulty-level validation ensure fair and comprehensive testing.
2. **Moderation and Validation:**

- A dedicated Moderation Committee reviews papers for clarity, parity, and academic relevance.
- Ensures consistency and adherence to institutional academic benchmarks.

3. **Centralized Evaluation:**
   - Confidential, coded evaluation process eliminates bias and ensures transparency.
   - ERP-enabled revaluation and recounting mechanisms enhance credibility.
4. **Digital Result Processing:**
   - ERP-based automation ensures accuracy and timely publication of results.
   - Analytical dashboards provide insights into performance trends, pass percentages, and CO–PO attainment.
5. **Quality and Regulatory Compliance:**
   - Fully aligned with **AICTE, UGC, NBA, and NAAC** standards.
   - Regular audits and Academic Council reviews ensure continuous improvement and data-driven governance.

Resolution No. 29: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on the Systematic and Transparent Examination Process implemented at the institution, as presented by the Principal.*

The Governing Body noted that the institution has established a robust, technology-enabled, and transparent evaluation framework that ensures academic fairness, regulatory compliance, and continuous quality enhancement.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation to the Controller of Examinations, Examination Cell staff, Moderation Committees, and Faculty Evaluators for their professionalism, integrity, and dedication in sustaining a transparent, accountable, and quality-driven examination process.*

Agenda Item No. GB/SRKIT/22/30: Report on Transitory Regulations for Curriculum and Academic Transitions — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on **Transitory Regulations** designed to ensure smooth and equitable academic transitions for students affected by curriculum revisions or regulatory changes.

It was noted that during the **academic year 2024–25, no new transitory regulations** were required, as there were **no curriculum or credit structure changes** necessitating such measures. All **readmitted students** continue under the **original academic regulations** applicable at the time of their admission, ensuring consistency, fairness, and compliance.

Existing **Examination and Assessment guidelines** remain valid until program completion. Wherever needed, transitory provisions are recommended by the **Boards of Studies (BOS)**, ratified by the **Academic Council**, and duly documented in the **ERP system** for

institutional record and regulatory adherence.

This structured framework ensures **academic transparency, integrity, and regulatory continuity** across all programs.

Resolution No. 30: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the report on Transitory Regulations for Curriculum and Academic Transitions for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that no new transitory regulations were required during the year and that readmitted students continue under existing academic frameworks, maintaining consistency and compliance. Any future transitory provisions will be formulated through BOS recommendations and Academic Council ratification.

Resolution Status: *Acknowledged and Recorded (Unanimously).*

**The Governing Body placed on record its appreciation for the efforts of the Heads of Departments, BOS Chairpersons, and the Examination Cell for maintaining systematic documentation, regulatory compliance, and smooth academic administration.*

Agenda Item No. GB/SRKIT/22/31: Report on Minors and Honors Programs Offered Under Autonomous (SRK23) Regulations — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the report on the **Minors and Honors Programs** implemented under the **Autonomous (SRK23) Regulations**, reaffirming SRK Institute of Technology's commitment to **academic flexibility, interdisciplinary learning, and NEP 2020-aligned academic excellence.**

These programs enable meritorious students to pursue **additional specializations** beyond their core curriculum, strengthening their technical expertise, research orientation, and employability.

Program Summary (A.Y. 2024–25):

- **Minors Programs:** 47 students registered (Departments: CSE–AI&ML, ECE)
- **Honors Programs:** 77 students registered
  - CSE – 34 students
  - CSE (AI&ML) – 17 students
  - ECE – 26 students

Implementation Highlights:

- Eligibility determined by **CGPA, prerequisite completion, and Departmental Committee approval.**
- Each student is guided by a **faculty mentor** for academic progress and performance

monitoring.

- Structured **credit-based, OBE-aligned framework**, approved by the **Boards of Studies (BOS)** and reviewed by the **Academic Committee**.

These initiatives foster **academic excellence, interdisciplinary engagement, and professional competitiveness**, aligning with global higher education standards.

Resolution No. 31: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the report on Minors and Honors Programs offered under the Autonomous (SRK23) Regulations for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that 47 students registered for Minors and 77 for Honors across CSE, CSE (AI&ML), and ECE, and that these programs enhance academic depth, innovation, and flexibility in accordance with OBE and NEP 2020 frameworks.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the Heads of Departments, Faculty Mentors, and Academic Committees for their effective coordination, mentorship, and contribution toward implementing these enriching academic initiatives that promote excellence and innovation.*

Agenda Item No. GB/SRKIT/22/32: Presentation of Financial Summary and Compliance Report — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **Financial Summary and Compliance Report** for the academic year **2024–25**, reaffirming SRK Institute of Technology's commitment to **fiscal discipline, transparency, and responsible financial governance**.

Despite the **non-receipt of full Government fee reimbursements** over the last three academic years, the institution has ensured **uninterrupted academic and administrative functioning** through effective fiscal management and planning.

Key Highlights:

- **ERP-enabled financial systems** ensure real-time tracking, transparency, and accuracy of transactions.
- **Regular internal and statutory audits** conducted in compliance with **UGC, AICTE, and autonomous norms.**
- The **Finance Department** continues to actively pursue pending **Government reimbursement claims**, maintaining financial stability through structured fee collection mechanisms.
- All statutory obligations — including **salary disbursement, maintenance, and academic expenditures** — were met without delay, demonstrating strong financial

prudence.

Resolution No. 32: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the Financial Summary and Compliance Report for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that all financial operations are ERP-integrated, transparent, and compliant with statutory and regulatory frameworks. Despite partial reimbursement delays, the institution continues to operate efficiently and meet all fiscal responsibilities through prudent management.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Finance Department, Accounts Section, and Management for their professionalism, accountability, and effective financial planning. The Body also advised periodic updates on reimbursement recovery and continued audit-based monitoring to sustain fiscal stability and transparency.*

Agenda Item No. GB/SRKIT/22/33: Presentation and Ratification of Audited Financial Statements — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **Audited Financial Statements** of SRK Institute of Technology (Autonomous) for the academic year **2024–25**, reaffirming the institution's commitment to **financial transparency, accountability, and statutory compliance.**

The audited statements — including the **Income and Expenditure Account, Balance Sheet, Cash Flow Statement, and Notes on Accounts** — were prepared and verified by **certified Chartered Accountants** in accordance with recognized accounting standards and institutional financial policies.

Key Highlights:

- The audit provides a comprehensive account of income, **expenditure, capital investments,** and the institution's overall financial health.
- Financial operations fully comply with **UGC, AICTE, and autonomous financial regulations**, reflecting prudence and sound governance.
- The **Finance Committee** reviewed and validated the statements prior to submission, confirming accuracy and integrity.
- All financial documents are securely archived for future statutory audits and inspections.

Resolution No. 33: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) approves and ratifies the Audited Financial Statements for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that the audit was conducted as per statutory accounting standards and institutional financial norms, ensuring full transparency, accuracy, and compliance. It further recommended that a summarized financial overview be periodically shared with the Governing Body to support strategic financial planning and oversight.

Resolution Status: *Approved and Ratified Unanimously.*

**The Governing Body placed on record its appreciation for the Finance Department, Audit Team, and Finance Committee for their diligence, professionalism, and commitment to maintaining fiscal discipline and good governance practices.*

Agenda Item No. GB/SRKIT/22/34: Presentation of Alumni Activity Report — Academic Year 2024–25.

Agenda Note: The Governing Body reviewed the **Alumni Activity Report** for the academic year **2024–25**, reaffirming SRK Institute of Technology's commitment to fostering a strong, active, and globally connected **alumni network** — a cornerstone of institutional growth, reputation, and professional outreach.

The **Registered Alumni Association** continues to function proactively, coordinating regional and national chapters to promote **mentorship, collaboration, and institutional support.**

Key Highlights (2024–25):

- **Annual Alumni Meet:** Successfully conducted on campus, strengthening networking and institutional bonding among graduates.
- **Academic & Professional Contributions:** Alumni actively contributed to **curriculum enhancement, student mentoring, placements, and industry collaborations**, and delivered expert talks and webinars.
- **Institutional Support:** Several alumni extended **philanthropic contributions** toward scholarships, infrastructure, and academic initiatives.
- **Digital Engagement:** The **Alumni Connect Cell**, newsletters, and social media platforms enhanced communication and database management.
- **Recognition:** Distinguished alumni were felicitated for achievements in **academia, industry, and social service**, reinforcing institutional pride.

These initiatives have deepened alumni–institution ties and strengthened SRKIT's **global visibility, student engagement, and industry integration.**

Resolution No. 34: *Resolved that the Governing Body of SRK Institute of Technology (Autonomous) acknowledges and records the Alumni Activity Report for the academic year 2024–25, as presented by the Principal.*

The Governing Body noted that the Alumni Association has played a vital role in promoting mentorship, placements, and institutional advancement through structured

engagement and recognition initiatives.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Governing Body placed on record its appreciation for the Alumni Association, Faculty Coordinators, and Organizing Committees for their dedicated efforts in building a vibrant, supportive, and globally engaged alumni community that contributes meaningfully to the institution's academic and professional ecosystem.*

Agenda Item No. AC/SRKIT/22/35: Report on Student Achievements in National and International Competitive Examinations — Academic Year 2024–25.

Agenda Note: The Council reviewed the report on **student achievements in national and international competitive examinations** during the academic year **2024–25**, reaffirming SRK Institute of Technology's dedication to **academic excellence, mentorship, and global competency development**.

A total of seven **students** qualified in prestigious examinations such as **GATE, GRE, TOEFL, and DUOLINGO**, showcasing strong academic preparation and the institution's effective student support framework.

Department-wise Summary:

- **CSD:** 1 student qualified in GRE
- **CSE:** 2 students in GRE, 1 in TOEFL, 1 in DUOLINGO
- **ECE:** 2 students in TOEFL

These achievements reflect the institution's robust academic ecosystem, consistent faculty mentoring, and the proactive efforts of the **Training & Placement Cell** in organizing **preparatory workshops, mock tests, and guidance sessions** to help students pursue higher education and global career opportunities.

The Principal congratulated the successful students and appreciated the contributions of the faculty mentors, Heads of Departments, and Training & Placement Cell for nurturing a culture of academic ambition and excellence.

Resolution No. 35: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) acknowledges and records the report on Student Achievements in National and International Competitive Examinations for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- Seven students qualified in GATE, GRE, TOEFL, and DUOLINGO examinations, demonstrating academic strength and international readiness.
- Faculty mentoring, preparatory initiatives, and structured guidance programs

contributed to these successful outcomes.

- The Training & Placement Cell played a key role in enhancing student preparedness for national and global opportunities.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

**The Council placed on record its commendation for the qualified students, faculty mentors, and departmental teams for their achievements, and encouraged continued institutional focus on strengthening training programs and fostering global academic excellence.*

Concluding Remarks / Vote of Thanks by the Member Secretary (Principal) (For the Governing Body Meeting)

Respected Chairperson, Hon'ble Members of the Governing Body, University Nominees, and Distinguished Invitees,

As we conclude today's Governing Body Meeting of **SRK Institute of Technology (Autonomous)**, I take this opportunity to express my **deep sense of gratitude and appreciation** to all esteemed members for their invaluable time, insightful deliberations, and continued guidance toward the holistic growth of our institution.

Your thoughtful observations and strategic suggestions during today's meeting have greatly contributed to strengthening our **academic governance, financial discipline, research culture, and institutional development initiatives.** The discussions held and resolutions approved today will serve as a roadmap for our continuous progress and alignment with the **Vision and Mission** of SRKIT.

I wish to place on record my sincere thanks to:

- The **Chairperson of the Governing Body** for leading the proceedings with foresight, wisdom, and vision that continue to inspire all of us.
- The **University Nominees** from JNTUK for their constructive advice and academic guidance ensuring compliance and quality alignment with the affiliating university.
- The **External Experts, Industry Representatives, and Members** for their professional insights, valuable recommendations, and support in shaping institutional strategies.
- The **Management and Administrative Teams** for their continued encouragement and resource support, enabling smooth institutional operations and academic excellence.

On behalf of the entire academic community of SRK Institute of Technology, I assure this esteemed body that all resolutions adopted in today's meeting will be implemented with **utmost sincerity, accountability, and timeliness**, ensuring measurable progress in all

academic and administrative domains.

Our collective vision remains steadfast — to transform SRKIT into a **research-driven, innovation-centered, and globally recognized institution of higher learning**, in full alignment with the **National Education Policy (NEP) 2020** and national quality frameworks.

Once again, I extend my heartfelt thanks to all members for your valuable contributions, continued trust, and constant encouragement in our journey toward institutional excellence.

Thank you all for your gracious presence and for making this meeting truly productive and inspiring.

(Dr. Kookutla Ramesh)

Principal & Member Secretary, Governing Body, SRK Institute of Technology (Autonomous)
Vote of Thanks — 22nd Governing Body Meeting, A.Y. 2025–26.

KNOWLEDGE IS POWER

SRK INSTITUTE OF TECHNOLOGY

VIJAYAWADA

4th ACADEMIC COUNCIL MEETING

07-11-2025

MINUTES OF THE 4th ACADEMIC COUNCIL MEETING

Date: 7th November 2025
Time: 11:00 AM ; **Meeting Adjourned at:** 1:30 PM
Venue: Conference Hall, SRK Institute of Technology, Vijayawada
Chair: Dr. Kookada Ramesh, Principal & Chairman, Academic Council

Academic Council Members:

S.No.	Name	Designation	Role	Signature
1	Dr.K.Ramesh	Principal	Chairman	K. Ramesh
2	Dr .M.H.M. Krishna prasad	Professor of CSE & Director, Academic Planning, JNTUK	JNTUK University Nominees	Attended in online Mode
3	Dr.G.Padmaja Rani	Professor of Physics & Director of Evaluation, JNTUK		Attended in online Mode
4	Dr M. Ramesh	Professor of BiotechnologyJNTUK		Attended in online Mode
5	Dr T Trimurthulu	Retd .Professor, Academician	GB Nominees	Attended in online Mode
6	Mr.T Raghava Prasad	Industrialist		Absent
7	Dr Anil Kumar	Paediatrician		Absent
8	Mr.Ch Narendra Babu	Advocate		Absent
10	Mr.K.Kiran	HOD - CE	Heads of the Departments	K.Kiran
11	Mr.S.Nageswara rao	HOD – EEE		S.Nage
12	Dr P Kishore Kumar	HOD ME		P.Kishore
13	Dr S Sri Gowri	HOD ECE		S. Sri Gowri
14	Dr A.Radhika	HOD - CSE		Radhika
15	Mrs. M Anitha	HOD- MCA		M.Anitha
16	Dr N.Murali Krishna	HOD – S &H		N. M. Krishna
17	Dr B Krishnaiah	HOD MBA		B. Krishnaiah
18	Dr G D K Kishore	HOD – IT		[illegible]

19	Dr D Anusha	HOD - CSE(AI&ML)		
20	Dr G.Srilakshmi	Controller of Examinations		
21	Dr K.Chaitanya	Associate Professor, CSE	Senior Faculty Members	
22	Dr D Ravi Teja	Associate Professor, ECE		
23	Dr.B.Sowjanya	Associate Professor, S &H		
24	Mr.Y.Naga Malleswara Rao	Additional Controller of Examinations		
25	Dr V Sreenivas	HOD - CSE(Data Science)	Member secretary	

Agenda & Deliberations

Agenda Item No. AC/SRKIT/04/01: *Review and Ratification of Resolutions Passed in the Previous Academic Council Meeting.*

Agenda Note: The Council reviewed the resolutions passed in the previous Academic Council meeting to assess their implementation status and effectiveness. It was reported that all resolutions and recommendations have been fully implemented as per the Council's directives, with no pending items. This reflects the institution's commitment to good governance, systematic follow-up, and continuous improvement in academic and administrative processes.

Resolution No. 1: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) approves and ratifies the implementation of all resolutions passed during the previous Academic Council meeting, having verified that all directives have been duly executed and no items remain pending.*

The Council recorded its appreciation for the effective administrative follow-up and the institution's continued commitment to transparency, accountability, and academic excellence.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. GB/SRKIT/04/02: Ratification of Results of Various Examinations Conducted During the Academic Year 2024–25 and Approval of the Provisional Certificate Format

Agenda Note: The Council reviewed the results of various examinations conducted during the academic year 2024–25. All examinations were conducted in accordance with academic regulations, ensuring transparency, fairness, and timely processing. The following examinations were successfully completed and verified:

- II B. Tech I semester (SRK23) Regular Examinations, December -2024(23 admitted batch).
- I B. Tech I semester (SRK23) Regular Examinations, December/January -2024/ 2025(24 admitted batch).
- I B. Tech II semester (SRK23) Supplementary Examinations, December-2024 (23

admitted batch).

- I B. Tech I semester (SRK23) Supplementary Examinations, December-2024 (23 admitted batch).
- M.Tech III semester (SRK23) Regular Examinations, December-2024 (23 admitted batch)
- MBA III semester (SRK23) and IMBA III Semester (SRK23) Regular Examinations, December-2024 (23 admitted batch).
- MCA III semester (SRK23) Regular Examinations, December-2024 (23 admitted batch).
- Revaluation Results of PG III semester (SRK23) Regular Examinations, December-2024 (23 admitted batch).
- Revaluation Results of PG I semester (SRK23) Regular Examinations, January -20 admitted batch).
- M.Tech I semester (SRK23) Regular Examinations, January -2025 (24 admitted batch).
- MBA I semester (SRK23) and IMBA I Semester (SRK23) Regular Examinations, January -2025 (24 admitted batch).
- MCA I semester (SRK23) Regular Examinations, January -2025 (24 admitted batch).
- Revaluation Results of I B. Tech I semester (SRK23) Regular Examinations, January -2025 (24 admitted batch).
- Revaluation Results of II B. Tech I semester (SRK23) Regular Examinations, December-2024 (23 admitted batch).
- Revaluation Results of I B. Tech II sem (SRK23) Supplementary Examinations, January-2025 (2023 admitted batch).
- I B. Tech II semester (SRK23) Regular Examinations, June -2025. (2024Admitted batch)
- I M. Tech II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch)
- MBA II semester (SRK23) and IMBA II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch)
- MCA II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch).
- Results of II B.Tech II semester (SRK23) Regular Examinations, April -2025 (23 admitted batch).
- Results of I B. Tech II semester (SRK23) Regular Examinations, June -2025. (2024 Admitted batch)
- Results of I M. Tech II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch)
- Results of MBA II semester (SRK23) and IMBA II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch)
- Results of MCA II semester (SRK23) Regular Examinations, July-2025 (2024 Admitted batch).
- Results of II B. Tech I Semester supplementary Examinations July-2025 (2023 Admitted batch).
- Results of I B. Tech I Semester supplementary Examinations June/ July-2025 (2023,2024 Admitted batch).
- Revaluation Results of PG IV semester (SRK23) Regular Examinations, January -2025 Admitted batch).

- Revaluation Results Revaluation results of II B. Tech II Semester (SRK23) Regular Examinations May-2025(2023Admitted batch)
- Results of PG IV semester (SRK23) Regular Examinations, May-2025 (23 admitted batch).

Additionally, the finalized *Provisional Certificate (PC)* format prepared by the Examination Cell was presented for approval. The Council recommended that the Provisional Certificate retain the official **JNTUK logo** exactly as displayed on the University's website, including color integrity, and that **RFID security features** be maintained. It was also suggested that the text *"Jawaharlal Nehru Technological University"* be presented in **bold letters** for prominence.

The Principal placed on record appreciation for the Examination Cell and faculty for their exemplary commitment to academic integrity, transparency, and efficiency in examination and result processing.

Resolution No. 2: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) ratifies the results of all examinations conducted during the academic year 2024–25, as detailed above, and approves the finalized Provisional Certificate (PC) format with the recommended specifications regarding the JNTUK logo, color, RFID feature, and bold presentation of the University name.*

The Council recorded its appreciation for the systematic and transparent functioning of the Examination Cell and faculty in upholding academic standards.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/03: *Approval and Ratification of the List of Eligible Candidates for the Issue of Provisional Certificates – Postgraduate Programs (Academic Year 2023–2025).*

Agenda Note: The Council considered the list of eligible candidates for the issue of *Provisional Certificates (PCs)* for all Postgraduate Programs of the institution for the academic year 2023–2025. Based on verification by the Controller of Examinations, **120 students** have successfully completed all academic and examination requirements as per the approved Autonomous Regulations and University norms.

Program-wise Summary of Eligible Candidates:

- M.Tech (CSE): 10 candidates (out of 12 admitted)
- M.Tech (ECE – VLSID): 1 candidate (out of 3 admitted)
- MBA: 53 candidates (out of 61 admitted)
- MCA: 56 candidates (out of 61 admitted)

All candidates have satisfied the prescribed criteria concerning course completion, attendance, and performance evaluation. The eligibility list has been duly vetted and recommended by the Examination Cell.

The Principal expressed appreciation to the Heads of Departments and the Examination Section for their sustained diligence, transparency, and commitment to upholding academic standards in the evaluation and certification process. Upon ratification by the Council, the Controller of Examinations will proceed with issuing the Provisional Certificates to the approved candidates.

Resolution No. 3: *Resolved that the Academic Council of SRK Institute of Technology*

(Autonomous) approves and ratifies the list of 120 eligible candidates for the issue of Provisional Certificates (PCs) pertaining to the Postgraduate Programs for the academic year 2023–2025, as verified and recommended by the Controller of Examinations.

Program-wise Approval:

- M.Tech (CSE): 10 candidates
- M.Tech (ECE – VLSID): 1 candidate
- MBA: 53 candidates
- MCA: 56 candidates

Further, the Council authorized the Controller of Examinations to proceed with the formal issue of the Provisional Certificates to the approved candidates. The Council also recorded its appreciation for the systematic and transparent conduct of the Examination Section and Departments in ensuring academic integrity and timely certification.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/04: *Ratification of Academic Regulations (SRK25) for Postgraduate and Integrated Programs — M.Tech, MBA, IMBA, and MCA.*

Agenda Note: The Council reviewed the *Academic Regulations (SRK25)* framed for the Postgraduate and Integrated Programs — M.Tech, MBA, IMBA, and MCA. These regulations have been carefully developed in line **with the National Education Policy (NEP) 2020**, and the guidelines of **UGC, AICTE, and the affiliating university (JNTUK)**, ensuring full compliance with national standards of academic excellence, flexibility, and outcome-based education.

The revised framework incorporates valuable inputs from faculty members, Boards of Studies, and industry experts, effectively bridging the gap between academic delivery and industry expectations. The regulations comprehensively outline the **credit structure, evaluation procedures, grading system, and progression rules** applicable to each program.

Key highlights include:

- Emphasis on **continuous internal evaluation** for holistic student assessment.
- Integration of **skill-based and multidisciplinary learning** components.
- Introduction of **project-oriented and experiential learning** approaches to promote innovation and employability.

These reforms aim to strengthen the institution's academic governance, transparency, and compliance, while promoting flexibility and learner-centric education. The Principal placed on record appreciation for the Boards of Studies and Academic Committees for their sustained and meticulous efforts in preparing these forward-looking regulations.

Resolution No. 4: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the Academic Regulations (SRK25) for the Postgraduate and Integrated Programs — M.Tech, MBA, IMBA, and MCA — as prepared in accordance with NEP 2020 and the guidelines of UGC, AICTE, and JNTUK.*

These regulations, developed through due consultation with the respective Boards of Studies and Academic Committees, are **adopted for implementation from the Academic Year 2025–26**

onwards.

The Council recorded its appreciation for the diligent and collaborative efforts of the faculty and committees in formulating these **comprehensive, flexible, and industry-relevant** academic regulations that align with NEP 2020 and institutional objectives of academic excellence.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/05: *Ratification of Course Structures for All Academic Programs – B.Tech (SRK23 – 3rd and 4th Year), M.Tech, MBA, MCA, and IMBA under SRK25 Regulations.*

Agenda Note: The Council considered the detailed course structures for all academic programs — **B.Tech (SRK23 – 3rd and 4th Year), M.Tech, MBA, MCA, and IMBA** — formulated under the **SRK25 Academic Regulations** for approval and ratification.

Each course structure has been meticulously developed in accordance with the approved **credit framework and Outcome-Based Education (OBE)** model, ensuring full compliance with **CO–PO–PSO mapping standards** and regulatory norms of **AICTE, UGC, and JNTUK.**

The course structures comprehensively include the following academic components:

- Core Courses and Professional Electives
- Laboratory and Skill Development Courses
- Mini-Projects and Capstone Projects
- Internships and Industry-Oriented Training Modules
- Open and Interdisciplinary Electives for multidisciplinary learning

These elements collectively promote **practical learning, innovation, analytical skills, and industry readiness** among students. The semester-wise design ensures an equitable academic workload, progressive learning outcomes, and balanced integration of theory and practice.

The revised frameworks were finalized after extensive deliberations by the **Boards of Studies (BOS)**, incorporating valuable **inputs from industry experts, alumni, and faculty**, thereby ensuring contemporaneity, employability, and alignment with **NEP 2020 objectives.**

The Principal expressed appreciation to the Heads of Departments, BOS Members, and Faculty Teams for their concerted efforts and academic rigor in developing these comprehensive and forward-looking course structures.

Resolution No. 5: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) approves and ratifies the course structures for all academic programs — B.Tech (SRK23 – 3rd and 4th Year), M.Tech, MBA, MCA, and IMBA — framed and recommended by the respective Boards of Studies under the Academic Regulations (SRK25).*

The Council noted that the course structures are fully aligned with **Outcome-Based Education (OBE) and CO–PO–PSO mapping standards**, ensuring regulatory compliance and fostering **academic flexibility, interdisciplinary learning, and industry relevance.**

The Council recorded its appreciation for the dedicated contributions of the Heads of Departments, BOS Members, and Faculty Teams for preparing these refined and contemporary

academic structures that reflect **clarity, coherence, and commitment to NEP 2020 principles.**

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/06: *Ratification and Approval of Academic Calendars for All Programs — B.Tech, M.Tech, MBA, IMBA, and MCA for the Academic Year 2025–26.*

Agenda Note: The Council reviewed the *Academic Calendars* prepared for all programs — **B.Tech, M.Tech, MBA, IMBA, and MCA** — for the academic year **2025–26**. These calendars have been carefully designed by the **Academic and Examination Committees** in consultation with the **Heads of Departments**, ensuring academic feasibility, inter-departmental coordination, and compliance with the guidelines of **AICTE, UGC, and JNTUK.**

Each Academic Calendar comprehensively outlines:

- Semester schedules and major academic milestones,
- Timelines for internal assessments and end examinations,
- Result declaration and review periods, and
- Institutional activities including holidays, workshops, FDPs, and co-curricular events.

The structured framework promotes **systematic academic management, timely completion of examinations**, and **uniformity across departments.** To enhance accessibility and transparency, the approved calendars are disseminated to all stakeholders through the **ERP portal, official email communications, and departmental notice boards.**

Provision has also been made for **mid-semester review and revisions**, enabling flexibility to accommodate regulatory updates or unforeseen contingencies. The calendars thus serve as a guiding framework for smooth conduct of academic activities, effective departmental coordination, and optimal resource utilization.

Resolution No. 6: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) approves and ratifies the Academic Calendars for all programs — B.Tech, M.Tech, MBA, IMBA, and MCA — for the academic year 2025–26, as prepared and recommended by the Academic and Examination Committees in consultation with the Heads of Departments.*

The Council noted that the calendars have been designed to ensure:

- Strict adherence to academic and examination timelines,
- Compliance with university and statutory body requirements,
- Effective synchronization of academic, co-curricular, and professional development activities, and
- Institutional transparency through systematic communication and monitoring mechanisms.

The Council placed on record its appreciation for the Academic and Examination Committees and all Heads of Departments for their **coordinated, diligent, and structured planning efforts** that contribute to the smooth and efficient functioning of the academic process.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/07: *Ratification of the Boards of Studies (BOS) Proceedings and Resolutions for the Academic Year 2025–26.*

Agenda Note: The Council reviewed the *Boards of Studies (BOS)* proceedings and resolutions of all departments for the academic year **2025–26**. The BOS, being the academic think tanks of the institution, play a vital role in maintaining the quality, relevance, and dynamism of the curricula in tune with emerging academic and industry trends.

During the academic year 2025–26, the following departments conducted their BOS meetings in accordance with institutional norms and academic planning schedules: **Civil, Mechanical, Electrical and Electronics Engineering (EEE), Electronics and Communication Engineering (ECE), Environmental Engineering (EVT), Computer Science and Engineering (CSE), CSE (AI & ML), CSE (Data Science), Information Technology (IT), MCA, MBA, IMBA, M.Tech (CSE, CSM, VLSI), and English.**

Each BOS was constituted with Heads of Departments, senior faculty members, and external experts from academia, industry, and alumni, ensuring comprehensive deliberation and alignment with the latest technological developments, professional expectations, and academic benchmarks.

The BOS meetings primarily focused on:

- Curriculum and syllabus revisions under **SRK25 regulations** to ensure academic contemporaneity,
- Inclusion of new **professional, open, and interdisciplinary electives**,
- Ratification of **paper setters and external examiners**, and
- Recommendations for **research promotion, laboratory modernization**, and **project/capstone evaluation frameworks.**

The following key resolutions were passed and recommended for approval:

1. Approval of revised syllabi for forthcoming semesters under SRK25 Regulations.
2. Inclusion of new electives enhancing flexibility and multidisciplinary exposure.
3. Ratification of the approved panel of paper setters and external examiners.
4. Recommendations for strengthening research culture, laboratory infrastructure, and project evaluation mechanisms.

These resolutions are now placed before the Academic Council for ratification and implementation as part of the institution's continuous quality improvement and academic governance process.

The Principal recorded appreciation to all BOS Chairpersons, members, and external experts for their meaningful contributions to curriculum enrichment, innovation, and academic excellence.

Resolution No. 7: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the proceedings and resolutions of the Boards of Studies (BOS) conducted during the academic year 2025–26 across all departments, namely Civil, Mechanical, EEE, ECE, EVT, CSE, CSE (AI & ML), CSE (Data Science), IT, MCA, MBA, IMBA, M.Tech (CSE, CSM, VLSI), and English.*

The Council noted that all BOS meetings were held in accordance with institutional academic norms, with active participation from faculty, industry representatives, and external experts. The approved resolutions related to **curriculum revision, elective inclusion, examiner ratification, and research and laboratory enhancements** are hereby ratified for implementation from the

forthcoming academic session.

The Council placed on record its appreciation for the **BOS Chairpersons, faculty coordinators, and external experts** for their dedication and valuable contributions to maintaining academic rigor, relevance, and excellence.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/08: *Ratification of the List of Paper Setters Approved by the Boards of Studies (BOS) for All Programs.*

Agenda Note: The Council reviewed the *List of Paper Setters* approved by the respective **Boards of Studies (BOS)** across all departments and academic programs of the institution.

Each BOS has meticulously constituted and recommended a **panel of external subject experts** from reputed academic and professional institutions. The empanelled paper setters have been selected based on their academic qualifications, teaching and evaluation experience, and scholarly contributions, ensuring the highest standards of academic assessment, integrity, and objectivity.

The **selection process** was conducted through a structured and transparent mechanism comprising the following stages:

1. **Preliminary Review:** Proposed names were reviewed and evaluated by each BOS, considering academic credentials, teaching expertise, and professional contributions.
2. **BOS Approval:** Upon approval by the respective BOS, the recommended panel was forwarded to the **Examination Cell** for institutional scrutiny and verification.
3. **Institutional Endorsement:** After due diligence, the Examination Cell finalized the list for implementation. Periodic updates to the panel are made in subsequent BOS meetings to include experts from emerging and interdisciplinary fields.

This process ensures **academic integrity, impartiality, and quality assurance** in question paper setting, aligning with **Outcome-Based Education (OBE)** principles and maintaining consistency with course outcomes (COs), program outcomes (POs), and prescribed syllabus content.

The Principal expressed appreciation to all BOS Chairpersons, members, and the Examination Cell for their diligence and commitment in constituting a credible and competent panel of paper setters that upholds the institution's standards of academic excellence and fairness in evaluation.

Resolution No. 8: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the List of Paper Setters as recommended and approved by the respective Boards of Studies (BOS) for all academic programs and departments.*

The Council noted that the selection process adhered to a **systematic and transparent mechanism**, involving:

- Verification of the academic credentials, teaching experience, and expertise of each proposed paper setter,
- BOS-level scrutiny and formal approval, and
- Final institutional endorsement by the Examination Cell.

The Council further emphasized the importance of **periodic review and updating of the panel**

to incorporate experts from new and emerging domains, thereby ensuring continuous enhancement in the quality, relevance, and fairness of examinations.

The Council recorded its **appreciation** for the collective efforts of the BOS Chairpersons, members, and the Examination Cell for maintaining transparency, academic rigor, and integrity in the paper-setting process.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/09: *Presentation and Ratification of the Comprehensive Result Analysis for All Programs and Departments – Academic Year 2024–25.*

Agenda Note: The Council reviewed the *Comprehensive Result Analysis* of all undergraduate and postgraduate programs for the academic year **2024–25**, presented semester-wise across all departments. This initiative reflects the institution's continued commitment **to data-driven academic evaluation, Outcome-Based Education (OBE)** practices, and **continuous quality improvement.**

Each department conducted a detailed **course-wise and subject-wise performance analysis** to assess student achievement levels, identify trends, and highlight both strengths and areas for enhancement in teaching–learning and assessment methodologies.

Based on these insights, departments have implemented targeted academic interventions, including:

- **Remedial and special classes** for academically weak students.
- **Mentoring and academic counselling sessions** to improve student engagement.
- **Strengthened continuous internal assessment (CIA)** mechanisms, and
- **Innovative pedagogical strategies** to enhance learning outcomes and overall performance.

The analysis also incorporated systematic **CO–PO mapping and evaluation,** ensuring alignment between instructional delivery, intended learning outcomes, and graduate attributes.

To ensure transparency, precision, and scalability, the institution utilized **ERP-based analytical tools** to generate automated reports, performance dashboards, and comparative insights at the course, department, and institutional levels. The **Examination Committee**, after comprehensive verification and validation, has reviewed the consolidated data and now submits the same for the Council's ratification.

The Principal expressed appreciation to the **Examination Cell, Departmental Coordinators, and Faculty Members** for their data-driven approach, academic diligence, and continuous efforts toward improving institutional performance and accountability.

Resolution No. 9: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the comprehensive semester-wise Result Analysis of all Undergraduate and Postgraduate programs for the academic year 2024–25, as reviewed and recommended by the Examination Committee.*

The Council noted that the analysis:

- Was conducted using **ERP-enabled data tools,**

- Included detailed **department-wise and subject-wise performance metrics**,
- Integrated **CO–PO attainment mapping**, and
- Identified areas requiring academic and pedagogical enhancement.

The Council appreciated the remedial and quality-improvement initiatives undertaken by departments and encouraged the continued adoption of **data analytics and OBE-based monitoring** to further strengthen academic quality and learning outcomes. However, the results of 1 year are not satisfactory and hence suggested to conduct remedial classes should be conducted for the slow learners.

The Council placed on record **its commendation** to the Examination Cell, Departmental Coordinators, and Faculty Members for their collective efforts in leveraging analytical insights to promote **transparency, accountability, and academic excellence**.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/10: *Ratification of the List of Students Detained Due to Shortage of Attendance or Non-fulfilment of Academic Credit Requirements – Academic Year 2024–25.*

Agenda Note: The Council reviewed the list of students detained during the academic year **2024–25** due to **shortage of attendance** or **non-fulfilment of academic credit requirements**, as prescribed under the **Autonomous Regulations of** the institution.

In accordance with institutional norms, a minimum of **75% attendance** in each registered course is mandatory for eligibility to appear in the end-semester examinations. Upon detailed verification by the **Examination Cell** in coordination with the **Heads of Departments**, the following detentions were identified:

- **33 Undergraduate (B.Tech) students** – detained due to shortage of attendance.
- **17 Postgraduate (PG) students** – detained due to shortage of attendance.

It was noted with satisfaction that **no student was detained due to academic credit deficiency**, indicating a positive trend of improved academic engagement and performance across programs.

To assist students who faced attendance-related challenges, the institution **implemented a range of student-support initiatives**, including:

- Regular **academic counseling and mentorship sessions**,
- **ERP-based attendance monitoring** for real-time tracking,
- **Special and extra classes** to help students recover shortfall, and
- **Re-registration provisions** to ensure academic continuity in subsequent semesters.

The verified list of detained students, reviewed and endorsed by **the Examination Cell** and **Departmental Academic Committees**, is now placed before the Academic Council for formal ratification. This transparent and rule-based process underscores the institution's commitment to **academic discipline, accountability, and governance integrity**.

Resolution No. 10: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the list of students detained during the academic year 2024–25 due to shortage of attendance, as verified and recommended by the Examination Cell*

and the respective Heads of Departments.

The Council noted that:

- **33 B.Tech students** and **17 PG students** were detained due to attendance shortage.
- **No student** was detained due to academic credit deficiency, reflecting improved academic consistency and engagement.

The Council appreciated the **student-support mechanisms** implemented by the institution — particularly mentoring, attendance tracking through ERP, and re-registration provisions — to promote academic recovery and persistence.

Further, the Council reaffirmed the importance of **strict compliance with attendance and credit requirements** to uphold institutional discipline, fairness, and academic quality within the autonomous framework.

The Council placed on record its **commendation** to the Examination Cell, Heads of Departments, and Faculty Advisors for their meticulous verification, transparency, and commitment to maintaining academic rigor.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/11: *Report and Ratification of Malpractice Cases and Disciplinary Actions Taken During Examinations Conducted Under SRK23 Regulations — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **examination malpractice cases** and **disciplinary actions** taken during the examinations conducted under the **SRK23 Regulations** for the academic year **2024–25**.

It was noted with satisfaction that instances of malpractice remained **minimal**, reflecting the growing culture **of academic honesty, responsibility, and ethical conduct** among students.

During the academic year, a total of **14 cases** of examination malpractice were reported, categorized as follows:

- **1 case** during the *II B.Tech I Semester Examinations*, and
- **13 cases** reported across other semester examinations conducted during the year.

Each case was **independently investigated** by the **Examination Cell** in coordination with the **Malpractice and Disciplinary Committee**, following a transparent and well-defined process as per institutional norms. Based on the nature and gravity of the violations, appropriate disciplinary actions were taken, which included:

- **Written warnings** for minor offenses,
- **Cancellation of examinations** for proven cases of malpractice, and
- **Referrals to higher disciplinary committees** for serious or repeat violations.

To further strengthen examination integrity and prevent recurrence, the institution has proactively implemented several **preventive and awareness initiatives**, such as:

- Awareness programs and circulars on **academic integrity and ethical conduct**,

- **Enhanced vigilance** through invigilator orientation and sensitization,
- **CCTV surveillance** and random inspections during examinations, and
- Strict enforcement of the **Examination Discipline and Anti-Malpractice Regulations**.

The Examination Cell and the Malpractice Committee have verified, documented, and closed all reported cases in accordance with due process. The compiled report is now presented before the Academic Council for formal consideration and ratification.

Resolution No. 11: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the report on malpractice cases and disciplinary actions taken during the examinations conducted under SRK23 Regulations for the academic year 2024–25, as reviewed and recommended by the Examination Cell and the Malpractice & Disciplinary Committee.*

The Council noted that:

- A total of **14 cases** were reported (including **1 case** during II B.Tech I Semester Examinations and **13 cases** in other examinations).
- All cases were **investigated and adjudicated fairly** following due procedure, with actions proportionate to the severity of the offenses.
- Preventive measures — including **CCTV monitoring, enhanced Invigilation**, and **student sensitization programs** — have been effective in reducing malpractice incidents.

The Council appreciated the **Examination Cell** and the **Malpractice & Disciplinary Committee** for their **fair, transparent, and consistent handling** of all reported cases and for upholding the **integrity, credibility, and ethical standards** of the institution's examination system.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/12: *Ratification of the List of Students Readmitted and Re-registered During the Academic Year 2024–25 Under SRK23 and JNTUK Regulations.*

Agenda Note: The Council reviewed the list of students **readmitted and re-registered** during the academic year **2024–25** under both the **SRK23 Autonomous Regulations** and the **JNTUK Regulations**.

During the year, a total of **twelve (12) students** were readmitted as follows:

- **Six (6) students** under SRK23 Regulations, and
- **Six (6) students** under JNTUK Regulations.

All readmissions were processed with **due diligence**, adhering strictly to institutional policies, autonomous norms, and the guidelines prescribed by the affiliating university (**JNTUK**).

The primary reasons for readmission included:

- Non-completion of required credits or academic backlogs,
- Medical or health-related reasons,
- Long-term absence, and

- Temporary discontinuation due to personal or financial circumstances.

Each case was **thoroughly examined and recommended** by the Academic Committee after verifying:

- The student's **academic standing and eligibility**,
- **Regulatory compliance** as per applicable norms, and
- **Credit mapping and course equivalency** to ensure academic consistency.

To support the smooth reintegration of these students, the institution implemented several supportive measures, including:

- Personalized **academic counseling and orientation**,
- **Remedial classes** for missed or uncompleted courses, and
- **Faculty mentorship and continuous progress monitoring** through departmental advisors.

All readmission records, approvals, course mappings, and eligibility details have been meticulously documented and integrated into the **ERP-based student information system** to maintain transparency and traceability.

The verified list of readmitted and re-registered students is now placed before the Academic Council for formal ratification.

Resolution No. 12: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the list of students readmitted and re-registered during the academic year 2024-25 under both the SRK23 Autonomous Regulations and the JNTUK Regulations, as verified and recommended by the Academic Committee and the Examination Cell.*

The Council noted that:

- A total of **12 students** were readmitted — **6 under SRK23 and 6 under JNTUK Regulations.**
- All readmissions were executed in **compliance with institutional and university norms**, ensuring fairness, transparency, and academic continuity.
- Each case was **documented, verified, and recorded** in the ERP system to maintain accountability and accessibility.

The Council commended the institution's proactive efforts in providing **academic and psychological support mechanisms**, including mentoring, remedial instruction, and performance tracking, to ensure the effective reintegration of readmitted students into regular academic progress.

The Council reaffirmed that the **readmission and re-registration process** shall continue with the same **rigor, documentation integrity, and regulatory compliance** under both the autonomous and affiliating university frameworks.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/13: *Presentation and Ratification of Student Activities*

Conducted During the Academic Year 2024 -25.

Agenda Note: The Council reviewed the comprehensive report on **student activities** organized during the academic year **2024–25**, reflecting the institution's strong commitment to fostering a **vibrant, inclusive, and holistic learning ecosystem** in line with the objectives of the **National Education Policy (NEP) 2020**.

During the period under review, a **total of 126 programs and events** were successfully conducted across all departments, emphasizing **academic enrichment, innovation, skill development, and all-round student growth.**

The activities broadly encompassed the following categories:

- **Technical and Innovation Events:** Technical fests, hackathons, coding and project competitions, paper presentations, and innovation challenges promoting creativity, collaboration, and technical excellence.
- **Skill Development Initiatives:** Expert lectures, workshops, industry training programs, and research-oriented seminars designed to strengthen employability, analytical thinking, and problem-solving skills.
- **Sports and Cultural Activities:** Inter-departmental tournaments, cultural festivals, talent shows, and annual day celebrations encouraging teamwork, leadership, and physical well-being.
- **Community and Social Outreach:** NSS activities, blood donation drives, environmental campaigns, and social awareness programs nurturing civic sense, empathy, and social responsibility.

These initiatives have significantly contributed to enhancing **student engagement, leadership skills, personality development, and professional readiness**, aligning with the institution's mission to provide holistic education.

The Principal recorded deep appreciation to the **Heads of Departments, faculty coordinators, and student leadership teams** for their enthusiastic participation, creative execution, and commitment to upholding institutional values and community spirit.

The detailed report on student activities for 2024–25 is now placed before the Academic Council for formal review and ratification.

Resolution No. 13: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the report on student activities conducted during the academic year 2024–25, encompassing academic, technical, co-curricular, extracurricular, and community engagement initiatives.*

The Council noted that:

- A total of **126 programs and events** were organized across departments during the year.
- These activities effectively advanced **academic excellence, innovation, teamwork, physical well-being, and social responsibility** among students.
- The initiatives are consistent with the institution's vision for **holistic development** and align with the **NEP 2020 framework**, which emphasizes multidimensional and experiential learning.

The Council placed on record its **appreciation** for the outstanding efforts of the faculty coordinators, Heads of Departments, and student organizers for their planning, dedication, and successful execution of these diverse and enriching programs.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/14: *Presentation and Ratification of Placement Statistics and Student Achievements — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **Placement Statistics and Student Achievements** for the academic year **2024–25**, which underscores the institution's commitment to producing **industry-ready, competent, and employable graduates.**

Through the concerted efforts of the **Training and Placement Cell (TPC)**, strong **industry collaborations**, and focused **career-readiness and skill development initiatives**, SRK Institute of Technology achieved remarkable placement outcomes during the year.

Key Highlights of Placement Performance:

- Over **40 reputed companies** from both core and IT sectors participated in on-campus recruitment drives.
- A total of **507 students** were successfully placed across **41 organizations**, recording an **overall placement rate of 67.42%**.
- The **highest salary package** offered was **₹6.25 LPA (Infosys)**, while the **average package** stood at **₹3.2 LPA**, indicating steady improvement in both placement quality and compensation benchmarks.
- Prominent recruiters included **Infosys, TCS, Cognizant, Accenture, Genpact, Virtusa**, and other leading organizations — reaffirming sustained **employer confidence** in the institution's graduates.

Beyond placements, students demonstrated **outstanding achievements** in various domains:

- **National-level hackathons**, innovation challenges, technical paper presentations, and conferences, showcasing creativity and problem-solving excellence.
- Recognition **in sports, cultural, and community events**, along with **merit-based scholarships**, reflecting the institution's success in promoting holistic development in line with the **National Education Policy (NEP) 2020**.
- The **Alumni Mentoring Program** and **career guidance sessions** have significantly enhanced student awareness, employability skills, and professional confidence.

The Principal expressed appreciation to the **Training and Placement Cell, faculty coordinators**, and **alumni mentors** for their strategic planning, dedication, and efforts that contributed to this year's exceptional results. Congratulations were also extended to all placed students for bringing distinction and pride to the institution.

The report is now placed before the Academic Council for formal review and ratification.

Resolution No. 14: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the Placement Statistics and Student Achievements report for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- A total of **507 students** were placed across **41 reputed organizations**, achieving a **67.42% placement rate**.
- The **highest package** offered was **₹6.25 LPA**, with an **average package** of **₹3.2 LPA**.
- The institution continues to maintain strong and trusted **industry linkages** with leading employers.
- Students attained **national recognition** through participation and success in hackathons, innovation contests, research forums, and technical symposiums, along with notable performances in sports and cultural activities.

The Council appreciated the efforts of the **Training and Placement Cell, faculty placement coordinators, and alumni mentors** for fostering an effective **industry-academia ecosystem**, promoting employability, and nurturing professional excellence among students.

The Council also encouraged continued strengthening of **career development programs, entrepreneurship initiatives, and industry collaborations** to further enhance student innovation and employability outcomes.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/15: *Report on Anti-Ragging Measures and Grievance Redressal Mechanisms — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **Anti-Ragging Measures** and **Grievance Redressal Mechanisms** implemented during the academic year **2024–25** at SRK Institute of Technology (Autonomous). The institution continues to uphold a **zero-tolerance policy toward ragging**, ensuring **a safe, inclusive, and student-centric campus environment** in strict adherence to **UGC and AICTE anti-ragging regulations**.

It is noteworthy that **no incidents of ragging were reported** during the academic year, a reflection of the sustained discipline, mutual respect, and heightened awareness among students, as well as the vigilant efforts of faculty and administrative teams.

To maintain this positive culture, the institution undertook multiple preventive and monitoring initiatives, including:

- **Regular monitoring and inspections** by the *Anti-Ragging Squad* in hostels, classrooms, and public spaces.
- **Orientation and awareness programs** for first-year students and parents at the beginning of the academic year.
- Prominent **anti-ragging displays** and digital communication campaigns across the campus.
- **24×7 helpline and online complaint registration system** ensuring accessibility and prompt response.

In parallel, the **Grievance Redressal Cell**, operating under the direct supervision of the Principal, continued to function as a **confidential, empathetic, and responsive platform** for addressing student concerns related to academics, administration, hostels, or personal welfare.

All grievances received were duly examined and resolved with fairness, documentation, and

sensitivity, ensuring transparency and accountability throughout the process.

Additionally, regular **counseling sessions, workshops, and awareness programs** on emotional well-being and ethical conduct have contributed to reinforcing a culture of **respect, inclusion, and positive peer interaction**.

The record of *zero ragging cases* during the academic year stands as a strong testament to SRKIT's **preventive vigilance, ethical governance, and student-centered ethos**.

The Principal expressed appreciation to the **Anti-Ragging Committee, Grievance Redressal Cell, faculty coordinators, hostel wardens**, and **student volunteers** for their collective commitment to maintaining campus safety, discipline, and mutual respect.

Resolution No. 15: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the report on Anti-Ragging Measures and Grievance Redressal Mechanisms for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- **No ragging incidents** were reported during the academic year, indicating the effectiveness of institutional monitoring and preventive mechanisms.
- **The Anti-Ragging Committee and Squad** have functioned proactively in compliance with **UGC and AICTE guidelines**, through systematic inspections, vigilance, and student sensitization programs.
- The **Grievance Redressal Cell** continues to provide a **fair, confidential, and empathetic platform** for resolving student concerns related to academics, administration, and welfare.
- **Regular counseling and awareness programs** have reinforced emotional well-being, peer cooperation, and campus harmony.

The Council placed on record its **commendation** for the institution's unwavering commitment to maintaining a **ragging-free, safe, and student-friendly environment** and encouraged continued emphasis on **preventive vigilance, empathy, and awareness-based engagement** in all future academic sessions.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/16: *Report on Infrastructure Development and Up gradation Initiatives Implemented During the Academic Year 2024–25.*

Agenda Note: The Council reviewed the detailed report on **infrastructure development and up gradation initiatives** undertaken during the academic year **2024–25**, reflecting SRK Institute of Technology's continued commitment to **academic excellence, sustainability, and student-centered growth.**

During the year, the institution implemented several strategic initiatives to strengthen **academic, digital, and physical infrastructure**, thereby creating a **technology-enabled, sustainable, and future-ready learning environment.**

Key Developments and Upgrades

1. Academic Infrastructure:

- Classrooms were modernized with **smart boards, multimedia projectors, and digital learning tools**, promoting interactive and technology-integrated pedagogy.
- **Laboratories** across all departments were upgraded with **advanced equipment, testing instruments, and licensed software**, supporting innovation and research.
- A new **DMF Laboratory** was established in the *EVT* Department to enhance hands-on exposure to environmental and mining applications.
- **140 new high-performance computer systems** were installed in the *CSE (AI & ML)* and *CSE (Data Science)* departments, strengthening computational and data analytics infrastructure.
- Implementation of the **Microsoft Campus Agreement** has facilitated cloud-based learning, digital collaboration, and seamless access to research applications for both students and faculty.

2. Library and ICT Upgradation:

- The **Central Library** was expanded with additional **e-books, digital journals, and international databases**, ensuring global academic access.
- **Campus-wide ICT infrastructure** has been upgraded through high-speed internet connectivity, ERP system integration, and extended Wi-Fi coverage, improving digital access and academic efficiency.

3. Student Amenities and Campus Facilities:

- **Hostel, cafeteria, and student amenities** were refurbished to improve comfort, hygiene, and accessibility.
- **Green campus initiatives** such as *rainwater harvesting, solid waste management systems*, and *tree plantation drives* were implemented, reinforcing environmental sustainability.
- **Sports, recreation, and cultural facilities** were expanded and upgraded to promote holistic student growth.
- Enhanced **safety and security measures**, including **CCTV surveillance, fire safety systems, and biometric access controls**, have strengthened campus vigilance and overall safety.

These developments highlight the **visionary leadership of the Management** and the **dedicated contributions of administrative, technical, and support teams**, reaffirming SRKIT's transformation into a modern, sustainable, and student-focused institution.

The comprehensive report on infrastructure enhancement for the academic year 2024–25 is placed before the Council for formal acknowledgment and record.

Resolution No. 16: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and places on record its appreciation for the infrastructure enhancement and modernization initiatives undertaken during the academic year 2024–25, as presented by the Principal.*

The Council noted that significant progress has been achieved in:

- Upgrading **academic and laboratory facilities** with modern technology and smart learning tools,
- Enhancing **ICT, ERP, and digital learning systems**,
- Expanding **library resources** with global digital access,
- Strengthening **student amenities, hostel facilities, and safety systems**, and
- Advancing **green campus initiatives** and sustainable development practices.

The Council recorded its **appreciation to the Management, Administrative, and Technical Teams** for their visionary planning, dedicated implementation, and commitment toward developing a **technology-driven, eco-conscious, and learner-centric campus** that promotes academic excellence and student well-being. However, suggested to get EAT RIGHT CAMPUS certification from FSSAI and further improvement towards **Green campus initiatives.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/17: *Presentation and Acknowledgment of Faculty Profiles, Qualifications, Achievements, and Academic Contributions.*

Agenda Note: The Council reviewed the report on the **faculty profiles, qualifications, achievements, and academic contributions** across all departments for the academic year **2024–25**. Faculty members remain the cornerstone of SRK Institute of Technology's academic excellence, research advancement, and institutional reputation.

The institution continues to maintain **a strong and diverse faculty base** comprising Professors, Associate Professors, and Assistant Professors, many of whom hold **Ph.D. degrees** and actively contribute to research, consultancy, innovation, and student mentorship.

Key Highlights:

- Faculty possess extensive **teaching, research, and industry experience**, fostering effective and skill-oriented learning.
- Numerous publications in **reputed national and international journals**, along with **patents, funded projects, and research grants**, demonstrate strong research engagement.
- Several **faculty** members received **promotions, awards, and recognitions** for academic excellence and professional service.
- Active participation in **FDPs, workshops, and training programs** ensures continuous professional growth and alignment with emerging pedagogies and technologies.
- Sustained **industry–academia collaborations** through guest lectures, consultancy, and research partnerships enrich practical learning outcomes.
- Faculty continue to mentor students, guide projects, and coordinate technical clubs and co-curricular activities, contributing to holistic student development.

The Council also noted the record of faculty promotions and recognitions conferred during the year, reflecting dedication and commitment to institutional and academic growth. The updated faculty database and contributions report were placed for acknowledgment.

Resolution No. 17: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and places on record its appreciation for the faculty members for their qualifications, professional achievements, and academic contributions during*

the academic year 2024–25.

The Council noted that:

- The faculty strength comprises **highly qualified and experienced members,** including many with doctoral and research credentials.
- Faculty have made significant contributions to **research, publications, patents, and funded projects.**
- **Continuous professional development** through FDPs, industry interactions, and academic collaborations is actively promoted.
- Faculty engagement in **mentorship, innovation, and societal outreach** has strengthened the institution's academic ecosystem.

The Council extended its **congratulations to faculty members who received promotions and recognitions** and commended their dedication to teaching, research, and innovation. It also appreciated the **Management, Principal, and Heads of Departments** for their consistent support in nurturing a culture of academic excellence and faculty development.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/18: *Presentation and Ratification of the Faculty Ratification Report for the Academic Year 2024–25.*

Agenda Note: The Council reviewed the **Faculty Ratification Report** for the academic year **2024–25**, as formally approved by the affiliating university – **Jawaharlal Nehru Technological University, Kakinada (JNTUK).**

Out of **196 faculty members** presently serving across various departments, a total of **121 faculty members** — including **Professors, Associate Professors, and Assistant Professors** — have been successfully **ratified by JNTUK** during this academic year.

The ratification process was carried out in **strict compliance with JNTUK norms and AICTE guidelines**, ensuring that all ratified faculty members possess the requisite **qualifications, experience, and eligibility** as prescribed under statutory and regulatory standards.

This ratification reflects the institution's **commitment to academic excellence, transparency, and statutory compliance**, as well as the **Management's continued support** for faculty development, recruitment, and professional advancement.

The Principal expressed appreciation to the **Heads of Departments** and the **Academic Audit Committee** for their diligence in compiling documentation, verifying credentials, and coordinating the submission of proposals to the university in a timely manner.

Upon approval by the Council, the ratified list will be officially **recorded, circulated, and archived** for institutional reference and governance documentation. The Principal also placed on record his appreciation for all **faculty members** – both ratified and awaiting ratification — for their **dedication, academic contributions, and commitment** to enhancing the institution's reputation and student outcomes.

Resolution No. 18: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the Faculty Ratification Report for the academic year*

2024–25, as approved by JNTUK, Kakinada, and presented by the Principal.

The Council noted that:

- Out of **196 faculty members, 121** have been ratified by JNTUK in accordance with **AICTE and university norms**.
- All ratified faculty meet the **prescribed eligibility, qualification, and experience requirements** as per statutory standards.
- The ratification process was **transparent, thorough, and timely**, reflecting institutional adherence to regulatory and quality assurance frameworks.

The Council placed on record its **appreciation** for the **Heads of Departments, Academic Audit Committee, and Administrative Staff** for their coordinated efforts in ensuring the smooth execution of the ratification process.

The Council also extended its **commendation** to all faculty members — both ratified and awaiting ratification — for their **dedication to teaching, research, and institutional development**, thereby strengthening SRK Institute of Technology's academic standing and professional excellence.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/19: *Report on Faculty Relieved During the Academic Year 2024–25 and Status of Faculty Recruitment.*

Agenda Note: The Council reviewed the report on **faculty members relieved** during the academic year **2024–25** and the corresponding **status of faculty recruitment** across all departments.

During this period, a total of **22 faculty members** from various departments were relieved from their duties owing to **resignation, retirement, pursuit of higher studies, or career advancement opportunities.** All separations were executed **in** full compliance with the **institutional service rules and HR policies**, ensuring the completion of all required formalities, including:

- Submission of all required documentation **and no-due certificates**,
- **Proper handover** of academic and administrative responsibilities, and
- Completion of **exit clearance procedures** at both departmental and institutional levels.

While these departures caused a short-term operational impact, the **Heads of Departments** effectively managed the redistribution of academic and administrative responsibilities to ensure **uninterrupted teaching and academic continuity.**

In parallel, the **faculty recruitment process** has been initiated to **fill** all vacant positions, adhering strictly to **AICTE norms, JNTUK guidelines, and institutional recruitment policies.** The selection process emphasizes transparency, merit, and qualification-based evaluation to maintain the quality and strength of the teaching staff.

All records related to relieved faculty, exit formalities, and recruitment progress have been properly **documented and archived** for institutional records and regulatory compliance.

The Principal placed on record his **appreciation and gratitude** to all outgoing faculty members

for their dedicated service, teaching excellence, and valuable contributions to the institution's growth and academic mission.

Resolution No. 19: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on faculty members relieved during the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- A total of **22 faculty members** across various departments have been relieved due to **resignation, retirement, higher education, or career progression.**
- All exits were processed as per **institutional norms and procedures**, with completion of documentation, handover, and clearance processes.
- **Heads of Departments** have efficiently managed temporary workload adjustments to ensure **academic continuity** and smooth departmental functioning.
- The **recruitment process** to fill the vacant faculty positions has been initiated and completed, ensuring adherence to **AICTE norms, university guidelines,** and institutional quality standards.

The Council placed on record its **appreciation for the outgoing faculty members** for their dedication, professionalism, and contributions to teaching, research, and institutional development.

The Council further advised the administration to **expedite the recruitment process** to fill all sanctioned posts at the earliest, ensuring academic continuity, regulatory compliance, and sustained excellence in teaching and learning.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/20: *Report on Faculty Development Programs (FDPs), Workshops, and Skill Enhancement Initiatives Conducted and Attended During the Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **Faculty Development Programs (FDPs), Workshops,** and **Skill Enhancement Initiatives** organized and attended during the academic year **2024–25**. These initiatives reflect SRK Institute of Technology's steadfast commitment to **faculty empowerment, academic excellence, and continuous professional development** in alignment with its vision of fostering **outcome-based, research-driven, and industry-oriented education.**

During the reporting period:

- **71 faculty members** actively participated in *national and international FDPs, workshops, and training programs* organized by reputed institutions and professional bodies.
- The institution itself organized **37 in-house FDPs and training sessions** across departments, focusing on current academic, research, and technological advancements.

Key Thematic Focus Areas:

- Artificial Intelligence, Machine Learning, and Data Science
- Internet of Things (IoT) and Industry 4.0 Applications

- Renewable Energy Systems and Sustainability
- Research Methodology, Patenting, and Academic Writing
- Pedagogical and Assessment Innovations under the Outcome-Based Education (OBE) Framework

Many of these programs were conducted in collaboration with **IITs, NITs, AICTE-ATAL Academies, ISTE, IEEE, CSI**, and other professional organizations, enabling faculty to access **cutting-edge knowledge, global best practices, and networking opportunities.**

The institution's internal FDPs further strengthened **peer learning, interdisciplinary collaboration, and academic exchange**, fostering a culture of innovation and continuous improvement.

These initiatives have significantly contributed to:

- **Enhanced teaching quality and pedagogical innovation,**
- **Improved research productivity and publication outcomes,**
- **Strengthened industry linkages and applied learning**, and
- **Continuous enhancement of OBE implementation and student learning outcomes.**

All FDPs and workshops have been meticulously documented in **faculty portfolios, departmental reports, and institutional quality assurance records** to ensure traceability for **NAAC, NBA, and internal quality audits.**

The Principal conveyed appreciation to the **Heads of Departments, FDP Coordinators, and Faculty Members** for their enthusiasm, participation, and commitment to professional growth and lifelong learning.

Resolution No. 20: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Faculty Development Programs (FDPs), Workshops, and Skill Enhancement Initiatives conducted and attended during the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- **71 faculty members** participated in external FDPs and training programs, and **37 in-house FDPs/workshops** were organized institutionally.
- The programs addressed **emerging technologies, pedagogical innovation, research enhancement, and OBE-based learning improvement.**
- Many of these were organized in collaboration with **national-level institutions and professional bodies**, ensuring high-quality exposure and impact.
- The outcomes have directly contributed to **teaching excellence, research engagement, and academic innovation** across departments.

The Council placed on record **its appreciation** to the **Heads of Departments, FDP Coordinators, and Faculty Members** for their proactive participation and dedication to **continuous professional development**, reaffirming SRKIT's commitment to **faculty empowerment, academic leadership, and institutional growth.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/21: *Report on Research and Development (R&D) Activities and Initiatives – Academic Year 2024-25.*

Agenda Note: The Council reviewed the report on **Research and Development (R&D) activities and initiatives** undertaken during the academic year **2024–25**, reflecting SRK Institute of Technology's sustained progress toward becoming a **research-driven, innovation-oriented, and socially relevant institution.**

The **R&D Cell** continues to function as the central coordinating body for promoting research, innovation, consultancy, and academic collaborations across departments. Faculty and students are encouraged to pursue research addressing **emerging technologies, sustainable development goals (SDGs), and real-world societal challenges,** thereby nurturing a purposeful and interdisciplinary research culture.

Key Highlights of R&D Activities (2024–25):

- **Funded Project Proposals:** Several research proposals were prepared and submitted to **AICTE, DST, UGC, ANRF**, and industry sponsors, demonstrating growing engagement in externally funded research.
- **Interdisciplinary Research Clusters:** Research groups have been established to promote collaboration across departments in thrust areas such as **Artificial Intelligence, Data Science, Renewable Energy, Sustainable Infrastructure, and IoT applications.**
- **Publications and Patents:** Faculty and students have contributed significantly through **Scopus/SCI-indexed publications, patent filings, and prototype developments**, reflecting tangible research progress.
- **Collaborations and Consultancy:** Strengthened **academia–industry partnerships** and collaborative research initiatives have expanded consultancy activities and professional linkages.
- **Institutional Support:** The Management's **research incentive schemes** and **seed funding programs** have encouraged faculty and student teams to initiate innovative and applied research projects.

These initiatives collectively reinforce SRKIT's mission to foster **knowledge creation, innovation, and societal relevance**, positioning the institution as a center of academic excellence and applied research impact.

The Principal conveyed appreciation to the **R&D Cell coordinators, faculty researchers, and student innovators** for their contributions and urged continued emphasis on interdisciplinary, impactful, and industry-linked research.

Resolution No. 21: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Research and Development (R&D) Activities and Initiatives undertaken during the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- The **R&D Cell** continues to function effectively as the central hub for **research, innovation, consultancy, and academic collaboration.**
- **Funded project proposals** have been submitted to **AICTE, DST, UGC, ANRF**, and other agencies, indicating increased research participation.

- **Publications in Scopus/SCI journals**, **patent filings**, and **prototype developments** reflect substantial research output.
- Strengthened **industry and academic collaborations** have enhanced the institution's research relevance and visibility.
- **Institutional incentives and seed funding** continue to motivate and support faculty-led innovation and applied research.

The Council placed on record **its appreciation** for the proactive role of the **R&D Cell, faculty researchers, and student innovators** in cultivating a vibrant and productive research ecosystem, and encouraged continued emphasis on **applied, interdisciplinary, and impactful research initiatives. However, suggested to publish papers in SCI.SCOPUS and WOS Journals.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/22: *Report on Recognized Research Centers and Ongoing Research Initiatives – Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on the **recognized Research Centers** and ongoing **research initiatives** at SRK Institute of Technology, marking a significant milestone in the institution's journey toward becoming a **research-driven and innovation-focused autonomous institution.**

The institution currently hosts **two university-recognized Research Centers**, approved by **Jawaharlal Nehru Technological University, Kakinada (JNTUK):**

1. **Research Center in Computer Science and Engineering (CSE)**
2. **Research Center in Electronics and Communication Engineering (ECE)**

These recognitions represent a major institutional achievement, underscoring SRKIT's commitment to **advanced research, interdisciplinary collaboration, and global knowledge creation.**

The **allocation of Ph.D. research scholars** by JNTUK is currently in progress, and full-scale research activities are set to begin in the upcoming academic cycle. The identified research domains are closely aligned with global priorities and national developmental goals, focusing on:

- Artificial Intelligence and Machine Learning
- Internet of Things (IoT) and Smart Systems
- Renewable Energy and Sustainable Technologies
- Advanced Communication Systems
- Data Analytics and Intelligent Computing

The **R&D Cell** continues to play a pivotal role in driving research and innovation through:

- Interdepartmental and inter-institutional collaborations,
- Funded projects and consultancy services,
- Industry partnerships and technology transfer initiatives, and
- Research capacity-building through FDPs, workshops, and conferences.

Institutional management has provided robust support through:

- **Seed funding and research incentives,**

- **Patent filing and publication assistance**, and
- **Infrastructure development for research laboratories and digital resources.**

Regular **national-level FDPs, workshops, and conferences** have been conducted to foster interdisciplinary collaboration, encourage faculty–student research teams, and ensure the **societal and industrial relevance** of research outcomes.

The establishment of these Research Centers marks a defining phase in SRKIT's evolution from a **teaching-centered institution to a research-driven center of excellence**, fully aligned with the **National Education Policy (NEP) 2020** and national innovation missions.

The Principal conveyed deep appreciation to the **Research Supervisors, Faculty Coordinators, R&D Cell members, and Department Heads** for their vision, dedication, and contributions in nurturing a vibrant research ecosystem.

Resolution No. 22: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the establishment of two recognized Research Centers in Computer Science and Engineering (CSE) and Electronics and Communication Engineering (ECE) — as approved by JNTUK, Kakinada, and the ongoing research initiatives undertaken under their purview.*

The Council noted that:

- The establishment of these Research Centers represents a **major institutional milestone**, positioning SRKIT as a **research-focused, innovation-oriented academic hub.**
- **Ph.D. scholar allocation** by JNTUK is in progress, with thematic research areas including **AI, IoT, Renewable Energy, Sustainable Technologies, and Data Analytics.**
- The **R&D Cell** continues to effectively facilitate **funded projects, collaborations, consultancy work, and patent initiatives**, supported by **institutional seed funding and incentives.**
- The institution regularly conducts **FDPs, workshops, and conferences** to promote interdisciplinary research, capacity building, and societal impact.

The Council placed on record its **commendation** for the efforts of the **R&D Cell, Research Supervisors, Faculty Coordinators, and Department Heads** in fostering a dynamic and sustainable research ecosystem consistent with the **NEP 2020 framework** and national research priorities.

The Council further resolved to **extend continued institutional support** for expanding research centers, strengthening infrastructure, and pursuing additional **recognitions from funding agencies and regulatory bodies.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/23: *Report on Salary Disbursements and Financial Compliance for Teaching and Non-Teaching Staff — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **salary disbursements and financial compliance** for the teaching and non-teaching **staff of** SRK Institute of Technology during the academic year **2024–25**. The report highlights the institution's consistent commitment to **financial discipline, transparency, and employee welfare.**

All salary payments were **disbursed promptly and without delay**, ensuring staff satisfaction and operational stability. Payments were executed through **direct bank transfers** using the institution's **ERP-integrated online payroll management system**, ensuring **accuracy, accountability, and secure digital record-keeping.**

The salary framework includes:

- **Basic Pay, House Rent Allowance (HRA), and Dearness Allowance (DA),**
- **Performance-based incentives and Provident Fund (PF) contributions,** and
- **Statutory deductions in** accordance with government and institutional norms.

The structure adheres fully to **UGC and AICTE pay scales** and aligns with the institution's **approved service rules.**

For the academic year 2024–25, **the total salary disbursement** stood at:

- **Teaching Staff:** ₹7,28,51,803
- **Non-Teaching Staff:** ₹1,99,86,809

All payroll-related data — including salary slips, tax deductions, PF details, and annual statements — are maintained digitally and made accessible to employees via the **ERP portal.** Queries or grievances regarding salary or benefits are promptly addressed by the **HR and Accounts Departments**, ensuring effective communication and employee satisfaction.

Periodic **internal audits** and **statutory audits** have been conducted to verify payroll accuracy, ensure compliance with statutory requirements, and uphold financial integrity.

The Principal expressed appreciation to the **Management, Accounts Department,** and **Human Resources Department** for their efficiency, professionalism, and transparency in managing payroll operations and maintaining employee trust.

Resolution No. 23: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on salary disbursements and financial compliance for teaching and non-teaching staff during the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- All **salary disbursements** were made **timely**, ensuring financial stability and staff satisfaction.
- Payments were processed through the **ERP-integrated payroll system**, enabling transparency, traceability, and digital accuracy.
- The salary framework adhered strictly to **UGC/AICTE pay scales and institutional** service regulations.
- The total salary disbursed amounted to **₹7,28,51,803 for teaching staff and ₹1,99,86,809 for non-teaching staff.**
- Regular **internal and statutory audits** were conducted to maintain compliance and uphold financial discipline.

The Council placed on record its **appreciation** for the **Management, Accounts Department,**

and HR Department for ensuring **timely disbursement, transparent financial management, and efficient payroll operations**, thereby reinforcing institutional trust and operational excellence.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/24: *Report on Central Library Resources, Digital Access, and Academic Support Services – Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on the **Central Library resources, digital access, and academic support services** for the academic year **2024–25, highlighting its** continued role as the intellectual hub of SRK Institute of Technology.

The Central Library remains a cornerstone of academic **and** research excellence, providing comprehensive learning resources, digital connectivity, and user-friendly services to support students, faculty, and researchers. It is **fully automated using the Adhokrut Library Management Software**, enabling efficient cataloging, circulation, and real-time access to resources.

Key Highlights:

- **Library Collection:** 29,447 volumes, 6,713 titles, and over 5,000 national and international journals, with coverage across engineering, management, sciences, and humanities.
- **Digital Access:** Seamless connectivity to premier academic platforms — **DELNET, NDLI, NPTEL, SWAYAM, and e-ShodhSindhu** — providing access to global e-resources, MOOCs, and research databases.
- **Facilities and Services:**
  - Dedicated sections for Reference, Periodicals, Digital Resources, and Project Reports.
  - **Book Bank Facility** for economically weaker students.
  - **E-Library Section** equipped with 20 high-speed computers and full internet connectivity.
  - Reprography, printing, and scanning facilities for academic documentation.
  - Extended working hours (9:00 AM–7:00 PM; longer during examinations) to meet student needs.
- **Academic Engagement:** Regular **Library Orientation Programs, Book Exhibitions, and Reading Competitions** foster reading culture, while awareness drives on **open access, plagiarism, and research ethics** promote academic integrity.

The Principal appreciated the **Librarian and supporting staff** for their proactive, student-centric approach and their efforts in maintaining an efficient, technology-enabled, and inclusive library environment.

Resolution No. 24: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on the Central Library Resources, Digital Access, and Academic Support Services for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- The library is **fully automated** through the **Adhokrut Library Management System,**

ensuring efficiency and transparency.

- It houses **29,447 volumes, 6,713 titles, and over 5,000 journals,** supporting academic and research excellence.
- Digital access through **DELNET, NDLI, NPTEL, SWAYAM, and e-ShodhSindhu** strengthens connectivity to global knowledge resources.
- Facilities such as **Book Bank, E-Library, reprography,** and extended working hours ensure equitable access and user convenience.
- Regular **orientation and awareness programs** promote reading habits, digital literacy, and responsible research practices.

The Council placed on record its **appreciation** for the **Librarian and Library Staff** for their dedication, professionalism, and service excellence in maintaining a **resource-rich, digitally enabled, and student-focused learning environment.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/25: *Report on Eminent Performer Sessions and Distinguished Guest Lectures Conducted During the Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on **Eminent Performer Sessions** and **Distinguished Guest Lectures** organized during the academic year **2024–25,** which have significantly enriched the academic ecosystem and contributed to the intellectual growth of both students and faculty.

As part of SRK Institute of Technology's continuous academic enrichment and knowledge-sharing initiatives, the institution regularly invites **eminent academicians, industry leaders, researchers, and innovators** to deliver lectures, workshops, and interactive sessions on topics of contemporary and emerging relevance.

Highlights of the Initiative:

- A series of **guest lectures and expert sessions** were conducted across departments on emerging themes such as **Artificial Intelligence, Data Science, Cybersecurity, Renewable Energy, Smart Infrastructure, and Entrepreneurship.**
- Distinguished speakers represented leading national and international organizations, including **IITs, NITs, IIITs, DRDO, ISRO,** and major industry leaders from **Infosys, TCS, and Accenture.**
- These sessions fostered **innovation, professional networking, and real-world insight,** helping students connect theoretical learning with industrial practices.
- All lectures and sessions were **digitally recorded** and **archived** in the institutional repository for continuous academic access and reference.
- As a mark of appreciation, **mementos and certificates** were presented to the distinguished guests for their valuable contributions to the institution's academic advancement.

These initiatives have played a pivotal role in **bridging academia and industry,** enhancing institutional visibility, and promoting a **vibrant intellectual and innovation-driven culture** within the campus.

The Principal expressed appreciation to the **Organizing Committees, Departmental Coordinators, and Student Volunteers** for their effective coordination and commitment to

ensuring the success of these impactful sessions.

Resolution No. 25: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Eminent Performer Sessions and Distinguished Guest Lectures conducted during the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- A series of **Eminent Performer and Guest Lecture Sessions** were organized with the participation of **renowned academicians, researchers, and industry experts.**
- These programs provided **valuable academic insights, exposure to emerging technologies, and career-oriented learning** opportunities for students.
- The initiatives have significantly **strengthened academia–industry collaboration**, promoted innovation and research culture, and enhanced overall academic engagement.
- All sessions have been **digitally archived** to ensure long-term access and institutional documentation.

The Council placed on record its **appreciation** for the **Organizing Faculty Coordinators, Departmental Teams, and Student Committees** for their exemplary efforts in conducting these enriching programs.

The Council also encouraged the **continuation and expansion of such collaborations** with **global academic institutions and industrial partners**, reaffirming SRKIT's commitment to **academic excellence, innovation, and global engagement.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/26: *Presentation of the Institutional Strategic Roadmap and Future Development Plan – Academic Year 2025–26 and Beyond.*

Agenda Note: The Council reviewed the **Institutional Strategic Roadmap and Future Development Plan** for the academic year **2025-26 and beyond**, outlining SRK Institute of Technology's long-term vision for academic excellence, research innovation, and institutional advancement.

In alignment with the **Vision and Mission** of the institution and the **National Education Policy (NEP) 2020**, the strategic roadmap seeks to position SRKIT as a **globally recognized institution** of higher learning, distinguished for its **academic innovation, research impact, sustainability, and societal engagement.**

Key Strategic Focus Areas and Initiatives:

1. **Introduction of Emerging Academic Programs**
   - Launch of new programs in **Artificial Intelligence, Cyber Security, Data Science, and Robotics**, integrating multidisciplinary and industry-relevant competencies.
   - Implementation of **B.Tech (Honors)** and **Minor Degree programs**, enhancing academic flexibility and employability as envisioned under NEP 2020.
2. **Innovation and Entrepreneurship Promotion**
   - Establishment of **Innovation and Incubation Centers** to support start-ups, entrepreneurship, and industry-academia collaboration.

- Institutional support for **innovation challenges, idea incubation, and student-led ventures.**

3. **Internationalization and Academic Collaborations**
   - Expansion of **global academic partnerships**, faculty and student exchange programs, and collaborative research networks.
   - Strengthening **MoUs with international universities, industries, and research organizations** for knowledge exchange and joint programs.
4. **Quality Enhancement and Accreditation Goals**
   - Continuous improvement in **NBA, NAAC, and NIRF** performance metrics through systematic benchmarking.
   - Deepened implementation of **Outcome-Based Education (OBE)** and data-driven **academic and administrative systems** for continuous quality enhancement.
5. **Research and Development Advancement**
   - Intensified pursuit of **externally funded projects** through agencies such as **ANRF, DST, AICTE, and UGC.**
   - Promotion of **interdisciplinary research collaborations, patent filings, and technology transfer** initiatives.
6. **Sustainability and Green Campus Initiatives**
   - Expansion **of renewable energy systems, waste management, and eco-friendly infrastructure.**
   - Institutional participation **in environmental awareness and carbon-neutral campus programs.**
7. **Long-Term Vision — Deemed-to-be University Status**
   - As part of the long-term roadmap, the institution envisions evolving into a **Deemed-to-be University under SRK Foundation,** enhancing academic autonomy, research orientation, and institutional prominence.

These initiatives collectively reinforce SRKIT's commitment to **excellence, innovation, sustainability, and social responsibility**, aligning with national and global higher education priorities.

The **Principal** expressed gratitude to the **Management, Faculty, and Academic Council Members** for their continued guidance and support, seeking their endorsement in realizing these forward-looking institutional aspirations.

Resolution No. 26: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and endorses the Institutional Strategic Roadmap and Development Plan for the Academic Year 2025–26 and beyond, as presented by the Principal.*

The Council noted that the proposed strategic plan:

- **Aligns with NEP 2020** and national higher education priorities.
- Focuses on **emerging programs, innovation ecosystems, and global academic collaborations.**
- Reinforces **institutional excellence** through OBE-based quality systems, research advancement, and sustainability initiatives.
- Envisions **long-term transformation toward Deemed-to-be University status** under SRK Foundation, enhancing autonomy and academic leadership.

The Council expressed its **appreciation and full support** for the strategic vision and advised

phased, outcome-based implementation under structured review mechanisms.

The Council further recommended **periodic monitoring and evaluation of** each strategic initiative by the **Internal Quality Assurance Cell (IQAC)** and **Academic Planning Committee**, ensuring alignment with institutional objectives and national benchmarks.

Resolution Status: *Acknowledged, Supported, and Endorsed Unanimously.*

Agenda Item No. AC/SRKIT/04/27: *Presentation of the Institutional Development Plan (IDP) and Strategic Vision for the Coming Years.*

Agenda Note: The Council reviewed the **Institutional Development Plan (IDP)** — a comprehensive, vision-oriented roadmap for the sustained growth and transformation of **SRK Institute of Technology (Autonomous)**. The plan reflects the institution's long-term strategic direction in alignment with the **National Education Policy (NEP) 2020**, the objectives of the **SRK Foundation**, and the institutional vision of becoming a **globally recognized center for innovation, research, and quality education**.

The IDP articulates a structured approach to enhancing **academic excellence, technological innovation, sustainability,** and **societal impact**, ensuring that SRKIT evolves as a **multidisciplinary, research-driven institution** that harmonizes global best practices with local relevance.

Key Strategic Focus Areas of the Institutional Development Plan (IDP):

1. **Academic Expansion and Curriculum Advancement**
   - Introduction of **interdisciplinary and emerging technology programs** in Artificial Intelligence, Data Science, Cyber Security, and Robotics.
   - Launch of **B.Tech (Honors)** and **Minor Degree** programs to enhance flexibility, employability, and multidisciplinary learning.
   - Curriculum design grounded in **Outcome-Based Education (OBE)** and industry relevance.
2. **Research, Innovation, and Consultancy Promotion**
   - Strengthening of existing **R&D Centers** and establishment of new research hubs in applied and societal domains.
   - Encouragement of **funded research projects, consultancy services, and technology transfer initiatives.**
   - Development of a structured **Innovation and Incubation Ecosystem** to promote start-ups and entrepreneurship.
3. **Infrastructure and Digital Transformation**
   - Expansion of **smart classrooms, laboratories, and digital learning spaces.**
   - Upgradation of **ERP-enabled academic and administrative systems** for data-driven governance.
   - Enhanced **ICT and network infrastructure** supporting online learning and hybrid pedagogy.
4. **Faculty Development and Academic Leadership**
   - **Regular FDPs, industry internships, and collaborative research** opportunities.
   - Support for **doctoral studies, global certifications, and pedagogical innovation.**
   - Implementation of a **faculty recognition and reward system** for academic and research excellence.
5. **Industry Collaboration and Centers of Excellence**
   - Establishment of **Centers of Excellence (CoEs)** in collaboration with reputed

industries and professional societies.

- Development of **long-term MoU's** for internships, joint projects, and skill development.
- Integration of **industry-driven projects** into curriculum and evaluation systems.

6. **Student Development and Employability Enhancement**
   - Strengthened **mentoring, career guidance, and placement readiness programs.**
   - Promotion of **entrepreneurship, leadership, and professional skills.**
   - **Focus on student well-being, counseling, and inclusive learning practices.**
7. **Sustainability, Social Responsibility, and Green Campus Initiatives**
   - Implementation of **renewable energy systems, waste management, and eco-friendly infrastructure.**
   - Expansion of **community outreach, NSS activities, and environmental campaigns.**
8. **Long-Term Vision — Deemed-to-be University Status**
   - Strategic steps toward achieving **Deemed-to-be University** status under SRK Foundation, promoting **greater academic autonomy, research flexibility, and national prominence.**

Through these initiatives, SRKFT envisions evolving into a **multidisciplinary, innovation-led institution**, driving excellence in academics, research, sustainability, and societal engagement.

The Principal expressed appreciation to the **Management, Faculty, Staff, and Academic Council Members** for their continuous guidance and collaboration in shaping this progressive institutional vision.

Resolution No. 27: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and endorses the Institutional Development Plan (IDP) as presented by the Principal, outlining the strategic roadmap for academic and institutional growth in alignment with NEP 2020 and the vision of SRK Foundation.*

The Council noted that:

- The IDP emphasizes **academic expansion, research innovation, and faculty advancement** as key pillars of institutional progress.
- Strategic priorities include **emerging technology programs, R&D ecosystem strengthening, industry partnerships, and digital transformation.**
- Holistic **student development and sustainability-focused initiatives** are integral to the institutional strategy.
- The long-term aspiration to achieve **Deemed-to-be University status** reflects a clear and ambitious vision for academic autonomy and excellence.

The Council placed on record its **appreciation** for the comprehensive and forward-looking development plan and extended its **full support** for its phased and outcome-based implementation.

The Council further recommended that the **Internal Quality Assurance Cell (IQAC)** and **Academic Planning Committee** periodically **monitor progress, evaluate outcomes, and submit review reports** to ensure alignment with institutional goals and measurable benchmarks.

Resolution Status: *Acknowledged, Endorsed, and Approved Unanimously.*

Agenda Item No. AC/SRKIT/04/28: *Report on Curriculum Revision, Academic Innovation, and Alignment with NEP 2020 and NBA Frameworks — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on curriculum revision and academic innovation undertaken during the **academic year 2024–25**, reaffirming SRK Institute of Technology's commitment to continuous academic enhancement in alignment with the **National Education Policy (NEP) 2020** and **NBA quality assurance frameworks.**

Comprehensive **syllabus revisions** were carried out across all undergraduate and postgraduate programs under the guidance of the respective **Boards of Studies (BOS)**, incorporating **industry feedback, emerging technologies, and outcome-based learning principles** to ensure that the curriculum remains relevant, contemporary, and globally benchmarked.

Key Features of Curriculum Revision and Enhancement:

1. **Integration of Emerging and Industry-Driven Content**
   - Inclusion of new modules **in Artificial Intelligence, Data Science, Cybersecurity, and IoT** across programs.
   - Curriculum co-designed through **consultation with industry experts and academic leaders** to ensure real-world alignment.
2. **Introduction of Value-Added and Skill-Oriented Courses**
   - Launch of **skill-based, hands-on, and value-added courses** to enhance employability and innovation.
   - Integration of **MOOCs, NPTEL, and SWAYAM** courses enabling flexible and credit-based online learning.
3. **Strengthened Outcome-Based Education (OBE) Implementation**
   - All courses structured under **CO–PO–PSO mapping** with measurable attainment metrics.
   - Continuous documentation and analysis supporting **NBA accreditation and quality assurance.**
4. **Experiential and Interdisciplinary Learning**
   - Introduction of **project-based learning, interdisciplinary electives,** and **capstone projects** promoting innovation and application-oriented learning.
   - Active student engagement through **internships and community-centered projects** integrating theory with practice.
5. **Industry Collaboration and BOS Governance**
   - Regular **BOS meetings, expert lectures, and curriculum co-design sessions** conducted with industry participation.
   - Course relevance and electives reviewed periodically to maintain global academic standards.
6. **Integration of Ethics, Sustainability, and Innovation Themes**
   - Embedding **of Sustainable Development Goals (SDGs), ethics,** and **entrepreneurship modules** across programs.
   - Focus on nurturing **socially responsible and innovation-driven graduates.**

These initiatives collectively reaffirm SRKIT's position as a **forward-looking, industry-aligned, and NEP-compliant institution,** committed to producing **competent, ethical, and globally competitive professionals.**

The Principal commended all **Heads of Departments, BOS Members, and Faculty Teams** for

their leadership and sustained efforts in advancing academic quality and curricular innovation.

Resolution No. 28: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Curriculum Revision, Academic Innovation, and Alignment with NEP 2020 and NBA Frameworks for the academic year 2024--25, as presented by the Principal.*

The Council noted that:

- Comprehensive **curriculum revisions** were implemented across all programs, ensuring relevance, academic rigor, and compliance with **NEP 2020** and **NBA** standards.
- Integration of **emerging technologies, value-added courses, and MOOCs** has strengthened employability and academic flexibility.
- **OBE-based structures** and **CO–PO–PSO attainment** mechanisms have been fully institutionalized.
- The curriculum effectively incorporates **sustainability, ethics, innovation, and social responsibility** in line with **SDG principles.**
- Ongoing **industry collaboration** and **BOS governance** ensure the curriculum remains dynamic and globally benchmarked.

The Council **commended the collective efforts** of the academic leadership, BOS members, and faculty teams for sustaining academic excellence and innovation.

It further advised **that annual curriculum reviews** continue under the Academic Committees, incorporating **student feedback, emerging trends, and accreditation recommendations to ensure continuous improvement and sustained quality.**

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/29: *Presentation on the Systematic and Transparent Examination Process Implemented at SRK Institute of Technology (Autonomous).*

Agenda Note: The Council reviewed the comprehensive presentation on the **systematic, transparent, and quality-driven examination process implemented at SRK Institute of Technology (Autonomous)**, designed to uphold the principles of **academic integrity, fairness, and accountability** in line with **NBA** and **NAAC** quality assurance frameworks.

The **Examination Cell** functions under a well-defined autonomous framework ensuring compliance with **institutional regulations, university guidelines**, and **national accreditation standards.** The process emphasizes **objectivity, confidentiality, and digital transparency**, thereby strengthening institutional credibility and trust.

Key Features of the Examination System:

1. **Question Paper Setting and Quality Assurance**
   - **External subject experts** are engaged for question paper setting to ensure impartiality and academic rigor.
   - All question papers are framed based on **Bloom's Taxonomy**, assessing cognitive levels from understanding to synthesis.
   - Rigorous **syllabus coverage verification, CO–PO mapping**, and **difficulty balance** ensure fair and comprehensive assessment.
2. **Moderation and Validation**

- A dedicated **Moderation Committee** reviews each paper for clarity, academic relevance, and uniform standards.
- The **moderation** process ensures **content validity**, parity across courses, and adherence to academic benchmarks.

3. **Centralized and Confidential Evaluation**
   - The evaluation process is **centralized, coded, and confidential**, ensuring anonymity and eliminating bias.
   - **Single valuation** is adopted for core courses, with provisions for **revaluation and recounting** to enhance transparency.
   - All evaluators follow structured rubrics ensuring uniformity and fairness in grading.
4. **Digital Result Processing and Data Analytics**
   - **ERP-enabled result processing** ensures accuracy, security, and timely publication of results.
   - Automated **statistical analytics** — including grade distribution, pass percentage, and CO attainment — are reviewed by the **Examination Committee** and **Academic Council**.
   - Analytical insights inform **curriculum refinement** and **pedagogical enhancement** for continuous improvement.
5. **Quality and Regulatory Alignment**
   - The entire examination process **aligns with Outcome-Based Education (OBE)** and complies with **AICTE, UGC, NBA, and NAAC** norms.
   - Regular **academic audits** and **council reviews** ensure continuous monitoring, documentation, and improvement of assessment practices.

Through this robust and transparent framework, **SRK Institute of Technology** consistently upholds **the highest standards of academic credibility, fairness, and regulatory compliance**, promoting trust among all stakeholders.

The Principal expressed appreciation to the **Controller of Examinations, Examination Cell, Moderation Committees**, and **Faculty Evaluators** for their professionalism and commitment to ensuring a seamless, accountable, and data-driven examination process.

Resolution No. 29: *Resolved that the Governing Body and Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledge and record the report on the Systematic and Transparent Examination Process implemented at the institution, as presented by the Principal.*

The Council noted that:

- **External question paper setting** ensures impartiality, cognitive diversity, and syllabus alignment through **Bloom's Taxonomy-based frameworks.**
- The **Moderation Committee** and **Examination Cell** ensure clarity, fairness, and parity across all programs.
- **Coded evaluation and ERP-based result processing** uphold confidentiality, transparency, and precision.
- **Data analytics and CO–PO attainment reports** guide ongoing pedagogical and curricular improvement.
- The entire process adheres to the quality benchmarks prescribed by **AICTE, UGC, NBA, and NAAC.**

The Council **placed** on record its **appreciation** to the **Controller of Examinations, Examination Cell staff, Moderation Committees, and Faculty Teams** for their efficiency, integrity, and sustained efforts in maintaining an effective, transparent, and quality-assured examination system.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/30: *Report on Transitory Regulations for Curriculum and Academic Transitions — Academic Year 2024-25.*

Agenda Note: The Council reviewed the report on **Transitory Regulations**, which serve as an academic mechanism to ensure smooth and equitable transitions for students affected by curriculum revisions, syllabus updates, or changes in credit structure.

It was noted that **during** the **academic year 2024–25**, no new transitory regulations were required, as there were **no active curriculum or regulation shifts** necessitating such measures. All **readmitted students** continue to follow the academic regulations under which they were originally admitted, maintaining academic fairness and consistency.

The existing **Examination and Assessment guidelines** remain valid for these students until the completion of their respective programs. Wherever applicable, transitory provisions are **recommended by the Boards of Studies (BOS), ratified by the Academic Council**, and **documented in the ERP system** for regulatory compliance and future reference.

This structured and transparent approach ensures **academic integrity, regulatory consistency, and seamless student progression** across all programs.

The Principal placed on record appreciation to the **Heads of Departments, BOS Chairpersons, and Examination Cell** for maintaining systematic documentation and ensuring compliance with regulatory frameworks.

Resolution No. 30: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Transitory Regulations for Curriculum and Academic Transitions for the academic year 2024-25, as presented by the Principal.*

The Council noted that:

- No new transitory regulations were required during 2024–25 due to the absence of regulation changes.
- Readmitted students continue under their originally applicable regulations, ensuring fairness and continuity.
- Examination and assessment provisions remain defined and valid until program completion.
- Any future transitory measures will be formulated through BOS recommendations and duly ratified by the Academic Council.

The Council commended the institution's commitment to **academic transparency, regulatory compliance, and seamless academic administration.**

Resolution Status: *Acknowledged and Recorded (Unanimously).*

Agenda Item No. AC/SRKIT/04/31: *Report on Minors and Honors Programs Offered Under*

Autonomous (SRK23) Regulations — Academic Year 2024–25.

Agenda Note: The Council reviewed the report on the **Minors and Honors Programs** implemented under the **Autonomous (SRK23) Regulations**, reflecting SRK Institute of Technology's commitment to **academic flexibility, interdisciplinary learning, and NEP 2020-aligned excellence.**

These programs provide academically strong students with opportunities to gain additional specialization beyond their core curriculum, thereby enhancing their technical depth, interdisciplinary knowledge, and employability.

Program Summary (A.Y. 2024–25):

- **Minors Programs:** 47 students registered (Departments: CSE AI&ML, ECE)
- **Honors Programs:** 77 students registered
  - CSE – 34 students
  - CSE (AI & ML) – 17 students
  - ECE – 26 students

Implementation Highlights:

- Eligibility based on **CGPA**, prerequisite completion, and Departmental Committee approval.
- Each student assigned a **faculty mentor** for guidance and progress tracking.
- Programs follow a structured **credit, evaluation, and OBE-based framework,** approved by the respective **Boards of Studies (BOS)** and reviewed by the **Academic Committee.**

These initiatives foster **academic excellence, research orientation, and innovation**, enabling students to achieve greater academic distinction and professional competitiveness.

The Principal appreciated the efforts of the **Heads of Departments, Faculty Mentors, and Academic Committees** for their effective coordination and academic stewardship in implementing these programs.

Resolution No. 31: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the report on the Minors and Honors Programs offered under the Autonomous (SRK23) Regulations for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- 47 students registered for **Minors** and 77 for **Honors** across CSE, CSE (AI&ML), and ECE.
- **Programs** provide structured, interdisciplinary, and advanced learning pathways aligned with **OBE** and **NEP 2020** principles.
- Course structures and **eligibility** criteria have been **reviewed and approved by BOS**, ensuring transparency and academic quality.

The Council commended the efforts of the departments and faculty teams for promoting **academic enrichment, innovation, and excellence** through the effective implementation of

these initiatives.

Resolution Status: *Approved and Ratified Unanimously.*

Agenda Item No. AC/SRKIT/04/32: *Presentation of Financial Summary and Compliance Report – Academic Year 2024–25.*

Agenda Note: The Council reviewed the **Financial Summary and Compliance Report** for the academic year **2024–25**, reaffirming SRK Institute of Technology's commitment to **fiscal discipline, transparency, and good governance**.

Despite the **non-receipt of full Government fee reimbursement** for the past three academic years, the institution has ensured uninterrupted academic and administrative operations through prudent financial management. The pending dues with the University and reimbursement details have been duly documented for reference.

Key Highlights:

- **ERP-enabled financial operations** ensure real-time monitoring, transparency, and accuracy in all transactions.
- **Regular internal and statutory audits** are conducted in compliance with **UGC, AICTE, and autonomous financial norms.**
- The **Finance Department** continues to pursue pending Government reimbursements while maintaining **installment-based collection systems** for financial stability.
- Despite constraints, the institution has **met all statutory obligations**, including salaries, maintenance, and academic expenditures, through effective fiscal planning.

The Principal commended the **Finance Department and Accounts Section** for their diligence, accountability, and efficient management under challenging conditions.

Resolution No. 32: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the Financial Summary and Compliance Report for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- Financial operations are **ERP-integrated, transparent, and compliant** with all regulatory standards.
- Non-receipt of Government fee reimbursement has affected total fee consolidation, but the institution continues to function smoothly through prudent management.
- **All audits, records, and financial reports** are fully compliant with **UGC, AICTE, and institutional regulations.**

The Council appreciated the **Finance Department, Accounts Section, and Management** for maintaining fiscal stability and transparency, and advised periodic updates on reimbursement recovery to be submitted to the **Academic Council and Governing Body**.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/33: *Presentation and Ratification of Audited Financial Statements – Academic Year 2024–25.*

Agenda Note: The Council reviewed the **Audited Financial Statements** of SRK Institute of Technology (Autonomous) for the **academic year 2024–25**, reflecting the institution's continued

commitment to **financial transparency, accountability, and statutory compliance**.

The audited statements include the **Income and Expenditure Account**, **Balance Sheet**, **Cash Flow Statement**, and **Notes on Accounts**, providing comprehensive disclosures on financial performance and governance. The audit was conducted by **certified Chartered Accountants in** accordance with statutory norms, recognized accounting standards, and institutional financial policies.

Key Highlights:

- The audit report presents the institution's total income, expenditure, capital investment, and overall financial position for the year.
- The financial operations **demonstrate prudence, efficiency, and compliance** with **UGC, AICTE, and autonomous financial regulations**.
- **The Finance Committee** has thoroughly reviewed and verified the audited statements prior to submission, confirming their accuracy and integrity.
- All financial records are securely maintained in the **Finance Office** for future statutory audits, inspections, and internal reviews.

The **Principal** commended the **Finance Department** and **Audit Team** for their professionalism, diligence, and adherence to good financial governance practices.

Resolution No. 33: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby approves and ratifies the Audited Financial Statements of the institution for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- The **Income & Expenditure Account**, **Balance Sheet**, and **Cash Flow Statement** were duly audited by qualified Chartered Accountants.
- The audit adhered to **statutory accounting standards** and **institutional financial policies**, ensuring transparency and accuracy.
- The **Finance Committee** has reviewed and endorsed the statements prior to presentation.
- All audited reports and supporting records are securely preserved for compliance and reference.

The Council appreciated the **Finance Department** and **Audit Team** for maintaining high standards of financial discipline, transparency, and governance. It further advised that a **summary of the annual audited accounts** be periodically shared with the **Governing Body** to support strategic financial planning and oversight.

Resolution Status: *Approved and Ratified Unanimously*

Agenda Item No. AC/SRKIT/04/34: *Presentation of Alumni Activity Report – Academic Year 2024–25.*

Agenda Note: The Council reviewed the **Alumni Activity Report** for the academic year **2024–25**, highlighting SRK Institute of Technology's commitment to maintaining strong and meaningful engagement with its alumni network — a key pillar of institutional growth, reputation, and global outreach.

The **Registered Alumni Association** continues to function actively, coordinating regional and

national chapters to foster professional collaboration, mentorship, and institutional development.

Key Highlights (2024–25):

- **Annual Alumni Meet:** Successfully conducted on campus, facilitating networking, experience sharing, and institutional bonding across batches.
- **Academic & Professional Contributions:** Alumni contributed to curriculum development, student mentoring, placements, and industry collaborations, in addition to delivering **guest lectures and webinars** on career and entrepreneurial skills.
- **Institutional Support & Philanthropy:** Several alumni extended support for **scholarships, infrastructure, and knowledge-sharing initiatives**, reflecting loyalty and institutional pride.
- **Digital Connectivity:** Engagement enhanced through **newsletters, social media, and the Alumni Connect Cell**, ensuring structured communication and database management.
- **Recognition:** Distinguished **alumni** were honored for achievements in academia, industry, and social service during major institutional events.

These initiatives have strengthened SRKIT's **alumni–institution relationship**, enriched student learning experiences, and expanded professional and global linkages.

The Principal expressed appreciation to the **Alumni Association, Faculty Coordinators, and Organizing Committees** for their dedicated efforts **in nurturing** a vibrant, connected, and supportive alumni community.

Resolution No. 34: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the Alumni Activity Report for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- **The Registered Alumni Association** has effectively promoted continued engagement and collaboration.
- The **Annual Alumni Meet** and related **initiatives** have enhanced institutional visibility and professional networking.
- Alumni contributions to **curriculum, placements, and mentorship** reflect strong academic–industry synergy.
- **Digital platforms and recognition programs** have strengthened **alumni** relations and institutional pride.

The Council commended the **Alumni Association, Faculty Coordinators, and Management** for their sustained efforts in building a dynamic alumni ecosystem that supports academic enrichment, employability, and institutional advancement.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Agenda Item No. AC/SRKIT/04/35: *Report on Student Achievements in National and International Competitive Examinations — Academic Year 2024–25.*

Agenda Note: The Council reviewed the report on student achievements **in national and international competitive examinations** during the academic year **2024–25**, reflecting SRK Institute of Technology's commitment to **academic excellence, mentorship, and global**

competency development.

A total of seven **students** qualified in prestigious examinations such as **GATE, GRE, TOEFL, and DUOLINGO**, demonstrating strong academic preparation and institutional support.

Department-wise Summary:

- **CSD:** 1 student qualified in GRE
- **CSE:** 2 students in GRE, 1 in TOEFL, 1 in DUOLINGO
- **ECE:** 2 students in TOEFL

These achievements highlight the institution's **robust academic ecosystem**, effective **faculty mentoring**, and the proactive efforts of the **Training & Placement Cell** in organizing preparatory workshops, mock tests, and counseling sessions.

The Principal congratulated the qualified students and commended the **faculty mentors, Heads of Departments, and Training & Placement Cell** for their guidance and sustained encouragement toward global academic and professional success.

Resolution No. 35: *Resolved that the Academic Council of SRK Institute of Technology (Autonomous) hereby acknowledges and records the report on Student Achievements in National and International Competitive Examinations for the academic year 2024–25, as presented by the Principal.*

The Council noted that:

- **Seven students** qualified in GATE, GRE, TOEFL, and DUOLINGO examinations, underscoring institutional excellence and global readiness.
- Faculty mentoring and structured training programs contributed significantly to these outcomes.
- **The Training & Placement Cell** effectively supported students through guidance and skill enhancement initiatives.

The Council appreciated the **students, faculty mentors, and departmental teams** for their achievements and encouraged continued efforts to expand **competitive exam training** and **international academic preparedness** initiatives.

Resolution Status: *Acknowledged and Recorded with Appreciation (Unanimously).*

Concluding Remarks / Vote of Thanks by the Principal

Respected Members of the Academic Council,

I take this opportunity to convey my **sincere gratitude** to all the esteemed members of the **Academic Council** for their valuable time, thoughtful deliberations, and constructive insights, which have greatly enriched today's proceedings.

Your **collective wisdom, guidance, and steadfast support** continue to inspire us in our ongoing pursuit of **academic excellence, research advancement, and institutional development.**

On behalf of **SRK Institute of Technology**, I extend **heartfelt thanks** for your continued

association and contribution toward shaping our academic policies and strengthening the standards of higher education.

Your presence and active participation in this meeting have added immense value to the decision-making process, and your commitment to the institution's vision is deeply appreciated.

Thank you once again for your presence, engagement, and unwavering dedication to the progress and excellence of **SRK Institute of Technology**.

K. Ramulu

SRKIT/FC/01/2025 10.10.2025

The 3rd meeting of the Finance Committee was held on 20.09.2025 in the board room 1 st floor SRK Institute of Technology.

The following members were present:

1. Dr. K Ramesh, Principal Chairman — K. Ramesh 10/10/2025
2. Dr B Krishnaiah HoD -MBA Member – B. Krishnaiah
3. Ms R Padmaja, Auditor- Member I/c B. Padmaja

The following resolutions were passed:

- The audited annual accounts of the year 2024-25 has been reviewed and approved together with the audited reports
- Dues from Fees reimbursement has been reviewed and instructed the AO and is advised to take necessary steps for enrollment of all eligible first year students with the portal for sanction of post metric scholarships and fee reimbursement and also to approach the concerned authorities related to reimbursement scheme, Government of Andhra Pradesh and comply the process of online submission and verification of pending applications (if any) immediately.
- Noting audit observations and approving the issues.
- Approving budgets (Income & Expenditure Statements).
- To prepare budget estimates of individual departments and the Institutional Budget estimates for the year 2025-2026.
- Discussing and approving procurement of items (copiers, furniture).
- Deciding on setting up new facilities (e.g., transit office).

K. Ramesh 10/10/2025

PRINCIPAL
SRK INSTITUTE OF TECHNOLOGY
ENIKEPADU, VIJAYAWADA-521 108.

SPKR & Associates
CHARTERED ACCOUNTANTS

Padmaja Rayala
B.Com., F.C.A. DISA (ICAI)
Cell : +91 93918 04041
39-2-19/A, Taruni Rayala Apartments,
Flat No. 302, Chennupati Petrol Bunk Road,
2nd Left, Labbipet, Vijayawada - 520 010.

AUDITOR'S REPORT

TO THE MEMBERS OF SRK INSTITUTE OF TECHNOLOGY

We have audited the attached statement of affairs of SRK INSTITUTE OF TECHNOLOGY, Enikepadu, Vijayawada-521108 as at 31st March,2025 and its income & expenditure account for the year ended on that date. These financial statements are the responsibility of the Institution's management. Our responsibility is to express an opinion on these financial statements based on audit.

We conducted the audit in accordance with accounting principles generally accepted in India, which require that we plan and perform the audit to obtain reasonable assurance that the financial statements are free from material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes an assessment of the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that the audit provides a responsible basis for our opinion.

We report that:

F. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of audit.
G. In our opinion, proper books of accounts as required by law have been kept by the institution so far as appears from examination of such books.
H. The statement of affairs and income & expenditure account dealt with by this report are in agreement with the books of account.

SPKR & ASSOCIATES * CHARTERED ACCOUNTANTS * VIJAYAWADA

e-mail : capadmaja@yahoo.co.in, rayalapadmaja@gmail.com, rayidisuresh@gmail.com

I. In our opinion, the statement of affairs and income and expenditure account dealt with by this report comply with general accounting and audit principles accepted in India.

J. In our opinion and according to the explanations given to us and to the best of our knowledge, the accounts give a true and a fair view.

   i. In the case of statement of affairs, of the state of affairs of the institution as at 31st March 2025.

   ii. In the case of income and expenditure account, of the excess of income over expenditure for the year ended on that date.

PLACE: VIJAYAWADA.

DATE:01.12.2025

SPKR & ASSOCIATES CHARTERED ACCOUNTANTS VIJAYAWADA

For SPKR & ASSOCIATES
CHARTERED ACCOUNTANTS

R. Padmaja

PARTNER.
FRN: 014518S MNO: 220807
PADMAJA RAYALA.

To
The Finance Committee,
SRK Institute of Technology,
Enikepadu,
Vijayawada-521108.

INTERNAL AUDIT REPORT

Period covered for audit from 01.04.2024 to 31.03.2025

Internal Audit was planned and conducted to obtain reasonable responsible assurance whether accounting processes system, its processes and controls operate efficiently and effectively and to see that the information is free from material, misstatements. Internal Audit was carried to assure.

- To verify correctness of accounting procedures and its reporting
- To verify compliance of the policies of institution and its controls implemented
- To verify the compliance with various statutory provisions applicable

Audit has covered verification of system of accounting of those expenses and incomes and others mentioned above and to express opinion on weakness in internal control, risk management and governance highlighting any exceptions and cases of non-compliance and suggest or recommend improvements in the design and operations of control based on internal audit .The following observations have been made during the course of audit.

1.Verified the receipts and payments vouchers and bills during the audit period.
2.Internal control with regards to system access is followed as per the policy and appears satisfactory.
3.All statutory payments are made well within the due dates and as per the prescribed norms.

4.Verified the cash balances with the cash book and found correct
5.Bank Reconciliations are done and matched with the Books of Accounts.

For SRK FOUNDATION

Authorised Signatory

Place: Vijayawada,

Date:

SRK INSTITUTE OF TECHNOLOGY
ENIKEPADU, VIJAYAWADA
SPONSORS:SRK FOUNDATION

BALANCE SHEET AS ON 31.03.2025

Liabilities	Sch. No	*AMOUNT* *RS. PS.*	Assets	Sch. No	*AMOUNT* *RS. PS.*
Capital Fund:			Fixed Assets	*Sch 6*	15,33,06,993
Balance as on 01.04.2024	(84,57,776)				
less: Excess of Expenditure Over income	3,45,64,830	(4,30,22,606)			
			Current Assets, Loans & Advances:		
Secured loans	*Sch 2*	2,33,61,985			
			Deposits		5,19,419
Unsecured Loans	*Sch 3*	8,21,92,693			
			Loans and Advances		3,00,000
Current Liabilities:					
Sundry Creditors	*Sch 4*	1,39,96,400	Rent Advance		1,65,000
Provisions for Exp	*Sch 5*	3,55,73,873	TDS /TCS		1,08,566.72
Due to VIT,Vipw own Institutions		6,97,59,733			
SRK Foundation		8,82,75,245	Fees Receivables		11,05,55,314
			Cash-in-hand		3,34,025.44
			Cash at Bank	*Sch 7*	48,48,004.63
		27,01,37,322			**27,01,37,322**

As per our report of even date
For Suresh and Babu
Chartered Accountants
FRN: 004254S

(CA S.Akkaiah Naidu)
Partner
ICAI M.No.208436

For SRK Institute of Technology

Secretary

Place : Vijayawada

SRK INSTITUTE OF TECHNOLOGY
ENIKEPADU, VIJAYAWADA
SPONSORS:SRK FOUNDATION

INCOME & EXPENDITURE STATEMENT FOR THE YEAR ENDING ON 31.03.2025

EXPENDITURE	AMOUNT RS. PS.	INCOME	AMOUNT RS. PS.
To Salaries Teaching	7,28,51,803.00	By Fees Received	15,52,90,204.00
To Salaries Non Teaching	1,99,86,809.00	- As per Schedule 1	
To Provident Fund	19,05,330.00	By Excess of Expenditure over Income	3,45,64,830.33
To ESI Paid by Mgt	4,73,549.00		
To Staff Welfare	9,19,925.00		
To Audit Fees	2,50,000.00		
To Travelling Expenses	80,77,075.00		
To Electricity Charges	60,92,809.00		
To Advertisement	3,75,532.00		
To PF ADMIN Charges	75,546.00		
To PF Interest	19,37,326.00		
To ISO Certification Expenses	15,930.00		
To Bank Charges	1,49,929.70		
To News paper and periodicals	31,570.00		
To AFRC Processing Fees	90,000.00		
To AICTE Renewal charges	5,94,100.00		
To Appecma Fees	2,00,000.00		
To Stamp Duty Expenses	60,500.00		
To JNTU Reg Fees	24,518.00		
To JNTU Ratification Exp	27,020.00		
To JNTU Research and Development I	1,00,000.00		
To Spot Admission Online Reg. Fees	1,10,000.00		
To MBA,MCA Mgt Seats Processing f	94,074.00		
To IMBA Student Reg Fees	6,600.00		
To Delnet Developing Library Renewa	13,570.00		
To Staff and Students Group Insurance	2,60,901.00		
To Staff Ratification fees to JNTU	60,000.00		
To Students Welfare	6,60,656.00		
To SMS Faciltiy Expenditure	15,000.00		
To Fire Renewal and other related Exp	3,08,695.00		
To Telephone Charges	1,81,947.28		
To Freight Exp	1,18,626.00		
To Sanitisor Expences	1,41,343.00		
To Sanitory Expences	2,75,093.00		
To Lift Maintanance	1,39,545.00		
To UPS Expences	4,64,828.00		
To UPS Maintenance	1,33,499.00		
To Mgt Seats Processing Fees AP EM	3,24,100.00		
To Computer Maintenance	8,30,035.00		
To C C Tv maintenance	11,599.00		
To Consortium of Private Autonomous Engineering college			
To Consultancy Fee	3,00,000.00		
To Courier Exp	6,370.00		
To General Exp	1,57,278.00		
To Taxes and :Licencses	2,04,460.00		
To Panchayat Taxes	6,61,175.00		
To Printing & Stationery	15,12,094.00		
To Printer AMC	34,000.00		
To Electrical Repairs	22,66,059.00		
To Electrical Inspection fee	2,900.00		

To Exams Expences	3,28,474.00		
To Ezone Security Expences	83,000.00		
To Security Charges	4,81,582.00		
To Faculty Development Programmee	9,722.00		
To NBA Processing Fees	1,77,000.00		
To NSS Expences	3,20,780.00		
To Repairs and Maintenance	1,61,652.00		
To Garden Maintenance	97,548.00		
To Furniture Repairs	20,640.00		
To Seminor and Workshop Expenses	3,25,962.00		
To Rent to Hyd	7,93,370.00		
To Rent to SRK Foundation Office	19,80,000.00		
To Intercom Phones AMC Charges	5,500.00		
To Generator Maintenance	30,302.00		
To Generator AMC	17,110.00		
TO GST	45,000.00		
To RO Plant Maintenance	26,508.00		
To Vehicle Maintenance	21,46,407.00		
To Lab Maintenance	1,88,434.00		
To Insurance on Vehicles	13,93,799.00		
To Building Insurance	5,45,043.00		
To Library Books	5,300.00		
To Library Journels	76,635.00		
To Prepayment Charges to Vehicle Lo	63,378.32		
To Interest Vehicles Finance	15,65,463.54		
To Interest on Unsecured Loans	11,24,764.00		
To Loan Processing Fees	49,195.00		
To Internet Bill	3,49,229.10		
To Building Maintenance	3,10,19,425.00		
To Motor Maintenance	36,500.00		
To AC Repairs and Maintance	2,37,270.00		
To Sports Exp	24,060.00		
To Placement Drive Exp	1,16,349.00		
To Placement Training	35,51,805.00		
To College Occation Expenses	28,557.00		
To Guest Welfare	31,217.00		
To Depreciation	1,88,64,334.39		
	18,98,55,034.33		**18,98,55,034.33**

As per our report of even date
For Suresh and Babu
Chartered Accountants
FRN: 004254S

(CA S.Akkaiah Naidu)
Partner
ICAI M.No.208436

Place : Vijayawada

For SRK Institute of Technology

Secretary

SRK INSTITUTE OF TECHNOLOGY
KANKEPADU, VIJAYAWADA
SPONSORS:SRK FOUNDATION

DEPRECIATION SCHEDULE FOR THE YEAR ENDED 31.3.2025

Schedule 6

S.NO.	Particulars	Opening bal as on 01.04.2024	Fixed Assets Bal up to Sep	Fixed Assetsbal from Oct	Deletions during the year	Total GROSS Block	Rate of Depreciation	Depreciation on sep bal 100%	Depreciation on from oct bal 50%	Total Depreciation	Net Block as ON 31.3.2025
1	Airconditioners	14,20,974.35	12,33,790.00	0.00	0.00	26,54,764.35	15.00	3,98,214.65	0.00	3,98,214.65	22,56,549.70
2	Computers	20,33,043.64	59,05,900.00	0.00	0.00	79,38,943.64	40.00	31,75,577.45	0.00	31,75,577.45	47,63,366.18
3	Furniture and fittings	76,75,250.35	15,83,580.00	6,45,816.00	0.00	99,04,646.35	10.00	9,25,883.04	32,290.80	9,58,173.84	89,46,472.52
4	Vehicles	2,72,78,668.75	38,55,621.00	65,08,897.00	8,00,000.00	3,68,43,186.75	15.00	45,50,143.46	4,88,167.28	50,38,310.74	3,18,04,876.01
5	Electrical Goods	36,36,824.69	5,23,088.00	28,18,616.00	50,400.00	69,28,128.69	10.00	4,10,951.27	1,40,930.80	5,51,882.07	63,76,246.62
6	Fans	2,10,182.88	0.00	0.00	0.00	2,10,182.88	10.00	21,018.29	0.00	21,018.29	1,89,164.60
7	Iron cots	1,888.69	0.00	0.00	0.00	1,888.69	15.00	283.30	0.00	283.30	1,605.38
8	Lab eqipment	59,28,950.31	4,98,910.00	56,000.00	0.00	64,83,860.31	15.00	9,64,179.05	4,200.00	9,68,379.05	55,15,481.26
9	Lcd Projector	7,19,136.33	0.00	0.00	0.00	7,19,136.33	15.00	1,07,870.45	0.00	1,07,870.45	6,11,265.88
10	Library books	4,21,878.88	1,82,615.00	3,14,508.00	0.00	9,19,001.88	40.00	2,41,797.55	62,901.60	3,04,699.15	6,14,302.73
11	Motor	39,121.86	0.00	0.00	0.00	39,121.86	15.00	5,868.28	0.00	5,868.28	33,253.58
12	Sports material	65,942.12	0.00	0.00	0.00	65,942.12	15.00	9,891.32	0.00	9,891.32	56,050.80
13	Telephone	21,846.52	0.00	0.00	0.00	21,846.52	15.00	3,276.98	0.00	3,276.98	18,569.54
14	UPS Sys	3,37,050.37	0.00	0.00	0.00	3,37,050.37	40.00	1,34,820.15	0.00	1,34,820.15	2,02,230.22
15	Xerox machine	17,498.85	0.00	0.00	0.00	17,498.85	15.00	2,624.83	0.00	2,624.83	14,874.02
16	CC Tv Cameras	3,14,058.93	3,65,400.00	0.00	0.00	6,79,458.93	15.00	1,01,918.84	0.00	1,01,918.84	5,77,540.09
17	FIRE Extinguisher	1,63,666.77	0.00	0.00	0.00	1,63,666.77	15.00	24,550.02	0.00	24,550.02	1,39,116.76
18	Matreses	15,195.44	0.00	0.00	0.00	15,195.44	15.00	2,279.32	0.00	2,279.32	12,916.13
19	Printer	5,41,498.18	0.00	2,27,155.00	0.00	7,68,653.18	15.00	81,224.73	17,036.63	98,261.35	6,70,391.83
20	Cash Counting Machine	12,119.10	0.00	0.00	0.00	12,119.10	15.00	1,817.87	0.00	1,817.87	10,301.24
21	Generator	69,009.83	0.00	0.00	0.00	69,009.83	15.00	10,351.48	0.00	10,351.48	58,658.36
22	Gross Cutting Machine	3,441.86	0.00	0.00	0.00	3,441.86	15.00	516.28	0.00	516.28	2,925.58
23	LCD TV	5,94,598.76	0.00	0.00	0.00	5,94,598.76	15.00	89,189.81	0.00	89,189.81	5,05,408.95
24	IBM Rational seed	32,432.90	0.00	0.00	0.00	32,432.90	15.00	4,864.93	0.00	4,864.93	27,567.96
25	Computers Laptop	727.47	0.00	0.00	0.00	727.47	40.00	290.99	0.00	290.99	436.48
26	Computer Softwere	1,46,566.47	3,50,000.00	0.00	0.00	4,96,566.47	40.00	1,98,626.59	0.00	1,98,626.59	2,97,939.88
27	Lab Server	12,752.64	0.00	0.00	0.00	12,752.64	40.00	5,101.06	0.00	5,101.06	7,651.58
28	Intercom Phones	1,151.54	0.00	0.00	0.00	1,151.54	15.00	172.73	0.00	172.73	978.80
29	Lift	4,54,292.61	0.00	8,32,500.00	0.00	12,86,792.61	15.00	68,143.89	62,437.50	1,30,581.39	11,56,211.22
30	Music System	18,066.55	0.00	0.00	0.00	18,066.55	15.00	2,709.98	0.00	2,709.98	15,356.57
31	Security Alarm System	27,684.37	0.00	0.00	0.00	27,684.37	15.00	4,152.66	0.00	4,152.66	23,531.72
32	Pest Flash machine	9,101.63	0.00	0.00	0.00	9,101.63	15.00	1,365.25	0.00	1,365.25	7,736.39
33	Steam Cooking Sys	36,235.38	0.00	0.00	0.00	36,235.38	15.00	5,435.31	0.00	5,435.31	30,800.07
34	Wireless Network	32,147.38	0.00	0.00	0.00	32,147.38	15.00	4,822.11	0.00	4,822.11	27,325.27
35	Lab Alarm System	16,168.21	0.00	0.00	0.00	16,168.21	15.00	2,425.23	0.00	2,425.23	13,742.98
36	Network Eqipment	56,025.96	0.00	0.00	0.00	56,025.96	15.00	8,403.89	0.00	8,403.89	47,622.07
36	Wifi Installation	5,22,824.95	0.00	0.00	0.00	5,22,824.95	15.00	78,423.74	0.00	78,423.74	4,44,401.21
37	Water tank Syntex	21,809.28	0.00	0.00	0.00	21,809.28	15.00	3,271.39	0.00	3,271.39	18,537.89
38	Data Cable Wiring	37,495.86	0.00	0.00	0.00	37,495.86	15.00	5,624.38	0.00	5,624.38	31,871.48
39	Mike set	8,767.11	0.00	0.00	0.00	8,767.11	15.00	1,315.07	0.00	1,315.07	7,452.04
40	Solar	56,151.87	0.00	0.00	0.00	56,151.87	15.00	8,422.78	0.00	8,422.78	47,729.09
41	R O Plant	83,051.19	0.00	0.00	0.00	83,051.19	15.00	12,457.68	0.00	12,457.68	70,593.52
42	Water Cooler	1,01,375.56	0.00	0.00	0.00	1,01,375.56	15.00	15,206.33	0.00	15,206.33	86,169.23
43	Transformer	0.00	14,39,600.00	0.00	0.00	14,39,600.00	15.00	2,15,940.00	0.00	2,15,940.00	12,23,660.00
44	Building	6,10,96,954.16	3,52,500.00	0.00	0.00	6,14,49,454.16	10.00	61,44,945.42	0.00	61,44,945.42	5,53,04,508.74
45	Land	3,10,33,600.00	0.00	0.00	0.00	3,10,33,600.00	0.00	0.00	0.00	0.00	3,10,33,600.00
		14,53,27,230.54	**1,62,91,004.00**	**1,14,03,492.00**	**8,50,400.00**	**17,21,71,326.54**	**805.00**	**1,80,56,369.79**	**8,07,964.60**	**1,88,64,334.39**	**15,33,06,992.15**
		14,53,27,230.54									
		0.00									

For SRK Institute of Technology

CIVIL DEPARTMENT III BOS MEETING 27-06-2025

SRK Institute of Technology

An Autonomous Institution | Permanently Affiliated to JNTUK
Approved by AICTE, New Delhi | Certified by ISO 9001:2015
Accredited by NBA & NAAC with "A" Grade

Dt: 24-06-2025

To

The Honourable Members of Board of Studies

Sir,

Sub: Invitation of Civil Engineering BOS meeting on 27-06-2025 -Reg

Happy to inform you that the Department of Civil Engineering Board Of Studies Meeting is proposed to conduct on 27-06-2025(Friday) at the Department to discuss the following agenda:

Agenda

1. To Finalize the Course Structure of III B.Tech I semester & II Semester of SRK23.
2. To Discuss and Ratify the detailed Course content of III B.Tech I Semester & II Semester Syllabus.
3. Any other matter with the permission of Chair.

In view of the above, the BOS is proposed to conduct online mode. The link for the meeting will be shared a day before. So, you are requested to kindly make it convenient to participate in the BOS meeting and extend your valuable guidance and suggestions.

Awaiting for your acceptance for Filing purpose.

Thanking you,

With Regards

T. Satyanarayana

(Dr. T.Satyanarayana)

CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

24/6/25

Copy to All BOS members

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Department of Civil Engineering

Dt: 24-06-2025

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With Regards

T. Satyanarayana

(Dr. T.Satyanarayana)
24/6/25
CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Copy to All BOS members

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Department of Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING
BoS Members (SRK23)

S.No	Name	Designation	Category
1	Dr. T.Satyanarayana	Professor & HOD	Chairman
		1 Subject Expert nominated by Vice-Chancellor	
2	Dr.V.Ravindra	Professor, Department of Civil Engineering University College of Engineering, JNTU, Kakinada	University Nominee
		2 Subject Experts outside Parent University	
3	Dr.T.Gunneswara Rao	Professor, Department of Civil Engineering NIT, Warangal	Member
4	Dr.A.Ramesh	Professor, Department of Civil Engineering VNR Vignana Jyothi Institute of Engineering and Technology,Hyderabad	Member
		1 Representative from Industry	
5	Sri.Ch.Chandrasekhar Srinivas	Design Engineer & Consultant, CS Associates, Machavaram, Vijayawada	Member
		Alumnus nominated by Principal	
6	Sri.J.Purnachandra Rao	Proofreader Bridge International Academics India LLP Hi-Tech City,Hyderabad-500081	Member
		Dean Academics	
7	Dr. K.Ramesh	Professor, Department of Civil Engineering, SRK Institute of Technology	Member
		All Faculty of the Department	
8	K.Kiran	Asst. Professor	Member
9	G.Sahithi	Asst. Professor	Member
10	A.Krishna Priya	Asst. Professor	Member
11	B.Sai Kumar Reddy	Asst. Professor	Member
12	Ch.Rajesh	Asst. Professor	Member
13	P.Vamsi Krishna	Asst. Professor	Member
14	S.Nagaraju	Asst. Professor	Member

T. Satya
Chairman BoS
24/6/25

CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Principal

Gmail

civil enginee
<civilengineering.srkit@gmail.c

SRK INSTITUTE OF TECHNOLOGY CIVIL ENGINEERING DEPARTMENT BOS MEETING ON 27-06-2025 AT 10:00AM

Ramesh A <ramesh_a@vnrvjiet.in> Tue, Jun 24, 2025 at 1:21 PM
To: civil engineering <civilengineering.srkit@gmail.com>

Sir

Thank you
I shall join the meeting accordingly

with kind regards
****

Dr. A.Ramesh Ph.D.
Professor
Department of Civil Engineering
VNR Vignana Jyothi Institute of Engineering & Technology,
Bachupally, Nizampet (S.O.)
Hyderabad - 90
Telangana
Ph. No. 040 23042759 / 60 ext 1114
Cell No. + 91 98495 48714

Purna Chandu
to Ravindra, Gunneswara, chchsrinivas, chandu, Ramesh, SAHITHI, T, me, ramesh_a

3:00 PM (17 minutes ago)

Thanks for the update—I'll be there for the III BOS Meeting on 27-06-2025.

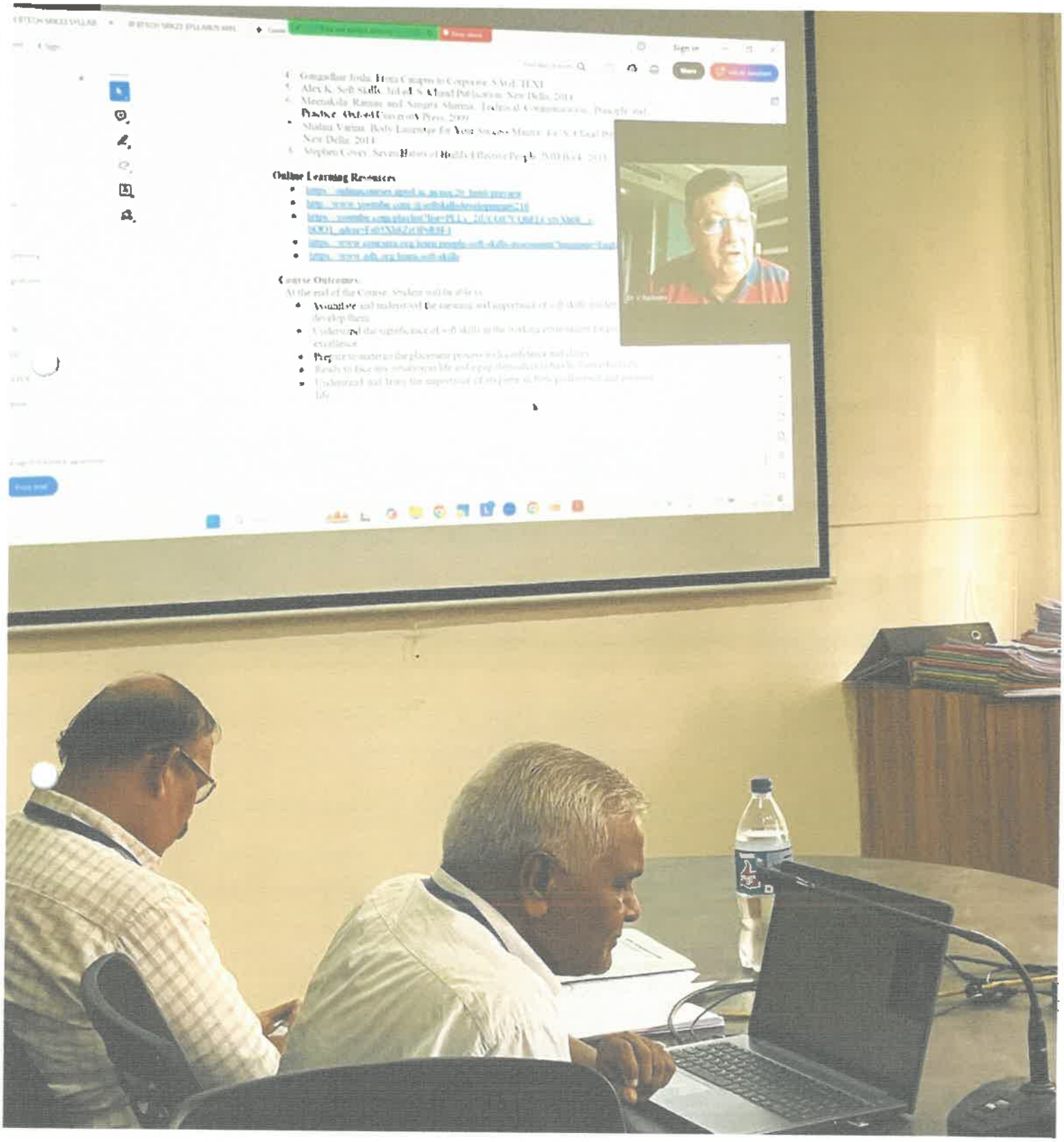
Best,
Purnachandra Rao J
Academic Proofreader,
Instructional design,
NewGlobe Education Services Pvt Ltd Llp.

...

Thanks for informing. | I will attend the meeting. | I will attend.

Reply | Reply all | Forward

Online Learning Resources
Course Outcomes


Online Learning Resources
Course Outcomes

4. Determination of Chlorides in water and soil
5. Determination and Estimation of Total Solids, Organic Solids and Inorganic Solids and Settleable Solids by Imhoff Cone
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter deWinkles Method and B.O.D
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose
12. Determination of Chlorine demand
13. Presumptive Coliform test
14. Visit a Water Treatment Plant and give a technical report.

NOTE: At least 10 of the above experiment are to be conducted.

SRK INSTITUTE OF TECHNOLOGY, ENIKEPADU, VIJAYAWADA-521108

Participants (12)

In the meeting (10)

- GS GOGINENI SAHITHI (me)
- DV Dr. V Ravindra
- AK ANUMOLU KRISHNA PRIYA
- BS B SAIKUMAR REDDY
- DA Dr. A Ramesh

IMG_5325.PNG

REC

Dr. V Ravindra

All tools

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis &Design of fixed &continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.

SRKIt CIVIL's screen

Dr. V Ravindra

1. Learn the usage of any fundamental software for design
2. Create geometries using pre-processor
3. Analyze and Interpret the results using post processor
4. Design the structural elements

Course Outcomes

After the completion of the course student should be able to

a) Model the geometry of real-world structure Represent the physical model of structural element/structure
b) Perform analysis
c) Interpret from the Post processing results
d) Design the structural elements and systems as per IS Codes

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis &Design of fixed &continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
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10. Detailing of Steel built up compression member

III BTECH SRK23 SYLLAB... × III BTECH SRK23 SYLLABUS MIN... + Google
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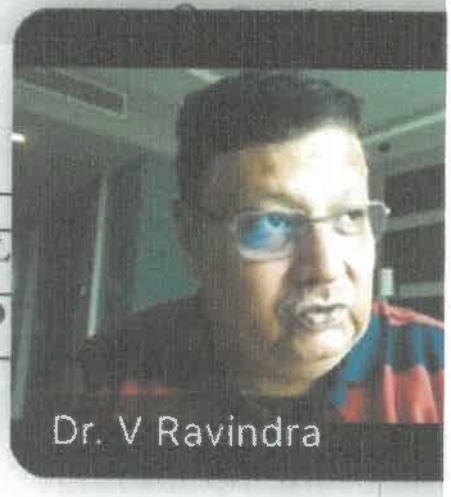

Department of Civil Engineering

III Year **II Semester**	**CAD LAB**	**L** **0**

Course Objectives: The objectives of the course are to

1. **Learn** the usage of any fundamental software for design
2. **Create** geometries using pre-processor
3. **Analyze** and Interpret the results using post processor
4. **Design** the structural elements

Course Outcomes

After the completion of the course student should be able to

a) Model the geometry of real-world structure Represent the physical model of structural element/structure
b) Perform analysis
c) Interpret from the Post processing results
d) Design the structural elements and a system as per ISCodes

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis &Design of fixed &continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of r idential building subjected to all loads (DL. LL WL EQL)

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L's screen

Dr. V Ravindra

1. Learn the usage of any fundamental software for design
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Course Outcomes

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LIST OF EXPERIMENTS

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Department of Civil Engineering

MINUTES OF BOARD OF STUDIES MEETING

BoS/CE/03 | **Date: 28/06/2025**
Department: CIVIL | **Academic Year: 2025-26**
Venue: IQAC ROOM | **Time: 10.00 AM**

Board of Studies Members

S. No	Name	Designation	Category	Signature
1	Dr. T.Satyanarayana	Professor & HOD	Chairman	
2	Dr.V.Ravindra	Professor, Department of Civil Engineering, Director Research and Development, University College of Engineering, JNTU, Kakinada	University Nominee	
3	Dr.T.Gunneswara Rao	Professor,Department of Civil Engineering, NIT, Warangal	Subject Expert Outside University	
4	Dr.A.Ramesh	Professor,Department of Civil Engineering, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad	Subject Expert Outside University	
5	Sri.Ch.Chandrasekhar Srinivas	Design Engineer & Consultant,CS Associates, Machavaram, Vijayawada	Representation from Industry	
6	Sri.J.Purnachandra Rao	Proofreader, Bridge International Academics India LLP, Hi-Tech City,Hyderabad-500081	Alumni Member	
7	Dr.K.Ramesh	Dean Academics	Member	28/6/2025
8	Sri K.Kiran	Asst. Professor	Member	
9	Smt G.Sahithi	Asst. Professor	Member	
10	Smt A.Krishna Priya	Asst. Professor	Member	
11	Sri B.Sai Kumar Reddy	Asst. Professor	Member	
12	Sri Ch.Rajesh	Asst. Professor	Member	
13	Sri P.Vamsi Krishna	Asst. Professor	Member	
14	S.Naga Raju	Asst. Professor	Member	

Dr.T.Satyanarayana chaired the meeting online https://us02web.zoom.us/j/83672288334?pwd=fICaGRNggGJqx0OpKp5kDGWKpZqH2a.1 and welcomed the University nominee Dr. V.Ravindra, Two Subject Experts outside University, Member Representation from Industry, Alumni member and all the Faculty members of the department to the Third BoS Meeting of Civil Engineering Department held on 27-06-2025 at 10AM. After a brief introduction of all the members of BoS, the agenda items given are taken up for discussion and the resolutions were passed.

AGENDA:

1. To Finalize the Course Structure of III B.Tech I semester & II Semester of SRK23.

2. To Discuss and Ratify the detailed Course content of III B.Tech I Semester & II Semester Syllabus.

3. Any other matter with the permission of Chair.

POINTS OF DISCUSSION:

1) About the Course Structure of III B.Tech I semester & II Semester of SRK 23.

2 About the III B.Tech I Semester & II Semester Syllabus-All the civil engineering core subjects.

3) Suggestions from University nominee, Subject Experts, Industry Expert, Alumni Expert and all other BoS members were taken.

RESOLUTIONS

About III B.Tech, I Semester & II Semester Course Structure & Syllabus:

1) SOFT SKILLS-I, SOFTSKILLS-II AUDIT COURSE were added in III B.Tech I & II Semesters in the Course Structure of SRK23-with no credits basis and was approved University Nominee Dr.V.Ravindra, Subject Experts Dr.A.Ramesh & Dr.T.Gunneswara Rao and all the BOS members.
2) Course Outcomes (CO's) of all subjects in III B.Tech I & II Semesters were updated as per the syllabus requirements, approved by all the BOS members.

3) The following 5 experiments were added to the Fluid Mechanics and Hydraulic Machines Laboratory course in III B.Tech- I Semester and approved by all the BOS members.
    1) Performance test on Pelton wheel.
    2) Efficiency test on Single Stage Centrifugal pump.
    3) Impact of Jet on Vanes.
    4) Performance test of Francis turbine.
    5) Efficiency test on Reciprocating pump.

4) As per, Alumni Member suggested that teaching Water Treatment topic has to be placed before water distribution methods, as it follows the real-life sequence and was approved.
5) Subject Expert Dr.A.Ramesh suggested the following:

    The following units may be rearranged to better align with the course objectives:
    1) Unit III: Highway Materials
    2) Unit IV: Design of Flexible Pavements
    3) Unit V: Design of Rigid Pavements
6) University Nominee Dr.V.Ravindra suggested to see that only 2 Standard Textbooks and any number of Reference Text books.
7) All the suggestions are taken from the University Nominee, Subject Experts, Expert from Industry, Alumni Member and all the faculty members of Civil Engineering Department to make small changes in the Course Syllabus.

T.
BoS CHAIRMAN
Dr.T.Satyanarayana
Professor&Head

CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

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Department of Civil Engineering

III YEAR-I SEMESTER

S. NO	CATEGORY	SUBJECTS	L	T	P	CREDITS
1	PROFESSIONAL CORE	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES	3	0	0	3
2	PROFESSIONAL CORE	ENGINEERING HYDROLOGY	3	0	0	3
3	PROFESSIONAL CORE	GEOTECHNICAL ENGINEERING -I	3	0	0	3
4	PROFESSIONAL ELECTIVE-I	1.ADVANCED STRUCTURAL ANALYSIS 2.ARCHITECTURE AND TOWN PLANNING 3.CONSTRUCTION TECHNOLOGY AND MANAGEMENT	3	0	0	3
5	OPEN ELECTIVE-I	OR Entrepreneurship development & venture creation 1.GREEN BUILDINGS 2.CONSTRUCTION TECHNOLOGY AND MANAGEMENT 3. CLIMATE CHANGE IMPACT ON ECO SYSTEM	3	0	0	3
6	PROFESSIONAL CORE	GEOTECHNICAL ENGINEERING LAB	0	0	3	1.5
7	PROFESSIONAL CORE	FLUID MECHANICS & HYDRAULIC MACHINES LAB	0	0	3	1.5
8	SKILL ENHANCEMENT COURSE	ESTIMATION, SPECIFICATIONS & CONTRACTS	0	1	2	2
9	ENGINEERING SCIENCE	TINKERING LAB	0	0	2	1
10	AUDIT COURSE	SOFT SKILLS -I	0	0	2	-
11	EVALUATION OF COMMUNITY SERVICE INTERNSHIP		-	-	-	2
		Total	15	1	12	23
MC	MINOR COURSE (STUDENT MAY SELECT FROM THE SAME SPECIALIZED MINORS POOL)		3	0	3	4.5
MC	MINOR COURSE THROUGH SWAYAM / NPTEL (MINIMUM 12 WEEK, 3 CREDIT COURSE)		3	0	0	3
HC	HONORS COURSE (STUDENT MAY SELECT FROM THE SAME HONORS POOL)		3	0	0	3
HC	HONORS COURSE (STUDENT MAY SELECT FROM THE SAME HONORS POOL)		3	0	0	3

T. Lalitha
CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
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III YEAR-II SEMESTER

S.NO	CATEGORY	SUBJECTS	L	T	P	CREDITS
1	PROFESSIONAL CORE	DESIGN AND DRAWING OF STEEL STRUCTURES	3	0	0	3
2	PROFESSIONAL CORE	HIGHWAY ENGINEERING	3	0	0	3
3	PROFESSIONAL CORE	ENVIRONMENTAL ENGINEERING	3	0	0	3
4	PROFESSIONAL ELECTIVE-II	1. GROUND IMPROVEMENT TECHNIQUES 2. REPAIR AND REHABILITATION OF STRUCTURES 3 VALUATION AND QUANTITY SURVEY	3	0	0	3
5	PROFESSIONAL ELECTIVE-III	1. FINITE ELEMENT METHOD 2. BRIDGE ENGINEERING 3. WATER RESOURCE ENGINEERING	3	0	0	3
6	OPEN ELECTIVE-II	1.DISATER MANAGEMENT 2.SUSTAINABILITY IN ENGINEERING PRACTICES 3.WATER SUPPLY SYSTEMS	3	0	0	3
7	PROFESSIONAL CORE	ENVIRONMENTAL ENGINEERING LAB	0	0	3	1.5
8	PROFESSIONAL CORE	HIGHWAY ENGINEERING LAB	0	0	3	1.5
9	SKILL ENHANCEMENT COURSE	CAD LAB	0	1	2	2
10	AUDIT COURSE	SOFT SKILLS -II	0	0	2	-
11	AUDIT COURSE	TECHNICAL PAPER WRITING & IPR	2	0	0	-
		Total	20	1	10	23
		Mandatory Industry Internship of 08weeks duration during Summer vacation				
MC	STUDENT MAY SELECT FROM THE SAME MINORS POOL		3	0	3	4.5
MC	MINOR COURSE (STUDENT MAY SELECT FROM THE SAME SPECIALIZED MINORS POOL)		3	0	0	3
HC	STUDENT MAY SELECT FROM THE SAME HONORS POOL		3	0	0	3
HC	HONORS COURSE (STUDENT MAY SELECT FROM THE HONORS POOL)		3	0	0	3

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OPEN ELECTIVES

S.NO	Category	Titles
1	Open Elective -1	1.Green Buildings 2.Construction technology and management 3. Climate Change impact on Eco system
2	Open Elective-2	1.Disater management 2.Sustainability in Engineering practices 3.Water Supply Systems
3	Open Elective-3	1.Building technology for engineers 2.Environmental impact assessment
4	Open Elective-4	1.Geo-Spatial Technologies 2. Solid waste management

Honors Degree courses

1. Introduction to Earthquake Engineering
2. Structural dynamics
3. Traffic Engineering and Management
4. Advanced Hydrology
5. Geosynthetics Engineering: In theory and practice
6. Environmental Geotechnics
7. Seismic Analysis of Structures
8. Environmental Air Pollution
9. Soil Dynamics
10. Advanced Transportation Engineering

Minors Degree

1. Surveying
2. Mechanics of solids
3. Soil Mechanics
4. Fluid Mechanics
5. Civil Engineering- Building Materials and Construction
6. Building Planning and drawing
7. Estimation and Costing
8. Sustainable Materials and Green building
9. Safety in Construction
10. Construction planning and Management

Web link for NPTEL courses: https://nptel.ac.in/courses

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III Year I Semester	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with different types of design philosophies.
2. Equip student with concepts of design of flexural members.
3. Understand Concepts of shear, bond and torsion.
4. Familiarize students with different types of compressions members and Design.
5. Understand different types of footings and their design.

Course Outcomes:

At the end of this course, the student will be able to

a. Demonstrate the knowledge of concrete design philosophies, by working and limit state methodology.
b. Apply the principles, procedures and current code requirements to the analysis and design of reinforced concrete beams under flexure by limit state method.
c. Identify the behavior of RCC members in bond, anchorage, shear and torsion and design the sections for shear, flexure and torsion, check for deflection, cracking as per codal provisions.
d. Analyze and Design reinforced concrete compression members and footings.
e. Analyze and Design reinforced concrete one way, two way slabs and waist slab staircase

SYLLABUS:

UNIT –I

Introduction: Working stress method Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design – Basic statistical principles – Characteristic loads –Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.

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UNIT –II

Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement- Maximum Flexural Steel- Design of Flanged Sections (T)- Effective width of flange – Behavior- Analysis and Design.

UNIT – III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion for L Beam – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.
Limit state design for serviceability: Deflection, cracking and code provision.

UNIT – IV

Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.
Footings: Different types of footings – Design of isolated footings, Square footings – Rectangular footings – circular footing – spread & sloped footings - subjected to axial loads.

UNIT – V

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.
NOTE: All the designs to be taught in Limit State Method. Drawing classes must be conducted every week and the students should prepare the Following plates.

- Reinforcement detailing of T-beams, L-beams and continuous beams and cantilevers.
- Reinforcement detailing of columns and isolated footings.
- Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXTBOOKS:

1. 'Reinforced Concrete Structures' by S. Unnikrishna Pillai &Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2. 'Design of concrete structures' by N. Krishna Raju.

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REFERENCES:

1. 'Limit State Design' by A. K. Jain
2. 'Reinforced Concrete Structures' by Park and Pauley, John Wiley and Sons.

IS Codes:

1) IS -456-2000 (Permitted to use in examination hall)
2) IS – 875,
3) SP-16

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III Year I Semester	ENGINEERING HYDROLOGY	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The course is designed to make the students,

1. Understand hydrologic cycle and its relevance to Civil engineering.
2. Learn physical processes and their interactions in hydrology.
3. Learn measurement and estimation of the components of hydrologic cycle.
4. Have an overview and understanding of Hydrographs.
5. Learn flood frequency analysis, design flood and flood routing methods.
6. Study the concepts of groundwater movement and well hydraulics.

Course Outcomes:

At the end of the course the students are expected to

a. Have a thorough understanding of the theories and principles governing the hydrologic processes.
b. Be able to quantify hydrologic components and apply concepts in hydrologic design of water resources projects.
c. Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
d. Develop design storms and carry out frequency analysis.
e. Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects.
f. Develop unit hydrograph and synthetic hydrograph.
g. Estimate flood magnitude and carry out flood routing.
h. Determine aquifer parameters and yield of wells.

SYLLABUS:

UNIT - I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, introduction to radar measurement of rain fall, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II

Abstractions: Initial abstractions, Evaporation: factors affecting, measurement, estimation, reduction, Evapotranspiration: factors affecting, measurement, estimation, control, Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

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UNIT-III

Runoff: Factors affecting runoff, components, empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, dimensionless unit hydrograph, synthetic unit hydrograph, introduction to IUH.

UNIT-IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT-V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of an open well-recuperation test.

TEXTBOOKS:

1. 'Engineering Hydrology' by Subramanya, K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. 'Engineering Hydrology' by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd., (2013), New Delhi
3. 'Applied hydrology' by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. 'Engineering Hydrology' by Ojha C.S.P, R. Berndtsson and P. Bhunya, Oxford University Press, (2010).

REFERENCES:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology' by Raghunath. H.M., New Age International Publishers, (2010)
3. 'Engineering Hydrology – Principles and Practice' by Ponce V.M., Prentice Hall International, (1994)
4. 'Hydrology and Water Resources Engineering' by Patra K.C., Narosa Publications, (2011).

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III Year I Semester	GEOTECHNICAL ENGINEERING– I	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon successful completion of this course, student will be able to

a. Understand soil formation, its index properties and classification.
b. Understand soil moisture and flow of water through soils and its effects.
c. Understand stress distribution in soils.
d. Understand Compressibility characteristics under partially saturated and fully saturated conditions.
e. Understand shear strength of soil at different loading & drainage conditions for different soils.

SYLLABUS:

UNIT – I

Introduction: Soil formation – Structure of Soils – Texture of Soils – Three phase system and phase relationships.

Index Properties and Classification Tests of Soils: Index properties – Density Index - Grain size analysis – Sieve and Hydrometer methods – Consistency of Clay Soils – Activity of Clays – Thixotropy of clays - soil Classification – Unified soil classification and I.S. Soil classification.

UNIT – II

Soil moisture and Capillarity: Soil moisture and modes of occurrence – Total, Neutral and Effective Pressures – Capillary Rise in soils.

Permeability: Flow of water through soils – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems.

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UNIT –III

Seepage and Flow Nets: Flow net for one-dimensional flow – two-dimensional flow – Basic equation for Seepage – Flow nets & Characteristics and Uses – Quicksand condition – Seepage forces

Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method. - Pressure Blubs.

UNIT – IV

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT - V

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – total and effective shear strength parameters – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions – stress paths.

TEXTBOOKS:

1. 'Soil Mechanics and Foundation Engineering by Dr. K.R. Arora, Standard Publishers and Distributors, New Delhi.
2. 'Soil Mechanics and Foundation Engineering' by V.N.S.Murthy ,CBS publishers

REFERENCES:

1. 'Fundamentals of Soil Mechanics' by D.W.Taylor., Wiley.
2. 'An introduction to Geotechnical Engineering' by Holtz and Kovacs; Prentice Hall.
3. 'Geotechnical Engineering' by C. Venkataramaiah, New Age International Publishers.
4. Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.

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III Year I Semester	ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
		3	0	0	3

Course Outcomes:

At the end of this course, the student will be able to

a. Calculate the deflections in beams pin jointed frames using energy theorems and analyze indeterminate trusses.
b. Analyze three hinged and two hinged arches.
c. Analyze the frames for gravity and lateral loads using approximate methods.
d. Analyze cables and suspension bridge structures.
e. Analyze structures using moment distribution method, Kanis method.

UNIT–I

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed plane trusses.

INDETERMINATE TRUSSES: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano's second theorem.

UNIT II

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches – (No analytical question).

UNIT-III Approximate Methods of Analyses: Application to building frames. (i) Portal Method (ii) Cantilever Method (iii) Substitute frame method for approximate analysis of multi-storey frames subjected to gravity loads and lateral loads. Shear force and bending moment diagrams - Elastic curve.

UNIT – IV Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

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UNIT – V Moment Distribution Method: Analysis of Portal frames – including Sway-Substitute frame analysis by two cycle. Sloped eflection method: Analysis of Portal frames – including Sway. Analysis of inclined frames. Shear force and bending moment diagrams - Elastic curve.

Kani's Method: Analysis of continuous beams–including settlement of supports and single bay portal frames with and without side sway. Shear force and bending moment diagrams - Elastic curve.

Text Books:

1. Structural Analysis: A Matrix Approach, G.S.Pandit and S.P.Gupta, Mc Graw Hill Pvt Ltd.
2. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi.

References:

1. Mechanics of Structures Vol – II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt. Ltd.
3. Structural Analysis by R.C. Hibbeler, Pearson, New Delhi.

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III Year I Semester	ARCHITECTURE AND TOWN PLANNING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objectives of this course are:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, and Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. Enabling the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, landscaping and expansion of towns.

Course Outcomes:

Upon the successful completion of this course, the student should be able to:

a. Distinguish architectural styles of eastern and western world.
b. Understand the importance of Orders of architecture.
c. Compose spaces of buildings using design concepts, planning principles.
d. Understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.

UNIT–I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures-Orders. Indian Architecture: Vedic age, Indus valley civilization.

Temples of Religions: Buddhist period: Stambas, Stupas, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhubaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT-II

Principles of designing and Planning: Principles of planning a residence-site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.

Post-classic Architecture: Introduction of post-classic architecture-contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

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UNIT–III

Historical Back Ground of Town Planning: Town planning in India –Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjo- Daro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT–IV

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- Neighborhood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation-planning regulations and limitations.

UNIT–V

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns-garden cities, satellite towns-floating towns-skyscrapers-pyramidal cities.

TEXT BOOKS:

1. 'The great ages of World Architecture 'by G.K.Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y.S.Sane.
3. 'Professional Practice'by G.K. Krishnamurthy, S.V.Ravindra, PHI Learning,New Delhi.
4. 'Indian Architecture–Vol.I&II'byPercy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning' by G.K.Haraskar.

REFERENCES:

1. 'Drafting and Design for Architecture'by Hepler, Cengage Learning
2. 'Architect's Portable Hand book' by John Patten Guthrie–McGraw Hill International Publications.
3. 'Modern Ideal Homes for India'by R.S.Deshpande.
4. 'Town and County Planning' by A.J.Brown and H.M.Sherrard.
5. 'Town Design'by Federik Glbbard, Architectural press,London.

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III Year I Semester	CONSTRUCTION TECHNOLOGY & MANAGEMENT	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. To introduce the importance of safety in construction projects

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Appreciate the importance of construction planning.
b. Understand the functioning of various earth moving equipment.
c. Know the methods of production of aggregate products and concreting.
d. Apply the gained knowledge to project management and construction techniques.
e. Know the different construction methods like earthwork, piling etc.

UNIT-I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.

UNIT-II

Project evaluation and review technique–cost analysis updating crashing for optimum cost–crashing for optimum resources–allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

UNIT-III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

Hoisting and earth work equipment–hoists–cranes–tractors-bulldozers–graders–scrapers–draglines-clam shell buckets.

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UNIT-IV

Concreting equipment— concrete mixers– Batching plants, mobile using plants like "Ajax"etc. mixing and placing of concrete – consolidating and finishing.

UNIT-V

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling).

TEXTBOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar NeerajJha(2011), Pearson.

REFERENCES:

1. 'Construction Project Management-An Integrated Approach'by Peter Fewings,Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by TreforWilliams , Cengage learning
3. 'Construction Technology' by Subir K.Sarkar and Subhajit Sarasvati, Oxford University press

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III Year I Semester	GREENBUILDINGS	L	T	P	C
		3	0	0	3

Course Outcomes:

a. To imbibe basics of green design and sustainable development concept.
b. To understand different features & and approaches in GREEN Buildings
c. To Study about the renewable energy sources & efficiencies in Green buildings
d. To know about the guidelines for the different design philosophies in green buildings
e. To understand the about energy conversations involved in Green buildings

UNIT – 1:

Introduction

What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building.

UNIT – 2:

Green Building Concepts And Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

UNIT-3:

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Eco friendly captive power generation for factory, Building requirement,

UNIT- 4:

Air Conditioning Introduction, CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement.

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UNIT –5:

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tom woolley and Samkimings, 2009. Recommended References:
3. Complete Guide to Green Buildings by Trish riley
4. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

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Department of Civil Engineering

III Year I Semester	CONSTRUCTION TECHNOLOGY AND MANAGEMENT	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. To introduce the importance of safety in construction projects

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Appreciate the importance of construction planning.
b. Understand the functioning of various earth moving equipment.
c. Know the methods of production of aggregate products and concreting.
d. Apply the gained knowledge to project management and construction techniques.
e. Know the different construction methods like earthwork, piling etc.

SYLLABUS:

UNIT-I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.

UNIT-II

Project evaluation and review technique–cost analysis-updating–crashing for optimum cost–crashing for optimum resources–allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

UNIT-III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

Hoisting and earth work equipment–hoists–cranes–tractors-bulldozers–graders–scrapers–draglines-clam shell buckets.

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UNIT-IV

Concreting equipment— concrete mixers--Batching plants, mobile using plants like "Ajax" etc. mixing and placing of concrete – consolidating and finishing.

UNIT-V

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling).

TEXTBOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar NeerajJha (2011), Pearson.

REFERENCES:

1. 'Construction Project Management-An Integrated Approach 'by Peter Fewings, Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams , Cengage learning
3. 'Construction Technology' by Subir K.Sarkarand Subhajit Sarasvati, Oxford University press

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III Year I Semester	CLIMATE CHANGE IMPACT ON ECO-SYSTEM	L	T	P	C
		3	0	0	3

UNIT I:
Climate System; Climate, weather and Climate Change; Overview of Earth's Atmosphere; Vertical Structure of Atmosphere; Radiation and Temperature; Laws of Radiation; Heat-Balance of Earth Atmosphere System; Random Temperature Variation; Modelling Vertical Variation in Air Temperature; Temporal Variation of Air temperature; Temperature Change in Soil; Thermal Time and Temperature Extremes.

UNIT II:
Hydrologic Cycle: Introduction; Global water balance; Cycling of water on land, a simple water balance model.

UNIT III:
Climate Variables affecting Precipitation: Precipitation and Weather, Humidity, Vapor Pressure, Forms of Precipitation, Types of Precipitation; Cloud; Atmospheric Stability; Monsoon; Wind Pattern in India; Global Wind Circulation; Evaporation and Transpiration, Processes of Vadose Zone, Surface Runoff, Stream flow.

UNIT IV:
Climate Variability: Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

UNIT V:
Climate Change: Introduction; Causes of Climate Change; Modeling of Climate Change, Global Climate Models, General Circulation Models, Downscaling; IPCC Scenarios.

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III Year I Semester	GEOTECHNICAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Learning Objectives:

The objective of this course is

1. To determine the index properties for soil classification-- Grain size distribution & Atterberg's limits.
2. To determine the engineering properties–Permeability, Compaction, consolidation, shear strength parameters & CBR value.
3. To find the degree of swelling by DFS test.
4. To impart knowledge of determination of index properties required for classification of soils.
5. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
6. To teach how to determines hear parameters of soil through different laboratory tests.

Outcomes:

a) Upon successful completion of this course, student will be able to
b) Determine index properties of soil and classify them.
c) Determine permeability of soils.
d) Determine Compaction, Consolidation and shear strength characteristics.

SYLLABUS:

LISTOFEXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Permeability of soil-Constant and Variable head tests
6. Compaction test
7. Consolidation test (to be demonstrated)
8. Direct Sheartest
9. Triaxial Compression test
10. Unconfined Compression test
11. VaneSheartest
12. Differential freeswell (DFS)
13. Field Plate Load Test demo
14. Field CBR demo

Atleast **Eight** experiments shall be conducted.

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LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrink age limits
3. Field density apparatus for

a) Core cutter method

b) Sand replacement method

4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus for

a) Constant head test

b) Variable head test

7. Universal auto compactor fo rI. Slight and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10tons loading frame with proving rings of 0.5 tons and 5tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38mm dia specimens.
13. Box shear test apparatus
14. Laboratory vanesh ear apparatus.
15. Hot air ovens (rangeoftemperature50^0-150^0C)
16. Field plate load Test equipment
17. Field CBR test equipment

References:

1. 'Determination of Soil Properties'by J.E.Bowles.
2. IS Code2720 –relevant parts.

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III Year I Semester	FLUID MECHANICS AND HYDRAULIC MACHINES LAB	L	T	P	C
		0	0	3	1.5

1. Verification of Bernoullis' equation.
2. Calibration of Venturimeter.
3. Calibration of orificemeter.
4. Determination of coefficient of discharge of a small orifice by constant head method
5. Determination of coefficient of discharge of an external cylindrical mouth piece by variable head method.
6. Calibration of a contracted rectangular notch.
7. Calibration of a triangular notch.
8. Determination of friction factor of the pipe material.
9. Determination of coefficient of dead loss due to a sudden expansion/ contraction in a pipeline.
10. Determination of head loss coefficient due to a bend in pipeline.
11. Performance test on Pelton wheel.
12. Efficiency test on Single stage centrifugal pump.
13. Impact of jet on vanes.
14. Performance test of Francis turbine.
15. Efficiency test on Reciprocating pump.

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		L	T	P	C
III Year	**ESTIMATION, SPECIFICATION AND CONTRACTS**	**0**	**1**	**2**	**2**
I Semester					

Course Learning Objectives:
The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

Course Outcomes:
Upon the successful completion of this course:

a. The student should be able to determine the quantities of different components of buildings.
b. The student should be in a position of find the cost of various building components.
c. The student should be capable of finalizing the value of structures.

UNIT–I
Contracts–Types of contracts–Contract Documents–Conditions of contract, Valuation of buildings- concepts of e-procurement and reverse auctions. Standard specifications for different items of building construction.

UNIT–II
General items of work in Building–Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT–III
Rate Analysis– Working out data for various items of work over head and contingent charges. Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

UNIT-IV
Detailed Estimation of Buildings using individual wall method for single, double and four roomed buildings.

UNIT-V
Detailed Estimation of Buildings using centre line method for single, double and four roomed buildings. Standard software's like building estimator etc.

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TEXT BOOKS:

1. 'Estimating and Costing' by B.N.Dutta,UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B.S.Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. 'Estimating and Costing'by G.S. Birdie.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS1200 (PartsItoXXV-1974/ Method of Measurement of Building & Civil Engg Works–B.I.S.)
3. 'Estimation, Costing and Specifications' by M.Chakraborthi; Laxmi publications.
4. National Building Code

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III Year I Semester	TINKERING LAB	L	T	P	C
		0	0	2	1

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Objectives: To

1. Encourage Innovation and Creativity

2. Provide Hands-on Learning

3. Impart Skill Development

4. Foster Collaboration and Teamwork

5. Enable Interdisciplinary Learning

6. Impart Problem-Solving mind-set

7. Prepare for Industry and Entrepreneurship

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

1) Make your own parallel and series circuits using breadboard for any application of your choice.

2) Demonstrate a traffic light circuit-using breadboard.

3) Build and demonstrate automatic Street Light using LDR.

4) Simulate the Arduino LED blinking activity in Tinkercad.

5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.

6) Interfacing IR Sensor and Servo Motor with Arduino.

7) Blink LED using ESP32.

8) LDR Interfacing with ESP32.

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9) Control an LED using Mobile App.

10) Design and 3D print a Walking Robot

11) Design and 3D Print a Rocket.

12) Build a live soil moisture-monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.

13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf

2) https://atl.aim.gov.in/ATL-Equipment-Manual/

3) https://aim.gov.in/pdf/Level-1.pdf

4) https://aim.gov.in/pdf/Level-2.pdf

5) https://aim.gov.in/pdf/Level-3.pdf

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.

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III Year I Semester	SOFT SKILLS I	L	T	P	C
		0	0	2	-

Course Objectives:

a. To prepare to face global competition for employment and excellence in profession.
b. To help the students understand and build interpersonal and interpersonal skillsthat will enable them to lead meaningful professional life.

UNIT-1

Introduction: Soft Skills vs. Life Skills, Emergence, Importance & need of life skills, reasons for skill gap, analysis.

Personality development, Use of polite language & Personal growth

UNIT-II

Presentation Skills: Process, Planning and Presentation, Types of Presentation: Written & Oral presentations, PPT'S, use of appropriate language.

UNIT-III

Group Discussions: Purpose, Guidelines, Leading spirit, clarity of voice, convincing with politeness, listening to others, develop managerial skills.

UNIT-IV:

Verbal ability: Speaking, Reading - need-types. Importance –Improving.

Writing skills: Report, Resume and Statement of Purpose.

Statements – arguments, Statements - conclusions

UNIT-V

Listening and speaking skills: Listening skills - IELTS, Listening for Note taking.

Speaking skills- JAM, Public speaking –Process & procedure.

Text Books:

1. Sherfield, M. Robert at al, Corner stone Developing Soft Skills, 4/e, Pearson Publication,New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

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Reference Books:

1. Ajay Singh, Verbal Ability and Reading Comprehension Arihanth publications India. New Delhi. 2018.
2. R S Agarwal A Modern approach to verbal reasoning, S Chand Publishing, New Delhi. 2008.
3. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014
4. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
5. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
7. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc20_hs60/preview
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

Course Outcomes:

. At the end of the Course, Student will be able to

- Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
- Understand the significance of soft skills in the working environment for professional excellence.
- Prepare to undergo the placement process with confidence and clarity.
- Ready to face any situation in life and equip themselves to handle them effectively.
- Understand and learn the importance of etiquette in both professional and personal life.

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III Year I Semester	EVALUATION OF COMMUNITY SERVICE INTERNSHIP	L	T	P	C
		-	-	-	2

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III Year II Semester	DESIGN AND DRAWING OF STEEL STRUCTURES	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of connections and relevant IS codes
2. Equip student with the concepts of designing flexural members
3. Understand design concepts of tension and compression members in trusses
4. Familiarize students with different types of columns and column bases and their design
5. Familiarize students with Plate girder and Gantry Girder and their design

Course Outcomes:

At the end of this course the student will be able to

a. Analyze and design steel structural members with relevant IS codes
b. Carryout analysis and design of flexural members and detailing
c. Design compression members of different types with connection detailing
d. Design Plate Girder and Gantry Girder with connection detailing
e. Produce the drawings pertaining to different components of steel structures

SYLLABUS:

UNIT – I

Connections: Riveted connections – definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III

Tension Members and compression members: Effective length of members, slenderness ratio-permissible stresses. Design compression members subjected to axial and eccentric loading. Design of members subjected to direct tension and bending. **Roof Trusses:** Different types of roof trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of purlins, members and joints.

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UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected to moment.

UNIT – V

Design of Plate Girder: Design consideration – IS Code Recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II – V. Drawing classes must be conducted every week and the students should prepare the following plates.

Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including joint details.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.
Plate 7 Detailing of gantry girder.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXTBOOKS

1. 'Steel Structures Design and Practice' by N.Subramanian, Oxford University Press.
2. 'Design of steel structures' by S.K. Duggal, Tata Mcgraw Hill, and New Delhi

REFERENCES

1. 'Structural Design in Steel' by SarwarAlamRaz, New Age International Publishers, New Delhi
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers
3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press,
5. 'Design of Steel Structures' by Ramachandra, Vol – 1, Universities Press.

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III Year II Semester	HIGHWAY ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objectives of this course are:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To acquire design principles of Intersections

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Plan highway network for a given area.
b. Determine Highway alignment and design highway geometrics.
c. Design Intersections and prepare traffic management plans.
d. Judge suitability of pavement materials.
e. Design flexible and rigid pavements.

UNIT- I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021,Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment-Factors affecting Alignment-Engineering Surveys – Drawings and Reports.

UNIT – II

Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical Alignment- Gradients- Vertical curves.

UNIT –III

Highway Materials: Sub grade soil: classification –Subgrade soil strength –California Bearing Ratio–Modulus of Subgrade Reaction. Stone aggregates: Desirable properties– Tests for Road Aggregates–Bituminous Materials: Types–Desirable properties—Testson Bitumen - Bituminous paving mixes: Requirements- resilient modulus of bituminous mixes – Marshall Method of Mix Design.

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UNIT–IV

Design of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors.

Flexible Pavements: Design factors–Flexible Pavement Design Methods–CBR method–IRC method–Burmister method–Mechanistic method–IRC Method for Low volume Flexible pavements.

UNIT–IV

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses–Combination of stresses–Design of slabs–Design of Joints–IRC method–Rigidpavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXTBOOKS:

1. Highway Engineering, Khanna S.K., Justo C.E.G and Veeraragavan A,Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, KadiyaliL. R,Khanna Publishers, New Delhi.

REFERENCES:

1. Principles of Highway Engineering, KadiyaliL .R,Khanna Publishers, NewDelhi.
2. Principles of Transportation Engineering, Partha Chakraborty and Animesh Das,PHI Learning Private Limited, Delhi.
3. **IRC: 37-2018-** Guidelines for Design of Flexible pavements
4. **IRC: 58-2015-** Guidelines for Design of Plain Jointed Rigid pavements for Highways.

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III Year II Semester	ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of water quality requirement for domestic usage and knowledge on design of water distribution network
3. Selection of valves and fixture in water distribution systems
4. Outline the planning and design of Sewerage System for a community/town/city
5. To impart knowledge on waste water treatment and disposal

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. To understand the importance plan, identify the water sources, estimate the demand and design the water supply system.
b. To understand the water quality requirements for usage and design the water distribution networks.
c. Select the suitable treatment methods for raw water treatment and design
d. To understand the sewage characters, plan and design the sewage systems.
e. To understand the wastewater treatment and decide the methods of disposal of waste water.

SYLLABUS:

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems. Water borne diseases. Planning of public water supply systems. Per capita demand and factors influencing it, types of water demands and its variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

Sources of Water: Various surface and subsurface sources considered for water supply and their comparison- Capacity of storage reservoirs, Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes and Pipe joints.

UNIT-II

Quality and Analysis of Water: Physical, Chemical and Biological characteristics of water. Water quality criteria for different uses- Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.

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Treatment of Water: Typical treatment flow of a municipal water treatment plant, Unit operations of water treatment: Theory and Design of Sedimentation, Coagulation, flocculation, Filtration, Water conditioning and softening, Disinfection, Removal of color and odors – Removal of Iron and manganese – Fluoridation and De-fluoridation –Ion Exchange - Ultra filtration- Reverse Osmosis.

UNIT-III

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines.

UNIT-IV

Planning and Design of Sewerage System

Characteristics and composition of sewage — population equivalent -Sanitary sewage flow estimation — Sewer materials — Hydraulics of flow in sanitary sewers — Sewer design — Storm drainage-Storm runoff estimation — sewer appurtenances — corrosion in sewers — prevention and control — sewage pumping-drainage in buildings-plumbing systems for drainage Primary Treatment of Sewage.

Objectives — Unit Operations and Processes — Selection of treatment processes — Onsite sanitation — Septic tank- Grey water harvesting — Primary treatment — Principles, functions and design of sewage treatment units — screens — grit chamber-primary sedimentation tanks — Construction, Operation and Maintenance aspects.

UNIT–V

Secondary Treatment of Sewage

Objectives — Selection of Treatment Methods — Principles, Functions, — Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor (SBR) — Membrane Bioreactor — UASB — Waste Stabilization Ponds — Other treatment methods -Reclamation and Reuse of sewage — Recent Advances in Sewage Treatment — Construction, Operation and Maintenance aspects.

Disposal of Sewage

Standards for– Disposal — Methods — dilution — Mass balance principle — Self purification of river - Oxygen sag curve — de-oxygenation and re-aeration — Streeter–Phelps model — Land disposal — Sewage farming — sodium hazards — Soil dispersion system.

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TEXT BOOKS

1. Water Supply and Sanitary Engineering – G.S. Birdie and J.S. Birdie
2. Water Supply Engineering. Dr. P.N. Modi, Standard Book House, Delhi.

REFERENCES

1. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi.
2. Water Supply Engineering.– Dr. B.C. Punmia, A.K. Jain and A.K. Jain. Laxmi Publications (P) Ltd., New Delhi.
3. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – McGraw-Hill Book Company, New Delhi, 1985.

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III Year II Semester	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objective of this course is:

1. To make the student appreciate the need for different ground improvement methods adoptedforimprovingtheproperties ofremoldedandin-situsoilsbyadoptingdifferent techniques such as in situ densification and dewatering methods.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geo synthetics can be used to improve the engineering performance of soils.
4. To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

a. The student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
b. The student should be able to understand the concepts and applications of various dewatering techniques.
c. The student should be able to understand various methods for stabilization methods and the concepts and applications of grouting.
d. The student should be in a position to design a reinforced earth embankment and check its stability.
e. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.

UNIT-I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – insitudensification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT-II

Dewatering–sumps and interceptor ditches –single and multi-stage well points–vacuum well points, horizontal wells – criteria for choice of filler material around drains – electro osmosis.

UNIT- III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization–use of industrial wastes like fly a shand granulated blast furnace slag.

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Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting–hydraulic fracturing in soils and rocks –post grouttests. Introduction to Liquefaction & its effects & applications.

UNIT-IV

Reinforced earth–principles–components of reinforced earth–design principles of reinforced earth walls – stability checks – soil nailing.

UNIT-V

Geosynthetics–geotextiles–types–functions, properties and applications – geogrids, geomembranes and gabions - properties and applications.

TEXT BOOKS:

1. 'Ground Improvement Techniques' by Purus Hotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro,Vikas Publishing House(p) limited ,New Delhi.

REFERENC EBOOKS:

1. 'Ground Improvement 'by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics 'by RM Koerner, Prentice Hall.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

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III Year II Semester	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

a. Recognize the mechanisms of degradation of concrete structures and to design durable Concrete structures.
b. Conduct field monitoring and non-destructive evaluation of concrete structures.
c. Design and suggest repair strategies for deteriorated concrete structures including
d. Repairing with composites
e. Understand the methods of strengthening methods for concrete structures
f. Assessment of the service ability and residual life span of concrete structures by Visual inspection and in situ tests

UNIT:I

Materials for repair and rehabilitation-Admixtures-types of admixtures-purposes of using admixtures-chemical composition-Natural admixtures-Fibers-wraps-Glass and Carbon fiber wraps-Steel Plates-Nondestructive evaluation :Importance-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects –Visual investigation- Acoustical emission methods-Corrosion activity measurement- chloride content–Depth of carbonation-Impact echo methods-Ultra sound pulse velocity methods- pull out tests.

UNIT:II

Strengthening and stabilization-Techniques-design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening-Connection stabilization and strengthening, Crack stabilization.

UNIT:III

Bonded installation techniques-Externally bonded FRP-Wetlay upsheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding-CDC debonding-plate end de bonding-strengthening of floor of structures post grout tests. Introduction to Liquefaction & its effects & applications.

UNIT:IV

Fiber reinforced concrete-Properties of constituent materials-Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete-applications of fiber reinforced concretes-Light weight concrete-properties of light weight concrete-No fines concrete-design of light weight concrete-Fly ash concrete-Introduction-classification of fly

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ash-properties and reaction mechanism of fly ash-Properties of fly ash concrete in fresh state and hardened state-Durability of fly ash concretes

UNIT:V

High performance concretes-Introduction-Development of high performance concretes-Materials of high performance concretes-Properties of high performance concretes-Self Consolidating concrete-properties-qualifications.

TEXT BOOKS

1. Maintenance Repair Rehabilitation & Minor works of Buildings -P.C.Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures--P.I.Modi,C.N.Patel,PHI Publications

REFERENCE:

1. Concrete Technology Theory and Practice-M.S.Shetty,SChandand Company
2. Concrete Repair and Maintenance illustrated-PeterHEmmons
3. Concrete Chemical Theory and Applications-Santa Kumar A.R.,Indian Society for Construction Engineering and Technology, Madras
4. Hand book on Repair and Rehabilitation of RC Buildings published by CPWD, Delhi
5. Rehabilitation of Concrete Structures-B.Vidivelli,Standard Publishers Distributors
6. Concrete Bridge Practice Construction Maintenance & Rehabilitation-V.K.Raina, Shroff Publishers and Distributors.

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III Year II Semester	VALUATION AND QUANTITY SURVEY	L	T	P	C
		3	0	0	3

Outcomes

a. Define basic terms related to estimation, quantity surveying and contract document Interpret the item of work from drawings and explain its general specification and unit of measurement
b. Make use of given data from CPWDDAR/DSR for calculating the unit rate of different items of work associated with building Construction
c. Develop detailed measurement (including BBS) and BoQofa various work like buildings, earth work for road, sanitary and water supply work
d. Explain various basic terms related to valuation of land and Building
e. Develop valuation of buildings using different methods of valuation.

UNIT I

Introduction- Quantity Surveying- Basic principles, Role/responsibility of Quantity surveyor at various stages of construction. Estimate-Details required, Type of estimate, purposes. Contingencies, Work-charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only)Bill of Quantity-Typical format-use Item of works-Identifyvariousitemofworkfromthedrawings-unitsofmeasurementofvarious materials and works (focus may give to RCC residential building) General rule & method of measurement with reference to Indian Standard Specifications- IS1200.

UNIT II

Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR. Specifications-Generalspecificationofallitemsofaresidentialbuilding.Detailed specification (CPWD specifications) of major item of work like Earth work excavation in foundation, masonry, Reinforced cement concrete, finishing of building work Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given).

UNIT III

Detailed Estimate- Preparation of detailed measurement using Centre line method & Short wall long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin- Residential/office/school building. BOQ preparation of a single storied RCC building work. Material quantity calculation of the items of work (Rubble, Brick work, Concrete work, Plastering) in detailed estimate prepared for building work. (Data for unit quantity should be provided from DAR).

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UNIT IV.

Bar Bending Schedule- Preparation of BBS of RCC beams, slabs, Column footings, Retaining wall. Road estimation-Estimation of earthwork from longitudinal section-metaled road. Estimation of sanitary and water supply work -Water tank, Septic tank, Manhole (No Detailed estimate needed-concept of item of work, its general specification and unit of measurement).(Valuation – purpose, factor affecting, introduction to terms-Value, Cost, Price, kinds of values Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase, Depreciation, obsolescence -Free hold and leasehold properties.)

UNIT V

Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey method.

Methods of valuation–rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Various method of valuation of land (Brief description only).

Text Books:

1. B.N.Dutta, Estimation and costing in civil engineering, UBS publishers
2. Rangwala, Estimation Costing and Valuation, Charotar publishing house pvt.ltd
3. Dr. S. Seetha Raman, M.Chinna swami, Estimation and quantity surveying, Anuradha publications Chennai.
4. M Chakraborthy, Estimating, Costing, Specification and valuation, published by the author, 21 B, Babanda Road, Calcutta 26

References:

1. BS Patil, Civil Engineering contracts and estimates, university press
2. VNVazirani & SPChandola, Civil Engineering Estimation and Costing, Khanna Publishers
3. IS1200-1968; Methods of measurement of building & civil engineering works
4. CPWDDAR2018andDSR2018orlatest
5. CPWDSpecificationsVol1&2(2019orlatestedition)

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III Year II Semester	FINITE ELEMENT METHOD	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

a. Develop finite element formulations of 1degree of freedom problems and solve Them
b. Understand any Finite Elements of ware to perform stress, thermal and modal Analysis
c. Compute the stiffness matrices of different elements and system
d. Interpret displacements, strains and stress resultants
e. Analyze planar structural systems using finite element modeling

UNIT I

Introduction: Review of stiffness method-Principle of Stationary potential energy-Potential energy of anelastic body-Rayleigh-Ritz method of functional approximation-variational approaches- weighted residual methods

UNIT II

Finite Element formulation of truss element: Stiffness matrix-properties of stiffness matrix –Selection of approximate displacement functions-solution of a planetruss-transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports-Galerkin's methodfor1-Dtruss– Computation of stress in a truss element.

UNIT III

Finite element formulation of Beam elements: Beam stiffness-assemble age of beam stiffen matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin's method – 2 Darbitrarily oriented beam element–inclined and skewed supports–rigid plane frame examples

UNIT IV

Finite element formulation for plane stress, plane strain and axi symmetric problems-Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems-comparison of CST and LST elements– convergence of solution-interpretation of stresses

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UNIT V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element-shape functions, evaluation of stiffness matrix, consistent modalload vector- Gauss quadrature-appropriate order of quadrature–element and mesh instabilities–spurious zero energy modes, stress computation-patch test.

TEXTBOOKS

1. A first course in the Finite Element Method–Daryl L.Logan, Thomson Publications.
2. Concepts and applications of Finite Element Analysis–Robert D.Cook, Michael EPlesha, JohnWiley & Sons Publications.

REFERENCES:

1. Introduction to Finite Elements in Engineering-Tirupati R.Chandrupatla, Ashok D. Belgunda, PHI publications.
2. Finite Element Methods (For Structural Engineers)Wail N Rifaie, Ashok K Govil, New Age International(P)Limited

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III Year II Semester	BRIDGE ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of Bridges and IRC standards
2. Equip student with the concepts and design of Slab Bridges,T Beam Bridges,Box Culverts
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and their maintenance

Course Outcomes:

At the end of this course the student will be able to

a. Explain different types of Bridges with diagrams and Loading standards
b. Carry out analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
c. Carry out analysis and design of Plate girder bridges
d. Organize for attending inspections and maintenance of bridges and prepare reports.

SYLLABUS:

UNIT-I

General Introduction to types of Bridges- (Slab bridges, TBeam, Arch bridges, Cable Stayed bridges, pre stressed concrete bridges, Truss Bridges, Culverts) - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT-II

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs-dispersion length-Design of interior panel of slab-Guyon's–Massonet Method–Hendry-Jaegar Methods- Courbon's theory- Pigeaud's method.

UNIT-III

T-Beam bridges- Analysis and design of various elements of bridge–Design of deck slab, longitudinal girders, Secondary beams- Reinforcement detailing.

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UNIT-IV

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

UNIT-V

Box Culverts: Loading–Analysis and Design-Reinforcement detailing.
Inspection and Maintenance of Bridges: Procedures and methods for inspection Testing of bridges- Maintenance of Sub Structures and Super structures-Maintenance of bearings-Maintenance Schedules.

TEXTBOOK

1. 'Essentials of Bridge Engineering 'by Johnson Victor D.
2. 'Design of Bridges' by Krishna Raju.

REFERENCES:

1. 'Design of Concrete Bridges' by Aswini, Vazirani,Ratwani.
2. 'Design of Steel Structures' by B.C.Punmai, Jain & Jain, Lakshmi Publications.
3. Design of Bridge Structures' by T.R. Jagadeesh, M.A. Jayaram, PHI.

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III Year II Semester	WATER RESOURCES ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The course is designed to make the students,

1. Learn the types of irrigation systems.
2. Understand the concepts of planning and design of irrigation systems.
3. Study the relationships among soil, water and plant and their significance in planning an irrigation system.
4. Understand design principles of erodible and non-erodible canals.
5. Know the principles of design of weirs on permeable foundations.
6. Know the concepts for analysis and design of storage head works.
7. Learn design principles of canal structures.

Course Outcomes

At the end of the course the student will be able to

a. Estimate irrigation water requirements.
b. Design irrigation canals
c. Design irrigation canal structures
d. Plan and design diversion head works
e. Analyze stability of gravity and earth dams.
f. Design hydraulic ogee spillways

SYLLABUS:

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals - Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

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UNIT- III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall. (Description only).

Regulators: Head and cross regulators, design principles (Description only).

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage. (Description only).

Outlets: Types, proportionality, sensitivity and flexibility.

River Training: Objectives and approaches.

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis.

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates.

TEXTBOOKS:

1. 'Irrigation and Waterpower Engineering' by Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi
2. 'Irrigation Water Resources and Waterpower Engineering' by Modi P N (2011), Standard Book House, New Delhi

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REFERENCES:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T. K (2012), S. Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.
4. 'Irrigation and Water Resources Engineering' by Asawa G L (2013), New Age International Publishers
5. 'Irrigation Engineering' by Raghunath H.M (2012), Wiley India.

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III Year II Semester	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre- disaster and post-disaster activities. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations.
2. Understand the 'relief system' and the 'disaster victim.' Understand how the phases of each are parallel and how they differ.
3. Describe the three planning strategies useful in mitigation.
4. Identify the regulatory controls used in hazard management.
5. Describe public awareness and economic incentive possibilities; understand the tools of post-disaster management.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. To understand the concepts, inter disciplinary nature of the disaster management and case studies.
b. Distinguish between the different approaches needed to manage pre- during and post- disaster periods.
c. Explain the process of risk management.
d. Relate to risk transfer.
e. Affirm the usefulness of integrating management principles in disaster mitigation work.

SYLLABUS:
UNIT-I
Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II
Man Made Disaster and Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

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UNIT-III

Risk and Vulnerability: Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

UNIT-IV

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations-roads and bridges- mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

UNIT-V

Multi-sectional Issues, Education and Community Preparedness: Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXT BOOKS:

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Punblishers& Distributors Pvt.Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., NewDelhi.
4. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universitiespress.
2. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universitiespress.R. Nishith, Singh AK,
3. "Disaster Management in India: Perspectives, Issues and strategies" New Royal BookCompany."

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III Year II Semester	SUSTAINABILITY IN ENGINEERING PRACTICES	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

a. Explain sustainable development and different environmental agreements and protocols.
b. Discuss real time activities causing environmental issues and different methods to use renewable energy resources.
c. Explain local and global environmental issues.
d. Differentiate between carbon emissions for regular and sustainable cities and explain different practices to move industries towards sustainability.
e. Discuss different renewable energy resources and explain methods to implement green technology.

UNIT-I

Introduction to Sustainable Engineering- Sustainable development, concepts of sustainable development: three pillar model, egg of sustainability model, Atkisson's pyramid model, prism model, principles of sustainable development, sustainable engineering, threats for sustainability.

Environmental Ethics and Legislations – Environmental ethics and education, multilateral environmental agreements and protocols, enforcement of environmental laws in India – The Water Act, The Air Act, The Environment Act.

UNIT-II

Local Environmental Issues- Solid waste, impact of solid waste on natural resources, zero waste concept and three R concept, waste to energy technology: thermo-chemical conversion, biochemical conversion.

Global Environmental Issues- Resource degradation: deterioration of water resources, land degradation, air pollution, climate change and global warming, ozone layer depletion, carbon footprint, carbon trading.

UNIT-III

Tools for Sustainability - Environmental management System (EMS), concept of ISO14000, life cycle assessment (LCA): basic components, advantages, disadvantages, case study. Environmental impact assessment (EIA), environmental auditing, bio mimicking, case studies.

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UNIT-IV

Sustainable Habitat - Concept of green building, green building materials, green building certification and rating: green rating for integrated habitat assessment(GRIHA),leader ship in energy and environmental design (LEED) rating, energy efficient buildings, sustainable cities, sustainable transport, sustainable pavements, case studies in sustainability engineering: Green building, sustainable city, sustainable transport system.

Sustainable Industrialization and Urbanization – Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.

UNIT-V

Renewable energy resources- Conventional and non- conventional forms of energy, solar energy, fuel cells, wind energy, small hydroplants, biogas systems, biofuels, energy from ocean, geothermal energy, conservation of energy.

Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing

Text Book:

R.L. Ragand Lekshmi Dinachandran Remesh. Introduction to Sustainable Engineering. 2nd Edition, PHI Learning Pvt. Ltd., 2016.

References:

1. D.T.AllenandD.R.Shonnard.SustainabilityEngineering:Concepts,Design and Case Studies, 1st Edition, Prentice Hall, 2011.
2. A.S.Bradley,A.O.Adebayo,P.Maria.Engineering applications insustainable designand development, 1st Edition, Cengage learning, 2016.

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III Year II Semester	WATER SUPPLY SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

At the end of the course, students will be able to:

a. Outline of the various facets of water usage in daily life.
b. Explain the origin of Natural waters and also to synthesize it for regular use.
c. Discuss the utilization of non-potable water.
d. Describe water supply system from a reservoir.
e. Explain the characteristics of wastewater.

UNIT-I

WATER AND LIFE:

Necessity of water – Domestic demand – Public demand – Irrigation – Transportation – Sanitation – Dilution of waste waters – Dust palliative – Recreation – Fire protection.

UNIT-II

SOURCES OF WATER:

Surface sources – Ground sources – Water from atmosphere – Desalination – Recycling of waste water – Recharging of aquifers.

UNIT-III

DUAL SUPPLY OF WATER:

Potable and non-potable water – Protected water – Grey water – Black water – Water borne diseases – water related diseases – Sewage Irrigation.

UNIT-IV

DISTRIBUTION OF WATER:

Based on topography – Gravity distribution – Direct pumping – Combined pumping and gravity flow. Service Reservoirs – Continuous supply – Intermittent supply – Networks of distribution– Emergency water supply as in case of fire accidents – Valves, hydrants and meters.

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UNIT-V

INDUSTRIAL WATER:

Location of Industry with reference to surface sources of water – Quality of water required for industrial operations – characteristics of waste water produced – Standards for letting industrial effluents into sources of water.

TEXT BOOKS:

1. K.N. Duggal, "Elements of Environmental Engineering", 7th Edition, S. Chand Publishers, 2010.
2. Hammer and Hammer "Water and wastewater Technology", 4th Edition, Prentice hall of India, 2003.
3. Howard S. Peavy, Donand P. Rowe, George Technobanoglous, "Environmental Engineering", 1st Edition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

REFERENCES:

1. B.C.Punmia, "Water Supply Engineering", Vol. 1, "Waste water Engineering Vol. II", 2nd Edition, Ashok Jain &Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
2. Fair, Geyer and Okun, "Water and Waste Water Engineering", 3rd Edition, Wiley, 2010.
3. Metcalf and Eddy, "Waste Water Engineering", 3rd Edition, Tata Mc Graw Hill, 2008.

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III Year II Semester	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Learning Objectives:

The course will address the following:

1. Estimation of some important characteristics of water and wastewater in the laboratory
2. It also gives the significance of the characteristics of the water and wastewater

Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Estimate some important characteristics of water and wastewater in the laboratory
b. Draw some conclusion and decide whether the water is suitable for construction or not, drinking or not; ultimate disposal as per effluent standards or not.
c. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
d. Estimate and study the strength of the raw and treated effluents in terms of BOD, COD, pH, TDS and chloride of the neutralization tank treating effluents from Chemistry lab or Environmental Engineering Laboratory

SYLLABUS:

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of Total Solids, Organic Solids and Inorganic Solids and Settleable Solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.
14. Visit a Water Treatment Plant and give a technical report.

NOTE: At least 10 of the above experiments are to be conducted.

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List of Equipments

1) pH meter
2) Turbidity meter
3) Conductivity meter
4) Hot air oven
5) Muffle furnace
6) Dissolved Oxygen meter
7) U–V visible spectrophotometer
8) COD Reflux Apparatus
9) Jar Test Apparatus
10) BOD incubator
11) Autoclave
12) Laminar flow chamber
13) Hazen's Apparatus

Textbooks

1. Standard Methods for Analysis of Water and Waste Water – APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

Reference

1. Relevant IS Codes.

Chemistry for Environmental Engineering by Sawyer and Mc. Carty

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III Year II Semester	HIGHWAY ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Course Learning Objectives:

The objectives of this course are:

1. To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

At the end of the course, the student will be able to

a. Test aggregates and judge the suitability of materials for the road construction
b. Test the given bitumen samples and judge their suitability for the road construction.
c. Obtain the optimum bitumen content for Bituminous Concrete
d. Determine the traffic volume, speed and parking characteristics.
e. Draw highway cross sections and intersections.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

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III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXTBOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

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III Year II Semester	CAD LAB	L	T	P	C
		0	1	2	2

Course Objectives: The objectives of the course are to

1. **Learn** the usage of any fundamental software for design
2. **Create** geometries using pre-processor
3. **Analyze** and Interpret the results using post processor
4. **Design** the structural elements

Course Outcomes

After the completion of the course student should be able to

a. Model the geometry of real-world structure Represent the physical model of structural element/structure
b. Perform analysis
c. Interpret from the Post processing results
d. Design the structural elements and a system as per ISCodes

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis &Design of fixed &continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.

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III Year II Semester	SOFT SKILLS- II	L	T	P	C
		0	0	2	-

Course Objectives:

a. To prepare to face global competition for employment and excellence in profession.
b. To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT-I

Soft skills Vs Hard skills: Communication strategies, Know yourself, strengths & weakness, Linkage between industry and soft skills, Challenges, Analysis.

Soft skills Vs English Language: Improving Techniques.

UNIT-II

Non –Verbal Communication: Importance- Facial Expressions-Eye Contact-Proxemics - Hap tics-Posture. Cross-cultural awareness body language, body language in Interview room, appearance and dress code, Kinetics-Para Language, Tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills.

UNIT-III

Intra Personal Skills: Importance of SWOT analysis, Johari windows, Goal setting-quotient skills, Emotional Intelligence, Attitudinal skills, Right thinking, Problem solving, Time management, stress management, Conflict Management. Critical thinking and problem solving.

UNIT-IV

Verbal Communication Skills: Vocabulary build- Elicitation, words often confused, One-word substitutes, Idiomatic expressions, Usage, Importance and Improving

UNIT-V

Inter Personal Communication Skills: Importance of Communication skills, Team work, managerial skills, Negotiation skills, Leadership skills, corporate etiquette.

Interview skills: Mock Interview

Text Books:

1. Sherfield, M. Robert at al, Corner stone Developing Soft Skills, 4/e, Pearson Publication,New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

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Reference Books:

1. Ajay Singh, Verbal Ability and Reading Comprehension Arihanth publications India. New Delhi. 2018.
2. R S Agarwal A Modern approach to verbal reasoning, S Chand Publishing, New Delhi. 2008.
3. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014
4. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
5. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
7. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc20_hs60/preview
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

Course Outcomes:

. At the end of the Course, Student will be able to

- Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
- Understand the significance of soft skills in the working environment for professional excellence.
- Prepare to undergo the placement process with confidence and clarity.
- Ready to face any situation in life and equip themselves to handle them effectively.
- Understand and learn the importance of etiquette in both professional and personal life

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III Year II Semester	AUDIT COURSE TECHNICAL PAPER WRITING & IPR	L	T	P	C
		2	0	0	-

Course Objective:

1. The course will explain the basic related to writing the technical reports and understanding the concepts related to formatting and structuring the report. This will help students to comprehend the concept of proofreading, proposals and practice

Unit I: Introduction: An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing.
Planning and Structuring: Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.

Unit II: Drafting report and design issues: The use of drafts, Illustrations and graphics.
Final edits: Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.

Unit III: Proofreading and summaries: Proofreading, summaries, Activities on summaries.
Presenting final reports: Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

Unit IV: Using word processor: Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros,

Unit V: Nature of Intellectual Property: Patents, Designs, Trade and Copyright.
Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property.

Text Books:

1. Kompal Bansal & Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.
2. William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.
3. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.

Reference Books:

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

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2. Day R, how to Write and Publish a Scientific Paper, Cambridge University Press(2006)

E-resources:

1. https://www.udemy.com/course/reportwriting/
2. https://www.udemy.com/course/professional-business-english-and-technical-report-writing/
3. https://www.udemy.com/course/betterbusinesswriting/

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

Ref: SRKIT/BOS/CSD 2025-26/3

Date: 21/06/2025.

Respected Sir/Madam,

Sub: CSD-BOS Meeting on 23-06-2025 – Invitation –Reg.

It is proposed to convene the **Department of CSE (Data Science)** Board of Studies Meeting at 10:30A.M on 23-06-2025 (Monday) in CSE (Data Science) Department to discuss the following agenda.

Agenda:

1. To finalize the detailed Course- Contents of Ist & IInd Semesters of IIIrd year B.Tech in SRK-23 regulations.
2. To finalize the detailed Course- Structure of IIIrd Year & IVth year BTech in SRK-23 regulations.
3. To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IIIrd B.Tech in SRK-23 regulations.
4. Any other matter with the permission of the chair.

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely

(Dr.V,Sreenivas)
HOD of CSD
SRKIT

For circulation among all BOS Members

Head of The Department
Department of Data Science
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MINUTES OF BOS MEETING

SRKIT/BOS/CSD/2025-26/3 **Date:** 23-06-2025

Department: CSE-Data Science **Academic Year**: 2025-2026

Venue: IQAC Room **Time**: 11:00 A.M

The Third Board of Studies meeting of CSE-Data Science was held on 23th June 2025 at 11:00 A.M. Through online mode in the IQAC room, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr. V.Sreenivas	Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Member	
(1 Representative from Industry)				
5	Mr. K. Sudheer	Software Engineer, Accenture ,Hyderabad	Member	
(Alumina Nominated by Principal)				
6	Mr. A. Chandra Sekhar Reddy	Software Engineer Cornerstone on Demand	Member	
(Faculty of the Department)				
7	N.Marimbi	Assistant Professor	Member	
8	Ch.Siva Durga	Assistant Professor	Member	

Dr. V.Sreenivas Chaired the Third BOS virtual meeting through the following link: https://us02web.zoom.us/j/89929765860?pwd=FavsFDZSIa2LyT8jUDrhORY8aj6At0.1 with Meeting ID: 899 2976 5860 & Passcode: 300343

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

GENDA:

SRKIT/BOS/CSD.2025-2026/3/01	Welcome Address And Opening Remarks by Chairman, Board of Studies in the Department of CSE-Data Science
SRKIT/BOS/CSD.2025-2026/3/02	To finalize the detailed Course structure and Course-Contents of I & II Semesters of II B.Tech in SRK-23.
SRKIT/BOS/CSD.2025-2026/3/03	To finalize the detailed Course- Structure of IInd Year, IIIrd Year & IVth year B.Tech in SRK-23 regulations
SRKIT/BOS/CSD.2025-2026/3/04	To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IInd B.Tech in SRK-23 regulations.

POINTS OF DISCUSSION:

1. To finalize the detailed Course- Contents of Ist & IInd Semesters of IIIrd year B.Tech in SRK-23 regulations.
2. To finalize the detailed Course- Structure of IIIrd Year & IVth year BTech in SRK-23 regulations.
3. To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IIIrd B.Tech in SRK-23 regulations.
4. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About B.Tech Third year I & II Semester-Course Structure, Course Outcomes and Syllabus of SRK-23
2. About B.Tech Third and Fourth year I & II Semester-Course Structure of SRK-23 Regulations.

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the SRK23 proposed course structure, course outcomes and syllabus for the Department of CSE-Data Science in the SRK Institute of Technology.

As per the Request the panel members have agreed to include the Soft Skill course in III-I Semester and Syllabus was framed by English Department and Both III-I and III-II English Syllabus was approved by BOS panel members of English and CSE (Data Science) Departments.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 1:20 P.M, Dr. V.Sreenivas, Chairman of BOS of the CSE-Data Science Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Chairman BOS

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Department of Computer Science & Engineering
(Data Science)

CSD Department BOS Members (SRK23)- A.Y 2025-26

S No.	Name	Designation	Category
1	Dr. V.Sreenivas	Professor & HOD	Chairman
(2 Subject Experts outside parent University)			
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. B. N. Jagadesh	Associate Professor Department of CSE VIT-AP, Amaravati.	Member
(1 Subject Expert nominated by Vice-Chancellor)			
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(1 Representative from Industry)			
5	Mr. Sudheer Koduru	Software Engineer, Accenture, Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. A. Chandra Sekhar Reddy	11X41A1223 (B-Tech SRKIT) MS : Computer Engineering Designation: Software Engineer Company: Cornerstone on Demand Poland Ph No: +48729423322. Email:avuthu25@gmail.com	Member
(Faculty of the Department)			
All CSD Faculty Members			

Chairman BOS

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B.Tech. – III Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	Machine Learning	3	0	0	3
2	Professional Core	Computer Networks	3	0	0	3
3	Professional Core	Software Engineering	3	0	0	3
4	Professional Elective-I	1. Automata Theory & Compiler Design 2. Object Oriented Analysis and Design 3. Soft computing 4. Internet of Things 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
5	Open Elective- I	OR Entrepreneurship Development & Venture Creation	3	0	0	3
6	Professional Core	Machine Learning Lab	0	0	3	1.5
7	Professional Core	Computer Networks Lab	0	0	3	1.5
8	Skill Enhancement course	Full Stack development -1 / SWAYAM Plus – Data Engineer / AI Engineer	0	1	2	2
9	ES	Tinkering Lab *(User Interface Design using Flutter)*/ SWAYAM Plus - Android Application Development (with Flutter)	0	0	2	1
10	Skill Enhancement course	Soft Skills-I	0	1	1	1
11	Evaluation of Community Service Project Internship		-	-	-	2
		Total	**15**	**1**	**10**	**24**
MC	Student may select from the Same Minor Pool		3	0	3	4.5
MC	Minor Course through SWAYAM / NPTEL (Minimum 12 Week, 3 credit course)		3	0	0	3
HC	Student may select from the Same Honors Pool		3	0	0	3
HC	Student may select from the Same Honors Pool		3	0	0	3

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Andhra Pradesh, India-Pin 521 108

B. Tech– III Year II Semester

S.No	Category	Title	L	T	P	C
1	Professional Core	Deep Learning	3	0	0	3
2	Professional Core	Operating Systems	3	0	0	3
3	Professional Core	Data Visualization	3	0	0	3
4	Professional Elective-II	1. Social Media Analytics 2. Cryptography & Network Security 3. Recommender Systems 4. Cloud Computing 5. Sensor Networks	3	0	0	3
5	Professional Elective-III	1. Software Project Management 2. Quantum Computing 3. Computer Vision 4. NoSQL databases 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
6	Open Elective – II		3	0	0	3
7	Professional Core	Deep Learning Lab	0	0	3	1.5
8	Professional Core	Data Visualization Lab	0	0	3	1.5
9	Skill Enhancement course	Soft skills-II	0	1	1	1
10	Audit Course	Technical Paper Writing & IPR	2	0	0	-
		Total	**20**	**01**	**08**	**22**
	*Mandatory Industry Internship / Mini Project of 08 weeks duration during summer vacation					
MC	Student may select from the same minors pool		3	0	3	4.5
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	0	3
	Student may select from the same honors pool		3	0	0	3
HC	Honors Course (Student may select from the honors pool)		3	0	0	3

**** Under Industry Internship interested students can pursue SWAYAM Plus courses viz., Hands-on Masterclass on Data Analytics OR Artificial Intelligence for Real-World Application***

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Note : Student need to do at least ONE MOOC Course (3 credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)

Open Electives, offered to other department students:

Open Elective I: Operating Systems / Computer Organization and Architecture
Open Elective II: Database Management Systems
Open Elective III: Object Oriented Programming Through Java
Open Elective IV: Computer Networks / Software Engineering / IOT Based Smart Systems

Minor Engineering

Note:

1. *To obtain Minor Engineering, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream.*
2. *During Minor/Honors Course selection, there should not be any overlapping with Regular/Major/OPEN Electives*

Minor in Data Science

1.	Introduction to Data Science	3-0-3-4.5 (II-II)
2.	Operating Systems	3-0-0-3 (III-I)
3.	Data Engineering	3-0-3-4.5 (III-II)
4.	Deep Learning	3-0-0-3 (IV-I)

Any of the following 12 Week 3 credit NPTEL MOOC Courses

5. Introduction to Database Systems
6. Artificial Intelligence: Knowledge Representation and Reasoning
7. Computer Networks and Internet Protocol
8. Fundamentals of Object Oriented Programming
9. Discrete Mathematics for CS
10. Software Engineering

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Suggested MOOC Courses for Honors Degree in Data Science

Note: ***To obtain Honor's degree, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream (without duplication).***

Mandatory Course(s):

1. Deep Learning for Natural Language Processing - 12 Week 3 Credit Course, MOOCS
2. Applied Time-Series Analysis 12 Week 3 Credit Course, MOOCS

Any of the following for remaining 12 Credits

3. Social Network Analysis 12 Week 3 Credit Course, MOOCS
4. Privacy and Security in Online Social Media 12 Week 3 Credit Course, MOOCS
5. Reinforcement Learning 12 Week 3 Credit Course, MOOCS
6. Algorithms in Computational Biology and Sequence Analysis 12 Week 3 Credit Course, MOOCS
7. GPU Architecture and Programming 12 Week 3 Credit Course, MOOCS
8. Quantum Algorithms and Cryptography 12 Week 3 Credit Course, MOOCS
9. Affective Computing 12 Week 3 Credit Course, MOOCS
10. Unmanned Arial Systems & Robotics 12 Week 3 Credit Course, MOOCS

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B.Tech III Year Syllabus (Autonomous) For BOS in SRKIT

SRK CSD <srkcsdhod@gmail.com>
to krishna.ankala, Jagadesh, kmarepalli, bcc: sudheer.koduru, bcc: Bhagya

20 Jun 2025, 15:00

Dear sir,

I Dr V.Sreenivas, Academic Director for CSE-Allied Branches in SRKIT. As we discussed over the phone regarding BOS, iam attaching all the branch of Syllabus for your References. Please let us know any changes. we have planned the BOS meeting on Monday (23-06-2025) at 10.30 A.M IST. i will share the link through whatsapp. I request you please be available at that time.

Thanking you.

Dr V.Sreenivas

4 attachments • Scanned by Gmail

B.Tech_CSE.docx

CSE-AI&ML.docx

B.Tech CSE(DS).d...

IT.pdf

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1 of 649

Need Approval of III Year B.Tech Syllabus for CSE (Data Science)-SRKIT

Inbox ×

SRK CSD 12:00 (4 minutes ago)

Dear Sir/Madam I Dr.V.Sreenivas Professor &HOD for CSE (Data Science) In SRK Institute of Technology. As per BOS Conducted in June Month, I need approval from t

Jagadesh Bommagani 12:04 (0 minutes ago)

to me

Approved

Thanks & Regards,
Dr.B.N.Jagadesh

...

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Board of Studies

SRK Institute of Technolog
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

1 of 649

Need Approval of III Year B.Tech Syllabus for CSE (Data Science)-SRKIT

Inbox ×

SRK CSD 12:00 (8 minutes ago)

Dear Sir/Madam I Dr.V.Sreenivas Professor &HOD for CSE (Data Science) In SRK Institute of Technology. As per BOS Conducted in June Month, I need approval from t

Jagadesh Bommagani 12:04 (4 minutes ago)

Approved Thanks & Regards, Dr.B.N.Jagadesh

KrishnaMohan Ankala 12:09 (0 minutes ago)

to me

Approved

Thanks and Regards

Dr.A.Krishna Mohan
BTech , MTech , MBA , PhD
Director
Student Affairs
JNTUK
Kakinada

...

CHAIRMAN
Board of Studies

SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108

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Need Approval of III Year B.Tech Syllabus for CSE (Data Science)-SRKIT

Inbox ×

SRK CSD 12:00 (10 minutes ago)

Dear Sir/Madam I Dr.V.Sreenivas Professor &HOD for CSE (Data Science) In SRK Institute of Technology. As per BOS Conducted in June Month, I need approval from t

Jagadesh Bommagani 12:04 (6 minutes ago)

Approved Thanks & Regards, Dr.B.N.Jagadesh

KrishnaMohan Ankala 12:09 (1 minute ago)

Approved Thanks and Regards Dr.A.Krishna Mohan BTech , MTech , MBA , PhDDirector Student AffairsJNTUK Kakinada

Koduru, Sudheer 12:09 (1 minute ago)

to kmarepalli@yahoo.com, Jagadesh, avuthu25@gmail.com, me, krishna.ankala@gmail.com

Reviewed and approved from my side.

Regards,
Sudheer Koduru.

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Board of Studies

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Andhra Pradesh, India-Pin 521 108.

SRK INSTITUTION OF TECHNOLOGY

(An Autonomous Institution, Affiliated to JNTUK Kakinada)

ENKEPADU, VIJAYAWADA-521108

SRK INSTITUTE OF TECHNOLOGY
VIJAYAWADA

Estd:2007

THIRD BOARD OF STUDIES MEETING – MINUTES

MINUTES OF BOS MEETING

SRKIT/BOS/CSE/2025-26/3 **Date:** 23-06-2025

Department: Computer Science and Engineering **Academic Year:** 2025-2026

Venue: IQAC Room **Time:** 11.00 A.M

The Third Board of Studies meeting of Computer Science & Engineering was held on 23rd June 2025 at 11:30 A.M. through online mode in the IQAC room, Department of CSE, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr.A.Radhika	Professor & HOD	Chairman	Radhika
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Subject Expert	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Subject Expert	
(1 Representative from Industry)				
5	Mr. k. Sudheer	Software Engineer, Accenture ,Hyderabad	Industry Expert	
(Alumnus nominated by Principal)				
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada	Alumni	
(Faculty of the Department)				
7	Dr.M.Ekambaram Naidu	Professor & Principal	Member	
8	D.V.Subba Rao	Associate Professor	Member	
9	Dr.K.Chaitanya	Associate Professor	Member	
10	Dr.P.Srinivas Kumar	Associate Professor	Member	PSK

11	Ch.Ambedkar	Assistant Professor	Member	
12	Ch.Pavani	Assistant Professor	Member	
13	K.Jayaram	Assistant Professor	Member	
14	D.Nalini Kumari	Assistant Professor	Member	
15	G.M.Padmaja	Assistant Professor	Member	
16	R.Lakshmi	Assistant Professor	Member	
17	V.Vijaya Durga	Assistant Professor	Member	
18	K.Krupa	Assistant Professor	Member	
19	R.JyothSingh	Assistant Professor	Member	
20	R.Dhana Lakshmi	Assistant Professor	Member	

Dr.A.Radhika chaired the Third BOS virtual meeting through the following link:

https://us02web.zoom.us/j/89929765860?pwd=FavsFDZSIa2LyT8jUDrhORY8aj6At0.1

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

Radhika

CHAIRMAN
Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Department of Computer Science and Engineering
BoS Members (R23)

SNo.	Name	Designation	Category
1	Dr. A.Radhika	Professor & HOD	Chairman
	(2 Subject Experts outside Parent University)		
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. B.N. Jagadesh	Professor, CSE VIT-AP, Amaravathi.	Member
	(I Subject Expert nominated by Vice-Chancellor)		
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
	(I Representative from Industry)		
5	Mr.K.Sudheer	Software Engineer Accenture, Hyderabad	Member
	(Alumnus nominated by Principal)		
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada.	Member
	(Faculty of the Department)		
7	All Faculty	SRK Institute of Technology, CSE Dept.	Members

Radhika
Chairman Bos
CHAIRMAN
Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Principal
PRINCIPAL
SRK INSTITUTE OF TECHNOLOGY
ENIKEPADU, VIJAYAWADA-521 108

SRK Institute of Technology

An Autonomous Institution | Permanently Affiliated to JNTUK
Approved by AICTE, New Delhi | Certified by ISO 9001:2015
Accredited by NBA & NAAC with "A" Grade

Ref: SRKIT/BOS/ CSE /2025-26/3

Date: 20/06/2025.

Respected Sir/Madam,

Sub: CSE-BOS Meeting on 23-06-2025 – Invitation –Reg.

It is proposed to convene the **CSE**-Board of Studies Meeting at 11:00AM on 23-06-2025 (Monday) in Computer Science and Engineering Department to discuss the following agenda.

Agenda:-

1. To finalize the detailed Course- Structure & Course-Contents of I & II Semesters of III B.Tech in SRK-23 Regulations.
2. To discuss & finalize the Course- Outcomes of I & II Semesters of III B.Tech in SRK-23.
3. Adopted Entrepreneur Innovation in BOS Minutes.
4. Any other matter with the permission of the chair.

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely,

Radhika

(Dr.A.Radhika)
CHAIRMAN
Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

For Circulation among all BOS Members

SRK INSTITUTE OF TECHNOLOGY, ENIKEPADU, VIJAYAWADA -521108
An Autonomous Institute with affiliation to JNTUK Approved by AICTE ISO 9001:2015 Certified Institution, Accredited with NBA & NAAC 'A' grade
COMPUTER SCIENCE AND ENGINEERING

Date & Time: 23rd June 2025, 11.00 AM Venue:f CSE,

Agenda for the 3rd Board of Studies Meeting

Item No.	Contents - Item Description
1	To finalize the detailed Course- Structure & Course-Contents of I & II Semesters of III B.Tech in SRK-23 Regulations.
2	To discuss & finalize the Course- Outcomes of I & II Semesters of III B.Tech in SRK-23.
3	Adopted Entrepreneur Innovation in BOS Minutes
4	Any other matter with the permission of the chair.

Radhika

Chairman

CHAIRMAN
Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

List of Members of the Board of Studies

SNo.	Name	Designation	Category
1	Dr. A.Radhika	Professor & HOD	Chairman
(2 Subject Experts outside Parent University)			
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. B.N. Jagadesh	Professor, CSE VIT-AP, Amaravathi.	Member
(I Subject Expert nominated by Vice-Chancellor)			
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(I Representative from Industry)			
5	Mr.K.Sudheer	Software Engineer Accenture, Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada.	Member
(Faculty of the Department)			
7	All Faculty	SRK Institute of Technology, CSE Dept.	Members

Radhika

Dr.A.Radhika

Chairman

CHAIRMAN
Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

AGENDA:

SRKIT/BOS/CSE.2025-26/3/01	To finalize the detailed Course- Structure & Course-Contents of I & II Semesters of III B.Tech in SRK-23 Regulations.
SRKIT/BOS/CSE.2025-26/3/02	To discuss & finalize the Course- Outcomes of I & II Semesters of III B.Tech in SRK-23.
SRKIT/BOS/CSE.2025-26/3/03	Adopted Entrepreneur Development and Venture Creature in BOS Minutes
SRKIT/BOS/CSE.2025-26/3/04	Any other matter with the permission of the chair.

POINTS OF DISCUSSION:

1. About B.Tech IIInd year Ist & IInd Semester Course structure and Syllabus of Regulation SRK-23.
2. About B.Tech IIInd year Ist & IInd Semester Course outcomes of each course in the Regulation SRK-23.
3. About Adoption of Entrepreneur Development and venture creation.
4. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About B.Tech Third year I & II Semester-Course Structure, course Contents of SRK-23
2. About B.Tech Third Year Course outcomes of Third year I & II Semester of SRK-23

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of Computer Science and Engineering in the SRK Institute of Technology.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 12.50 p.m., Dr. A.Radhika, Chairman of BOS of the CSE Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Radhika

Chairman BOS

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Board of Studies
Dept. of Computer Science & Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

B.Tech III Year Syllabus (Autonomous) For BOS in SRKIT

SRK CSD <srkcsdhod@gmail.com>
to krishna.ankala, Jagadesh, kmarepalli, bcc: sudheer.koduru, bcc: Bhagya

20 Jun 2025, 15:00

Dear sir,

I Dr V.Sreenivas, Academic Director for CSE-Allied Branches in SRKIT. As we discussed over the phone regarding BOS, Iam attaching all the branch of Syllabus for your References. Please let us know any changes. we have planned the BOS meeting on Monday (23-06-2025) at 10.30 A.M IST. I will share the link through whatsapp. I request you please be available at that time.

Thanking you.

Dr V.Sreenivas

4 attachments • Scanned by Gmail

B.Tech_CSE.docx | CSE-AI&ML.docx | B.Tech CSE(DS).d... | IT.pdf

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Andhra Pradesh, India-Pin 521 108.

1 of 649

Need Approval of III Year B.Tech Syllabus for CSE (Data Science)-SRKIT

Inbox ×

12:00 (8 minutes ago)

SRK CSD

Dear Sir/Madam I Dr.V.Sreenivas Professor &HOD for CSE (Data Science) In SRK Institute of Technology. As per BOS Conducted in June Month, I need approval from t

12:04 (4 minutes ago)

Jagadesh Bommagani

Approved Thanks & Regards, Dr.B.N.Jagadesh

12:09 (0 minutes ago)

KrishnaMohan Ankala

to me

Approved

Thanks and Regards

Dr.A.Krishna Mohan

BTech , MTech , MBA , PhD

Director

Student Affairs

JNTUK

Kakinada

...

Radhika

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Need Approval of III Year B.Tech Syllabus for CSE (Data Science)-SRKIT

Inbox x

SRK CSD

12:00 (4 minutes ago)

Dear Sir/Madam I Dr.V.Sreenivas Professor &HOD for CSE (Data Science) In SRK Institute of Technology. As per BOS Conducted in June Month, I need approval from t

Jagadesh Bommagani

to me

12:04 (0 minutes ago)

Approved

Thanks & Regards,
Dr.B.N.Jagadesh

...

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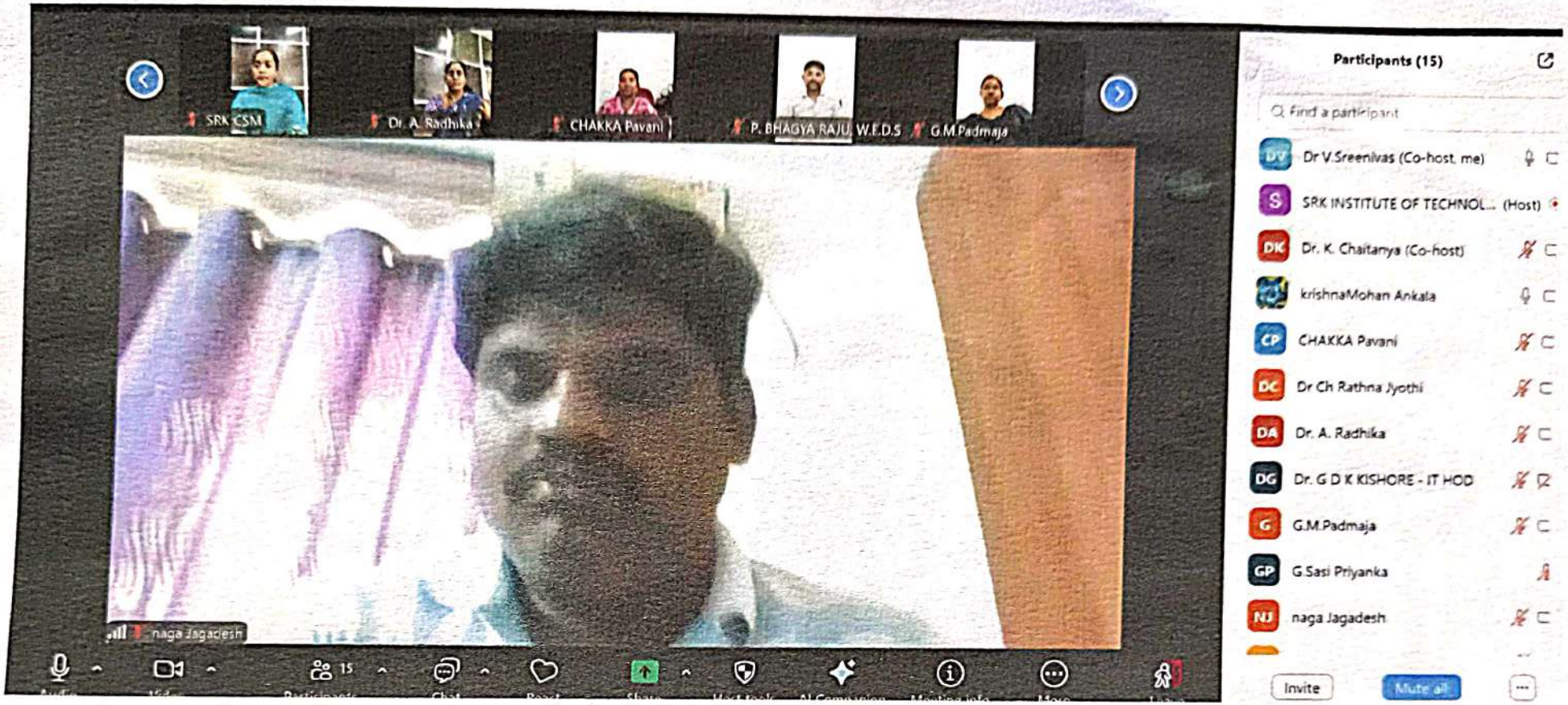
Andhra Pradesh, India-Pin 521 108.



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Department Vision

To evolve as a center of repute and produce globally competent professionals with high academic and ethical values

Department Mission

1. To provide learning ambience to generate innovative and problem solving skills with professionalism through strong theoretical foundation, practical skills, and interdisciplinary knowledge to tackle real-world challenges.

2. To foster consultancy and basic as well as applied research activities to solve real world problems through industry institution interaction.

3.To engage in life-long learning and create awareness of the contemporary developments in computer science and engineering to become outstanding professionals with moral and ethical values.

Radhika
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PROGRAMME OUTCOMES

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

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COURSE STRUCTURE (R23) –B.TECH CSE

(Applicable from the academic year 2023-24 and onwards)

B.Tech. – III Year I Semester

S.No	Category	Title	L	T	P	C
1	Professional Core	Data Warehousing and Data Mining	3	0	0	3
2	Professional Core	Computer Networks	3	0	0	3
3	Professional Core	Formal Languages and Automata Theory	3	0	0	3
4	Professional Elective-I	1. Object Oriented Analysis and Design 2. Artificial Intelligence 3. Microprocessors & Microcontrollers 4. Quantum Computing 5. 12 week MOOC Swayam/ NPTEL course recommended by the BoS	3	0	0	3
5	Open Elective-I	OR Entrepreneurship Development & Venture Creation	3	0	0	3
6	Professional Core	Data Mining Lab	0	0	3	1.5
7	Professional Core	Computer Networks Lab	0	0	3	1.5
8	Skill Enhancement course	Full Stack development-2	0	1	2	2
9	Skill Enhancement course	Soft-Skills	0	1	1	1
10	Engineering Science	User Interface Design using Flutter / SWAYAM Plus - Android Application Development (with Flutter)	0	0	2	1
11	Evaluation of Community Service Internship		-	-	-	2
	Total		15	1	10	23
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	3	4.5
MC	Minor Course through SWAYAM/NPTEL (minimum 12 week, 3 credit course)		3	0	0	3
HC	Honors Course (Student may select from the same honors pool)		3	0	0	3
HC	Honors Course (Student may select from the same honors pool)		3	0	0	3

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SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India Pin 521 108.

B.Tech. III Year II Semester

S.No	Category	Title	L	T	P	C
1	Professional Core	Compiler Design	3	0	0	3
2	Professional Core	Cloud Computing	3	0	0	3
3	Professional Core	Cryptography & Network Security	3	0	0	3
4	Professional Elective-II	1. Software Testing Methodologies 2. Cyber Security 3. DevOps 4. Machine Learning 5. 12 week MOOC Swayam/ NPTEL course recommended by the BoS	3	0	0	3
5	Professional Elective-III	1. Software Project Management 2. Mobile Adhoc Networks 3. Natural Language Processing 4. Big Data Analytics 5. Distributed Operating System 6. 12 week MOOC Swayam/ NPTEL course recommended by the BoS	3	0	0	3
6	Open Elective – II		3	0	0	3
7	Professional Core	Cloud Computing Lab	0	0	3	1.5
8	Professional Core	Cryptography & Network Security Lab	0	0	3	1.5
9	Skill Enhancement course	Soft skills / SWAYAM Plus - 21st Century Employability Skills	0	1	1	1
10	Audit Course	Technical Paper Writing &IPR	2	0	0	-
		Total	**20**	**1**	**08**	**23**
Mandatory Industry Internship / Mini Project of 08 weeks duration during summer vacation						
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	3	4.5
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	0	3
HC	Honors Course (Student may select from the same honors pool)		3	0	0	3
HC	Honors Course (Student may select from the honors pool)		3	0	0	3

* Under Industry Internship interested students can pursue SWAYAM Plus courses viz., Hands-on Masterclass on Data Analytics OR Artificial Intelligence for Real-World Application

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Accredited with NAAC 'A' grade, ISO 9001:2015 Certified Institution
Department of Computer Science and Engineering

COURSES OFFERED FOR HONORS DEGREE IN CSE

Note: ***To obtain Honor's degree, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream.***

1. Social Network Analysis 12 Week 3 Credit Course, MOOCS
2. Applied Linear Algebra in AI & ML 12 Week 3 Credit Course, MOOCS
3. Design & Implementation of Human-Computer Interfaces – NPTEL MOOCS
4. Cryptography and Network Security 12 Week 3 Credit Course, MOOCS
5. Privacy and Security in Online Social Media 12 Week 3 Credit Course, MOOCS
6. Deep Learning for Natural Language Processing - 12 Week 3 Credit Course, MOOCS
7. Computer Vision 12 Week 3 Credit Course, MOOCS
8. Applied Time-Series Analysis 12 Week 3 Credit Course, MOOCS
9. Parallel Computer Architecture 12 Week 3 Credit Course, MOOCS
10. Reinforcement Learning 12 Week 3 Credit Course, MOOCS
11. GPU Architecture and Programming 12 Week 3 Credit Course, MOOCS
12. Computational Complexity 12 Week 3 Credit Course, MOOCS
13. Quantum Algorithms and Cryptography 12 Week 3 Credit Course, MOOCS
14. Unmanned Arial Systems & Robotics 12 Week 3 Credit Course, MOOCS
15. Prompt Engineering for Generative AI (III - II)

1. Computer Networks 3-0-0-3
2. Artificial Intelligence 3-0-0-3
3. Cyber Security 3-0-0-3
4. Introduction to Data Science 3-0-3-4.5
5. Data Warehousing and Data Mining 3-0-0-3
6. Object Oriented Programming Through Java 3-0-3-4.5
7. Cloud computing 3-0-0-3
8. Graph Theory 3-0-0-3
9. Data Analytics with Python

Foundations of Cryptography

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Open Electives, offered to other department students:

Open Elective I: Principles of Operating Systems/ Computer Organization and Architecture
Open Elective II: Principles of Database Management Systems
Open Elective III: Object Oriented Programming Through Java
Open Elective IV: Principles of Software Engineering /Computer Networks

Minor Engineering

Note:

1. *To obtain Minor Engineering, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream.*
2. *During Minor/Honors Course selection, there should not be any overlapping with Regular/Major/OPEN Electives*

Minor in CSE

1.	Principles of Database Management Systems	3-0-3-4.5 (II-II)
2.	Principles of Software Engineering	3-0-0-3 (III-I)
3.	Advanced Data Structures & Algorithm Analysis	3-0-3-4.5 (III-II)
4.	Principles of Operating Systems	3-0-0-3 (IV-I)

Any of the following 12 Week 3 credit NPTEL MOOC Courses

5. Artificial Intelligence: Knowledge Representation and Reasoning
6. Computer Networks and Internet Protocol
7. Machine Learning and Deep Learning - Fundamentals and Applications
8. Fundamentals of Object Oriented Programming
9. Discrete Mathematics for CS
10. Software Engineering

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Principles of DBMS
DBMS lab
Software engineering
ADSA
ADSA Lab
Principles of OS.

III Year I Semester	DATA WAREHOUSING & DATA MINING	L	T	P	C
		3	0	0	3

Pre-requisites: Data Structures, Algorithms, Probability & Statistics, Data Base Management Systems

Course Objectives: The main objective of the course is to

- Introduce basic concepts and techniques of data warehousing and data mining
- Examine the types of the data to be mined and apply pre-processing methods on raw data
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamental concepts of data warehousing, OLAP, and data mining techniques, including data modeling, design, implementation, and visualization. *(L2)*
- Apply comprehensive data preprocessing techniques—including data cleaning, integration, reduction, transformation, and discretization(L3)
- Apply classification techniques such as decision trees, Bayesian methods, and rule-based classification for solving data mining problems and evaluate classification models. *(L3)*
- Analyze association rule mining concepts by generating frequent item sets and association rules using Apriori and FP-Growth algorithms. *(L4)*
- Compare and implement different clustering algorithms including K-means, hierarchical clustering, and DBSCAN for data clustering applications. *(L5)*

UNIT–I: Data Warehousing and Online Analytical Processing: Basic concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Cloud Data Warehouse, Data Mining and Patten Mining, Technologies, Applications, Major issues, Data Objects & Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity. (Text Book- 1)

UNIT II: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization. (Text Book- 1)

UNIT–III: Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Visual Mining for Decision Tree Induction, Bayesian Classification Methods: Bayes Theorem, Naïve Bayes Classification, Rule-Based Classification, Model Evaluation and Selection. (Text Book- 2)

UNIT–IV: Association Analysis: Problem Definition, Frequent Itemset Generation, Rule Generation: Confident Based Pruning, Rule Generation in Apriori Algorithm, Compact Representation of frequent item sets, FP-Growth Algorithm. (Text Book- 2)

UNIT–V: Cluster Analysis: Overview, Basics and Importance of Cluster Analysis, Clustering techniques, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bi-secting K Means, Agglomerative Hierarchical Clustering: Basic

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Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Text Book- 2)

Text Books:

1. Data Mining concepts and Techniques, 3rd edition, Jiawei Han, Michel Kamber, Elsevier, 2011.
2. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson, 2012.

Reference Books:

1. Data Mining: VikramPudi and P. Radha Krishna, Oxford Publisher.
2. Data Mining Techniques, Arun K Pujari, 3rd edition, Universities Press,2013.
3. (NPTEL course by Prof.PabitraMitra) ***http://onlinecourses.nptel.ac.in/noc17_mg24/preview***
   http://www.saedsayad.com/data_mining_map.htm

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III Year I Semester	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives:

- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

Course Outcomes: At the end of the course students will be able to

- Describe various network types, topologies, and compare the OSI and TCP/IP reference models along with physical layer transmission media. *(L2)*
- Design and evaluate data link layer protocols by implementing framing, flow control, error detection (CRC, checksum), and ARQ mechanisms (simplex, stop-and-wait) to ensure reliable point-to-point communication.s. *(L2)*
- Illustrate media access control mechanisms, including random access, controlled access, and channelization techniques, and describe Ethernet standards. *(L2)*
- Analyze network layer design issues, routing algorithms, congestion control methods, and IPv4/IPv6 protocols and addressing schemes. *(L4)*
- Analyze transport-layer (UDP/TCP) and application-layer (HTTP, SMTP, TELNET, DNS) protocols, applying key concepts like ports, reliable delivery, flow/congestion control, remote login, web services, email, and domain resolution. *(L4)*

UNIT I: Introduction: Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP.

Physical Layer –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and introduction about unguided media.

UNIT II: Data link layer: Design issues, **Framing:** fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols:** simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.
Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC, Point to point protocol (PPP)

UNIT – III: Media Access Control: Random Access: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
Wired LANs: Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet(100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

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UNIT – IV: The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks,
Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. Traffic Control Algorithm-Leaky bucket & Token bucket.
Internet Working: How networks differ- How networks can be connected- Tunnelling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6.

UNIT –V: The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services- TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control, Congestion control in TCP.
Application Layer — World Wide Web: HTTP, Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging-Domain Name System.

Text Books:

1. Computer Networksm, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

References Books:

1. Data Communications and Networks- Achut S Godbole, AtulKahate
2. Computer Networks, Mayank Dave, CENGAGE

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III Year I Semester	FORMAL LANGUAGES AND AUTOMATA THEORY	L	T	P	C
		3	0	0	3

Course Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines
- To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
- To understand the relation between Contexts free Languages, PDA and TM
- To learn how to design PDA as acceptor and TM as Calculators

Course Outcomes: At the end of the course students will be able to

- Explain the fundamental concepts of finite automata, including DFA, NFA, their equivalence, and minimization techniques. *(L2)*
- Analyze regular expressions, their equivalence with finite automata, and study properties of regular languages and grammar classifications. *(L4)*
- Apply context-free grammar concepts to derive languages, simplify grammars, and transform grammars into normal forms. *(L3)*
- Design and evaluate pushdown automata models and demonstrate their equivalence with context-free grammars. *(L5)*
- Understand Turing machines, their variants, decidability problems, and computational complexity classes such as P, NP, NP-hard, and NP-complete. *(L2)*

UNIT I

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT II

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.

UNIT III

Formal Languages, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

UNIT IV

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

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UNIT V

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.

Text Books:

1. Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008

2. Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007

Reference Books:

1. Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI
2. Theory of Computation, V. Kulkarni, Oxford University Press, 2013
3. Theory of Automata, Languages and Computation, Rajendra kumar, McGraw Hill, 2014

e-Resources:

https://nptel.ac.in/courses/106/104/106104028/

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III Year I Semester	OBJECT ORIENTED ANALYSIS AND DESIGN (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Objectives: The main objective is the students to

- Become familiar with all phases of OOAD.
- Master the main features of the UML.
- Master the main concepts of Object Technologies and how to apply them at work and develop the ability to analyze and solve challenging problem in various domains.
- Learn the Object design Principles and understand how to apply them towards Implementation.

Course Outcomes: At the end of the course students will be able to

- Understand the structure and inherent complexity of software systems and apply principles of designing complex systems. *(L2)*
- Explain UML fundamentals, modeling principles, and basic structural modeling concepts for software development. *(L2)*
- Apply advanced UML structural modeling techniques including class, object diagrams, and package organization. *(L3)*
- Analyze basic behavioral modeling using interaction, use case, and activity diagrams for system design. *(L4)*
- Evaluate advanced behavioral and architectural modeling concepts including state machines, component, and deployment diagrams. *(L5)*

UNIT I:

Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems. **Case Study:** System Architecture: Satellite-Based Navigation

UNIT II:

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle. **Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams. **Case Study:** Control System: Traffic Management.

UNIT III:

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. **Advanced Structural Modeling:** Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. **Case Study:** AI: Cryptanalysis.

UNIT IV:

Basic Behavioral Modeling-I: Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams. **Case Study:** Web Application: Vacation Tracking System

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UNIT V:

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. **Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams. **Case Study:** Weather Forecasting

Text Books:

1. Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston , "Object- Oriented Analysis and Design with Applications", 3rd edition, 2013, PEARSON.
2. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

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III Year I Semester	ARTIFICIAL INTELLIGENCE (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

Pre-requisite:

1. Knowledge in Computer Programming.
2. A course on "Mathematical Foundations of Computer Science".
3. Background in linear algebra, data structures and algorithms, and probability.

Course Objectives:

1. The student should be made to study the concepts of Artificial Intelligence.
2. The student should be made to learn the methods of solving problems using Artificial Intelligence.
3. The student should be made to introduce the concepts of Expert Systems.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.
5. To learn different knowledge representation techniques

Course Outcomes: At the end of the course students will be able to

- Describe fundamental concepts of AI, intelligent agents, rationality, and problem formulation in AI. *(L2)*
- Apply uninformed and heuristic search algorithms, and analyze game playing strategies including minimax and alpha-beta pruning. *(L3)*
- Explain various knowledge representation techniques and reason under uncertainty using probabilistic methods. *(L2)*
- Analyze logic concepts and inference mechanisms, and understand machine learning approaches including inductive, explanation-based, statistical, and reinforcement learning. *(L4)*
- Understand the architecture and components of expert systems and evaluate their roles and applications. *(L2)*

UNIT - I

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT - II

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT - III

Representation of Knowledge: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Bayes' probabilistic interferences and dempstershafer theory.

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UNIT - IV

Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT - V

Expert Systems: Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.

Textbooks:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", SecondEdition, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill

Reference Books:

1. David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logical approach", Oxford University Press.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning.

Online Learning Resources:

1. *https://ai.google/*
2. *https://swayam.gov.in/nd1_noc19_me71/preview*

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III Year I Semester	MICROPROCESSORS & MICROCONTROLLERS (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Objectives:

- To introduce fundamental architectural concepts of microprocessors and microcontrollers.
- To impart knowledge on addressing modes and instruction set of 8086 and 8051
- To introduce assembly language programming concepts
- To explain memory and I/O interfacing with 8086 and 8051
- To introduce16 bit and 32 bit microcontrollers.

Course Outcomes: At the end of the course students will be able to

- Describe the architecture, features, and operation modes of the 8086 microprocessor including its system timing and interrupt handling. *(L2)*
- Apply programming concepts of 8086 including instructions, addressing modes, and develop assembly language programs using assembler directives. *(L3)*
- Design and Implement interface circuit for 8086 microprocessor with memory and peripheral devices, and understand the operation of programmable controllers and interrupt systems. *(L3)*
- Understand the architecture, instruction set, and programming of the 8051 microcontroller along with its special function registers and I/O circuits. *(L2)*
- Design and implement interfacing and programming of 8051 microcontroller peripherals including timers, serial ports, interrupts, and compare microprocessor and microcontroller families. *(L5)*

UNIT I:

8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT II:

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT III:

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT IV:

Microcontroller, Architecture of 8051, Special Function Registers(SFRs), I/O Pins Ports and Circuits, Instruction set, Addressing modes, Assembly language programming.

UNIT V:

Interfacing Microcontroller, Programming 8051 Timers, Serial Port Programming, Interrupts Programming, LCD & Keyboard Interfacing, ADC, DAC & Sensor Interfacing, External Memory

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Interface, Stepper Motor and Waveform generation, Comparison of Microprocessor, Microcontroller, PIC and ARM processors

Textbooks:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition,1994.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012.

Reference Books:

1. Ramesh S Gaonkar, Microprocessor Architecture Programming and Applications with the 8085, 6th edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.

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III Year I Semester	QUANTUM COMPUTING (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Objectives:
To introduce the fundamentals of quantum computing, the problem-solving approach using finite dimensional mathematics

Course Outcomes: At the end of the course students will be able to

- Describe the evolution and significance of quantum computing and differentiate between classical bits and quantum qubits. *(L2)*
- Explain the mathematical, physical, and biological foundations essential for quantum computing. *(L2)*
- Illustrate the concept of qubits, their physical realizations, and design basic quantum circuits using quantum gates. *(L3)*
- Analyze key quantum algorithms and their relation to classical computational complexity. *(L4)*
- Evaluate quantum error correction techniques and discuss quantum information theory and cryptography. *(L5)*

UNIT - I
History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II
Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III
Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV
Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V
Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

Text Books:

1. Quantum Computation and Quantum Information, Nielsen M. A.,Cambridge
2. Programming Quantum Computers, Essential Algorithms and Code Samples, Eric R Johnson, Nic Harrigan, Mercedes Ginemo, Segovia, Oreilly

Reference Books:

1. Quantum Computing for Computer Scientists, Noson S. Yanofsk, Mirco A. Mannucci
2. Principles of Quantum Computation and Information,Benenti G., Casati G. and Strini G., Vol.I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

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III Year I Semester	DATA MINING LAB	L	T	P	C
		0	0	3	1.5

Pre-requisites: Data Base Management Systems, Python Programming

Course Objectives: The main objective of the course is to

- Inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
- Design a data warehouse or data mart to present information needed by management in a form that is usable
- Emphasize hands-on experience working with all real data sets.
- Test real data sets using popular data mining tools such as WEKA, Python Libraries
- Develop ability to design various algorithms based on data mining tools.

Course Outcomes: At the end of the course students will be able to

- **Apply** data warehousing concepts and design multi-dimensional data models such as star, snowflake, and fact constellation schemas; develop and implement ETL processes and perform OLAP operations using data warehouse tools. *(L3)*
- **Utilize** machine learning tools like WEKA and programming languages (Python, R, Java) to preprocess data, perform classification, clustering, association rule mining, and evaluate the results using statistical and visualization techniques. *(L3)*
- **Develop and implement** data mining algorithms including Apriori, Naïve Bayes, k-means clustering, and compute statistical measures like chi-square; interpret and visualize the data and mining results effectively. *(L4)*

Software Requirements: WEKA Tool/Python/R-Tool/Rapid Tool/Oracle Data mining

List of Experiments:

1. Creation of a Data Warehouse.
   - Build Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration Tool, Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects,etc.,)
   - Design multi-dimensional data models namely Star, Snowflake and Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, manufacturing, Automobiles, sales etc).
   - Write ETL scripts and implement using data warehouse tools.
   - Perform Various OLAP operations such slice, dice, roll up, drill up and pivot

2. Explore machine learning tool "WEKA"
   - Explore WEKA Data Mining/Machine Learning Toolkit.
   - Downloading and/or installation of WEKA data mining toolkit.
   - Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
   - Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel)
   - Study the arff file format Explore the available data sets in WEKA. Load each dataset (ex. Weather dataset, Iris dataset, etc.)
   - Load each dataset and observe the following:

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1. List the attribute names and they types
2. Number of records in each dataset
3. Identify the class attribute (if any)
4. Plot Histogram
5. Determine the number of records for each class.
6. Visualize the data in various dimensions

3. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
   - Explore various options available in Weka for preprocessing data and apply Unsupervised filters like Discretization, Resample filter, etc. on each dataset
   - Load weather. nominal, Iris, Glass datasets into Weka and run Apriori Algorithm with different support and confidence values.
   - Study the rules generated. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated.
   - Derive interesting insights and observe the effect of discretization in the rule generation process.

4. Demonstrate performing classification on data sets Weka/R
   - Load each dataset and run 1d3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic.
   - Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix.
   - Load each dataset into Weka/R and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
   - Plot RoC Curves
   - Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

5. Demonstrate performing clustering of data sets
   - Load each dataset into Weka/R and run simple k-means clustering algorithm with different values of k (number of desired clusters).
   - Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
   - Explore other clustering techniques available in Weka/R.
   - Explore visualization features of Weka/R to visualize the clusters. Derive interesting insights and explain.

6. Demonstrate knowledge flow application on data sets into Weka/R
   - Develop a knowledge flow layout for finding strong association rules by using Apriori, FP Growth algorithms
   - Set up the knowledge flow to load an ARFF (batch mode) and perform a cross validation using J48 algorithm
   - Demonstrate plotting multiple ROC curves in the same plot window by using j48 and Random forest tree

7. Demonstrate ZeroR technique on Iris dataset (by using necessary preprocessing techniques(s)) and share your observations

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8. Write a java program to prepare a simulated data set with unique instances.
9. Write a Python program to generate frequent item sets / association rules using Apriori algorithm
10. Write a program to calculate chi-square value using Python/R. Report your observation.
11. Write a program of Naive Bayesian classification using Python/R programming language.
12. Implement a Java/R program to perform Apriori algorithm
13. Write a R program to cluster your choice of data using simple k-means algorithm using JDK
14. Write a program of cluster analysis using simple k-means algorithm Python/R programming language.
15. Write a program to compute/display dissimilarity matrix (for your own dataset containing at least four instances with two attributes) using Python
16. Visualize the datasets using matplotlib in python/R.(Histogram, Box plot, Bar chart, Pie chart etc.,)

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III Year I Semester	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work

Course Outcomes: At the end of the course students will be able to

- **Understand and apply** fundamental networking concepts, including network device functions, LAN setup, and data link layer framing techniques such as character stuffing, bit stuffing, and error detection/correction methods. *(L2,L3)*
- **Develop and implement** network protocols and algorithms including sliding window protocols (Go-Back-N, Selective Repeat, Stop-and-Wait), congestion control (leaky bucket), and routing algorithms like Dijkstra's and Distance Vector routing for effective network communication. *(L3)*
- **Analyze and simulate** network traffic and performance using tools like Wireshark, Nmap, and NS2 Simulator for packet capture, traffic analysis, network scanning, operating system detection, and evaluating network parameters such as packet drops and throughput. *(L4)*

List of Experiments:

1. Study of Network devices in detail and connect the computers in Local Area Network.
2. Write a Program to implement the data link layer farming methods such as
   i) Character stuffing ii) bit stuffing.
3. Write a Program to implement data link layer farming method checksum.
4. Write a program for Hamming Code generation for error detection and correction.
5. Write a Program to implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
6. Write a Program to implement Sliding window protocol for Goback N.
7. Write a Program to implement Sliding window protocol for Selective repeat.
8. Write a Program to implement Stop and Wait Protocol.
9. Write a program for congestion control using leaky bucket algorithm
10. Write a Program to implement Dijkstra's algorithm to compute the Shortest path through a graph.
11. Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node (Take an example subnet graph with weights indicating delay between nodes).
12. Write a Program to implement Broadcast tree by taking subnet of hosts.
13. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
14. How to run Nmap scan
15. Operating System Detection using Nmap
16. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.

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III Year I Semester	FULL STACK DEVELOPMENT - 2 (SKILL ENHANCEMENT COURSE)	L	T	P	C
		0	1	2	2

Course Objectives:

The main objectives of the course are to

- Make use of router, template engine and authentication using sessions to develop application in ExpressJS.
- Build a single page application using RESTful APIs in ExpressJS
- Apply router and hooks in designing ReactJS application
- Make use of MongoDB queries to perform CRUD operations on document database

Course Outcomes: At the end of the course students will be able to

- **Design and develop** web applications using ExpressJS, by implementing routing, HTTP methods, middleware, form data handling, sessions, authentication, and RESTful API integration with MongoDB for full-stack functionality. *(L3,(L4)*
- **Develop interactive and responsive user interfaces** using ReactJS with JSX, components, props, states, styling, forms, conditional rendering, lists, hooks, and routing to create single-page applications *(L3, L4)*
- **Perform and manage data operations** using MongoDB, including CRUD queries, collections, indexes, aggregations, and configuration (local & Atlas), with the ability to integrate database operations into full-stack apps. *(L3, L2)*

Experiments covering the Topics:

- ExpressJS – Routing, HTTP Methods, Middleware, Templating, Form Data
- ExpressJS – Cookies, Sessions, Authentication, Database, RESTful APIs
- ReactJS – Render HTML, JSX, Components – function & Class, Props and States, Styles, Respond to Events
- ReactJS – Conditional Rendering, Rendering Lists, React Forms, React Router, Updating the Screen
- ReactJS – Hooks, Sharing data between Components, Applications – To-do list and Quiz
- MongoDB – Installation, Configuration, CRUD operations, Databases, Collections and Records

Sample Experiments:

1. ExpressJS – Routing, HTTP Methods, Middleware.

a. Write a program to define a route, Handling Routes, Route Parameters, Query Parameters and URL building.

b. Write a program to accept data, retrieve data and delete a specified resource using http methods.

c. Write a program to show the working of middleware.

2. ExpressJS – Templating, Form Data

a. Write a program using templating engine.

b. Write a program to work with form data.

3. ExpressJS – Cookies, Sessions, Authentication

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a. Write a program for session management using cookies and sessions.
b. Write a program for user authentication.

4. ExpressJS – Database, RESTful APIs

a. Write a program to connect MongoDB database using Mangoose and perform CRUD operations.
b. Write a program to develop a single page application using RESTful APIs.

5. ReactJS – Render HTML, JSX, Components – function & Class

a. Write a program to render HTML to a web page.
b. Write a program for writing markup with JSX.
c. Write a program for creating and nesting components (function and class).

6. ReactJS – Props and States, Styles, Respond to Events

a. Write a program to work with props and states.
b. Write a program to add styles (CSS & Sass Styling) and display data.
c. Write a program for responding to events.

7. ReactJS – Conditional Rendering, Rendering Lists, React Forms

a. Write a program for conditional rendering.
b. Write a program for rendering lists.
c. Write a program for working with different form fields using react forms.

8. ReactJS – React Router, Updating the Screen

a. Write a program for routing to different pages using react router.
b. Write a program for updating the screen.

9. ReactJS – Hooks, Sharing data between Components

a. Write a program to understand the importance of using hooks.
b. Write a program for sharing data between components.

10. MongoDB – Installation, Configuration, CRUD operations

a. Install MongoDB and configure ATLAS
b. Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()

11. MongoDB – Databases, Collections and Records

a. Write MongoDB queries to Create and drop databases and collections.
b. Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(), aggregate().

12. Augmented Programs: (Any 2 must be completed)

a. Design a to-do list application using NodeJS and ExpressJS.
b. Design a Quiz app using ReactJS.
c. Complete the MongoDB certification from MongoDB University website.

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Text Books:

1. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
2. Node.Js in Action, Mike Cantelon, Mark Harter, T.J. Holowaychuk, Nathan Rajlich,Manning Publications. (Chapters 1-11)
3. React Quickly, AzatMardan,Manning Publications(Chapters 1-8,12-14)

Web Links:

1. ExpressJS - ***https://www.tutorialspoint.com/expressjs***
2. ReactJS - ***https://www.w3schools.com/REACT*** (and) ***https://react.dev/learn#***
3. MongoDB - ***https://learn.mongodb.com/learning-paths/introduction-to-mongodb***

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III Year I Semester	USER INTERFACE DESIGN USING FLUTTER	L	T	P	C
		0	0	2	1

Course Objectives:

- Learns to Implement Flutter Widgets and Layouts
- Understands Responsive UI Design and with Navigation in Flutter
- Knowledge on Widges and customize widgets for specific UI elements, Themes
- Understand to include animation apart from fetching data

Course Outcomes: At the end of the course students will be able to

- **Develop and deploy mobile applications** using Flutter by understanding Dart language fundamentals, Flutter architecture, widget tree, and layout structures for building visually structured UIs. *(L2, L3)*
- **Implement navigation, state management, responsiveness, and animations** in Flutter apps using built-in tools like Navigator, Provider, and Media Query, along with styling and custom widget development *(L3, L4)*

List of Experiments:

Students need to implement the following experiments

1. a) Install Flutter and Dart SDK.
   b) Write a simple Dart program to understand the language basics.

2. a) Explore various Flutter widgets (Text, Image, Container, etc.).
   b) Implement different layout structures using Row, Column, and Stack widgets.

3. a) Design a responsive UI that adapts to different screen sizes.
   b) Implement media queries and breakpoints for responsiveness.

4. a) Set up navigation between different screens using Navigator.
   b) Implement navigation with named routes.

5. a) Learn about stateful and stateless widgets.
   b) Implement state management using set State and Provider.

6. a) Create custom widgets for specific UI elements.
   b) Apply styling using themes and custom styles.

7. a) Design a form with various input fields.
   b) Implement form validation and error handling.

8. a) Add animations to UI elements using Flutter's animation framework.
   b) Experiment with different types of animations (fade, slide, etc.).

9. a) Fetch data from a REST API.
   b) Display the fetched data in a meaningful way in the UI.

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10. a) Write unit tests for UI components.
    b) Use Flutter's debugging tools to identify and fix issues.

Text Books:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps 1st Edition, Apres
3. Richard Rose, Flutter & Dart Cookbook, Developing Full stack Applications for the Cloud, Oreilly.

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Subjects offered by Department of CSE to other Departments- OPEN ELECTIVE-I

III Year I Semester	Principles of Operating Systems	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course is to make student

- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- Illustrate different conditions for deadlock and their possible solutions.

UNIT - I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open- Source Operating Systes

System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT - II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT – III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks.

UNIT - IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing

Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

UNIT - V

File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.

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Text Books:

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

Reference Books:

1. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:

1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

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Reference Books:

III Year I Semester	Computer Organization and Architecture	L	T	P	C
		3	0	0	3

Course Objectives:

The purpose of the course is to introduce principles of computer organization and the basic architectural concepts. It provides an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems

UNIT I:

Basic Structure Of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

Logic gates: Digital Logic gates,Two-level realizations using gates - AND-OR, OR-AND, NAND-NAND and NOR-NOR

UNIT II:

Sequential circuits I: Classification of sequential circuits (synchronous and asynchronous): basic flip-flops, truth tables and excitation tables (NAND RS latch, NOR RS latch, RS flip-flop. JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals).Conversion of flip-flop to flip-flop, Race around condition, Master J-K flipflop

Register Transfer Language And Micro-operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro- operations, Logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers, Computer instructions, Instruction cycle.

UNIT III:

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT IV:

Microprocessors: Evaluation of Microprocessors, CISC and RISC, Characteristics of Microprocessors

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Cache memories performance considerations, Virtual memories Introduction to Shift registers and RAID

UNIT V:

Input – Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

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Text Books:

1. Digital Logic and Computer Design, Moriss Mano, 11th Edition, Pearson Education.
2. Computer Organization, 5thed.,Hamacher, Vranesicand Zaky,TMH,2002
3. Computer System Architecture, 3/e, MorisMano, Pearson/PHI.

Reference Books:

1. Computer System Organization &Architecture, John D.Carpinelli, Pearson,2008
2. Computer System Organization, NareshJotwani, TMH, 2009
3. Computer Organization & Architecture: Designing for Performance, 7th ed., William Stallings, PHI, 2006
4. Structured Computer Organization, Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

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III Year II Semester	COMPILER DESIGN	L	T	P	C
		3	0	0	3

Course Objectives:

Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

Course Outcomes: At the end of the course students will be able to

- Understand the structure of a compiler and design lexical analyzers using finite automata and regular expressions. *(L2, L3)*
- Apply parsing techniques such as predictive and LR parsing to construct parsing tables and resolve grammar ambiguities. *(L3, L4)*
- Develop syntax-directed translation schemes and generate intermediate code for expressions, control structures, and procedure calls. *(L3, L4)*
- Analyze and optimize code using control flow graphs, basic block techniques, and loop optimization strategies. *(L4, L5)*
- Understand runtime memory management and generate efficient target code using appropriate register allocation and code generation algorithms. *(L2, L3, L5)*

UNIT I:

Lexical Analysis: Language Processors, Structure of a Compiler, Lexical Analysis, The Role of the Lexical Analyzer, Bootstrapping, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical Analyzer Generator-LEX, Finite Automata, Regular Expressions and Finite Automata, Design of a Lexical Analyzer Generator.

Syntax Analysis: The Role of the Parser, Context-Free Grammars, Derivations, Parse Trees, Ambiguity, Left Recursion, Left Factoring,

UNIT II:

Top Down Parsing: Pre Processing Steps of Top Down Parsing, Backtracking, Recursive Descent Parsing, LL (1) Grammars, Non-recursive Predictive Parsing, Error Recovery in Predictive Parsing.

Bottom Up Parsing: Introduction, Difference between LR and LL Parsers, Types of LR Parsers, Shift Reduce Parsing, SLR Parsers, Construction of SLR Parsing Tables, More Powerful LR Parses, Construction of CLR (1) and LALR Parsing Tables, Dangling Else Ambiguity, Error Recovery in LR Parsing, Handling Ambiguity Grammar with LR Parsers.

UNIT III:

Syntax Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's. **Intermediate Code Generation:** Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow, Backpatching, Intermediate Code for Procedures.

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UNIT IV:

Code Optimization: The Principle Sources of Optimization, Basic Blocks, Optimization of Basic Blocks, Structure Preserving Transformations, Flow Graphs, Loop Optimization, Data-Flow Analysis, Peephole Optimization

UNIT V:

Run Time Environments: Storage Organization, Run Time Storage Allocation, Activation Records, Procedure Calls, Displays

Code Generation: Issues in the Design of a Code Generator, Object Code Forms, Code Generation Algorithm, Register Allocation and Assignment.

Text Books:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson, 2007.

Reference Books:

1. Compiler Construction, Principles and Practice, Kenneth C Louden, Cengage Learning, 2006
2. Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
3. Optimizing Compilers for Modern Architectures, Randy Allen, Ken Kennedy, Morgan Kauffmann, 2001.
4. Levine, J.R., T. Mason and D. Brown, Lex and Yacc, edition, O'Reilly & Associates, 1990

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III Year - I Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To equip the students with the skills to effectively communicate in English
- To motivate the students to develop confidence
- To improve the students' writing skills
- To train the students in interview skills, group discussions and Resume Preparation
- To enhance the students' interpersonal skills

UNIT – I

Listening Skills: Shaping Young Minds - A Talk by Azim Premji (Listening Activity-Self analysis and Perception), Self-Introduction, Public speaking –JAM, Pronunciation- Accent Neutralization.

UNIT – II

Etiquette:- Office etiquettes- Polite language-improving listening -Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

Verbal Communication: Speaking task- Modeling (IELTS), Corporate Communication Skills Reading – need – types, Importance - Improving

UNIT – III

Writing Skills-Remedial Grammar with a focus on Sentence Structures Basic Sentence Structures, Transformation of Sentences, Paragraph writing, Letter-Writing, Note Making, Note Taking, Minutes of the Meeting

UNIT-IV

Interview Skills– Group Discussion, Debate, Do's & Don'ts of Interviews, Cover letter, Written and Video resume preparation.

UNIT-V

Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting

Interpersonal relationships, Consequences of interpersonal relationships

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Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

Reference books:

1. R.S.Aggarwal, A Modern Approach to Verbal &Non-Verbal Reasoning, S.Chand&Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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III Year II Semester	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives:

- To explain the evolving utility computing model called cloud computing.
- To introduce the various levels of services offered by cloud.
- To discuss the fundamentals of cloud enabling technologies such as distributed computing, service-oriented architecture and virtualization.
- To emphasize the security and other challenges in cloud computing.
- To introduce the advanced concepts such as containers, serverless computing and cloud-centric Internet of Things.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamental concepts, architecture, service models, deployment models, and major providers in cloud computing. *(L2)*
- Describe and explain the underlying enabling technologies of cloud computing including distributed systems, SOA, RPC, and virtualization basics. *(L2, L3)*
- Analyze and apply virtualization and containerization techniques used in cloud environments, including Docker and Kubernetes orchestration. *(L3, L4)*
- Evaluate the challenges of cloud computing related to interoperability, scalability, energy efficiency, and security architecture. *(L4, L5)*
- Explore advanced cloud topics like serverless computing, IoT integration, fog/edge computing, DevOps, and emerging paradigms like quantum cloud. *(L2, L3)*

UNIT -I: Introduction to Cloud Computing Fundamentals

Cloud computing at a glance, defining a cloud, cloud computing reference model, types of services (IaaS, PaaS, SaaS), cloud deployment models (public, private, hybrid), utility computing, cloud computing characteristics and benefits, cloud service providers (Amazon Web Services, Microsoft Azure, Google AppEngine).

UNIT-II: Cloud Enabling Technologies

Ubiquitous Internet, parallel and distributed computing, elements of parallel computing, hardware architectures for parallel computing (SISD, SIMD, MISD, MIMD), elements of distributed computing, Inter-process communication, technologies for distributed computing, remote procedure calls (RPC), service-oriented architecture (SOA), Web services, virtualization.

UNIT-III: Virtualization and Containers

Characteristics of virtualized environments, taxonomy of virtualization techniques, virtualization and cloud Computing, pros and cons of virtualization, technology examples (XEN, VMware), building blocks of containers, container platforms (LXC, Docker), container orchestration, Docker Swarm and Kubernetes, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.

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UNIT-IV: Cloud computing challenges
Economics of the cloud, cloud interoperability and standards, scalability and fault tolerance, energy efficiency in clouds, federated clouds, cloud computing security, fundamentals of computer security, cloud security architecture, cloud shared responsibility model, security in cloud deployment models.

UNIT -V: Advanced concepts in cloud computing
Serverless computing, Function-as-a-Service, serverless computing architecture, public cloud (e.g. AWS Lambda) and open-source (e.g. OpenFaaS) serverless platforms, Internet of Things (IoT), applications, cloud-centric IoT and layers, edge and fog computing, DevOps, infrastructure-as-code, quantum cloud computing.

Text Books:

1. Mastering Cloud Computing, 2nd edition, Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, Shivananda Poojara, Satish N. Srirama, Mc Graw Hill, 2024.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018.
2. Essentials of cloud Computing, K. Chandrasekhran, CRC press, 2014.
3. Online documentation and tutorials from cloud service providers (e.g., AWS, Azure, GCP)

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III Year II Semester	CRYPTOGRAPHY & NETWORK SECURITY	L	T	P	C
		3	0	0	3

Course Objectives:
The main objectives of this course are to explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, public key algorithms, design issues and working principles of various authentication protocols and various secure communication standards including Kerberos, IPsec, and SSL/TLS.

Course Outcomes: At the end of the course students will be able to

- Understand fundamental cryptographic goals, attacks, services, and mathematical principles essential for cryptographic algorithms. *(L2)*
- Apply algebraic and finite field concepts to analyze symmetric key encryption techniques like DES and AES. *(L3, L4)*
- Explain the mathematics behind public key encryption and analyze asymmetric algorithms such as RSA, Rabin, ElGamal, and ECC. *(L2, L4)*
- Evaluate message integrity mechanisms, digital signatures, and key management strategies in secure communication systems. *(L5)*
- Analyze and apply security mechanisms at various OSI layers and identify system-level threats and defenses. *(L3, L4)*

UNIT I:
Basic Principles : Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography- integer arithmetic, modular arithmetic, matrices, linear conguence.

UNIT II:
Symmetric Encryption: Mathematics of Symmetric Key Cryptography-algebraic structures, $GF(2^n)$ Fields, Introduction to Modern Symmetric Key Ciphers-modern block ciphers, modern stream ciphers, Data Encryption Standard- DES structure, DES analysis, Security of DES, Multiple DES, Advanced Encryption Standard-transformations, key expansions, AES ciphers, Analysis of AES.

UNIT III:
Asymmetric Encryption: Mathematics of Asymmetric Key Cryptography-primes, primality testing, factorization, CRT, Asymmetric Key Cryptography- RSA crypto system, Rabin cryptosystem, Elgamal Crypto system, ECC

UNIT IV:
Data Integrity, Digital Signature Schemes & Key Management : Message Integrity and Message Authentication-message integrity, Random Oracle model, Message authentication,

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Cryptographic Hash Functions-whirlpool, SHA-512, Digital Signature- process, services, attacks, schemes, applications, Key Management-symmetric key distribution, Kerberos.

UNIT V:

Network Security-I: Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS, **Network Security-II :** Security at the Network Layer: IPSec-two modes, two security protocols, security association, IKE, ISAKMP, System Security-users, trust, trusted systems, buffer overflow, malicious software, worms, viruses, IDS, Firewalls.

Text Books:

1. Cryptography and Network Security, 3rd Edition Behrouz A Forouzan, Deb deep Mukhopadhyay, McGraw Hill,2015
2. Cryptography and Network Security,4th Edition, William Stallings, (6e) Pearson,2006
3. Everyday Cryptography, 1st Edition, Keith M.Martin, Oxford,2016

Reference Books:

1. Network Security and Cryptography, 1st Edition, Bernard Meneges, Cengage Learning,2018

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III Year II Semester	SOFTWARE TESTING METHODOLOGIES (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

Course Objectives

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test automation and management using the latest tools.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamentals of software testing and apply flow graph-based path testing techniques to detect and analyze bugs. *(L2, L3)*
- Apply transaction flow, data flow, and domain testing strategies to identify defects in software control structures and interface boundaries. *(L3, L4)*
- Analyze path products using regular expressions and apply logic-based testing techniques to evaluate software behavior through formal specification methods. *(L4, L5)*
- Model and test software using state graphs, identifying valid and invalid transitions to improve system reliability. *(L3, L4)*
- Construct and utilize graph matrices for software analysis and demonstrate proficiency in using automated testing tools like Selenium, JMeter, or SoapUI. *(L3, (L6)*

UNIT - I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: transaction flows, transaction flow testing techniques.

Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing.

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT - IV

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

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UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).

Text Books:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

Reference Books:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

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III Year II Semester	CYBER SECURITY (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

Course Objectives:
The aim of the course is to

- identify security risks and take preventive steps
- understand the forensics fundamentals
- understand the evidence capturing process
- understand the preservation of digital evidence

Course Outcomes: At the end of the course students will be able to

- Understand the fundamentals of cybercrime, its classifications, and the evolving security challenges in mobile and network environments. *(L1, L2)*
- : Identify and analyze various cyberattack tools and methods including phishing, malware, SQL injection, and network attacks. *(L2,(L4)*
- Apply cybercrime investigation techniques using digital evidence collection, email/IP tracking, and encryption/decryption methods. *(L3, L4)*
- Evaluate computer forensic tools and methodologies for investigating cyber incidents across multiple platforms and devices. *(L5, L3)*
- Understand and interpret the legal framework governing cybercrime in India and globally, including IT Act provisions and amendments. *(L2, (L5)*

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation ofMobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

UNIT II: Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

UNIT III: Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV: Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint

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Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

UNIT V: Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime andPunishment, Cyberlaw, Technology and Students: Indian Scenario.

Text Books:

1. Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY, 2011.
2. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Reference Books:

1. Michael T. Simpson, Kent Backman and James E. Corley, "Hands on Ethical Hacking and Network Defence", Cengage, 2019.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Alfred Basta, Nadine Basta,Mary Brown and Ravinder Kumar "Cyber Security and Cyber Laws" , Cengage,2018.

E-Resources:

1. CERT-In Guidelines- ***http://www.cert-in.org.in/***
2. ***https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks***[Online Course]
3. ***https://computersecurity.stanford.edu/free-online-videos*** [Free Online Videos]
4. Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, ***https://ocw.mit.edu*** License: Creative Commons BY-NC-SA.

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III Year II Semester	DEVOPS (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

Course Objectives:
The main objectives of this course are to:

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamentals of DevOps, its lifecycle, principles, and key tools for automation and release management. (L1, L2)
- Apply source code version control using GIT and perform unit testing with code coverage analysis using tools like JUnit and SonarQube. (L3, L2)
- Implement build automation and continuous integration using Jenkins, including pipeline creation and managing distributed build environments. (L3, L4)
- Demonstrate continuous delivery concepts and container management using Docker and integrate automated testing with Selenium. (L3, L2)
- Evaluate configuration management tools like Ansible and container orchestration platforms such as Kubernetes/OpenShift for deployment automation. (L5, L3)

UNIT-I
Introduction to DevOps: Introduction to SDLC, Agile Model. Introduction to Devops. DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/ CD. Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT-II
Source Code Management (GIT): The need for source code control, The history of source code management, Roles and code, source code management system and migrations. What is Version Control and GIT, GIT Installation, GIT features, GIT workflow, working with remote repository, GIT commands, GIT branching, GIT staging and collaboration. UNIT TESTING - CODE COVERAGE: Junit, nUnit & Code Coverage with Sonar Qube, SonarQube - Code Quality Analysis.

UNIT-III
Build Automation - Continuous Integration (CI): Build Automation, What is CI Why CI is Required, CI tools, Introduction to Jenkins (With Architecture), jenkins workflow, jenkins master slave architecture, Jenkins Pipelines, PIPELINE BASICS - Jenkins Master, Node, Agent, and Executor Freestyle Projects & Pipelines, Jenkins for Continuous Integration,

Create and Manage Builds, User Management in Jenkins Schedule Builds, Launch Builds on Slave Nodes.

UNIT-IV

Continuous Delivery (CD): Importance of Continuous Delivery, CONTINUOUS DEPLOYMENT CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, DockerFile, Running containers, Working with containers and publish to Docker Hub.

Testing Tools: Introduction to Selenium and its features, JavaScript testing.

UNIT-V

Configuration Management - ANSIBLE: Introduction to Ansible, Ansible tasks, Roles, Jinja templating, Vaults, Deployments using Ansible.

CONTAINERIZATION USING KUBERNETES(OPENSHIFT): Introduction to Kubernetes Namespace & Resources, CI/CD - On OCP, BC, DC & ConfigMaps, Deploying Apps on Openshift Container Pods. Introduction to Puppet master and Chef.

Text Books:

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

Reference Books:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10
2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.
3. Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing, 2016.
4. Joakim Verona. Practical Devops, Ingram short title; 2nd edition (2018). ISBN10: 1788392574
5. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

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III Year II Semester	MACHINE LEARNING (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

Course Objectives:
The objectives of the course is to

- Define machine learning and its different types (supervised and unsupervised) and understand their applications.
- Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).
- Implement unsupervised learning techniques, such as K-means clustering.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamental concepts, paradigms, and stages of machine learning including data acquisition, feature engineering, and model evaluation. (L1, L2)
- Apply and analyze nearest neighbor algorithms using various proximity and distance measures for classification and regression tasks. (L3, L4)
- Evaluate decision tree models and Bayes classifiers for classification and regression, understanding bias-variance trade-offs and classifier optimality. (L4,L5)
- Implement and assess linear classifiers including perceptrons, support vector machines, logistic regression, and neural networks using backpropagation. (L3, L4)
- Understand and apply various clustering techniques including partitioning, hierarchical, fuzzy, and spectral clustering for data grouping. (L2, L3)

UNIT-I: Introduction to Machine Learning: Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.

UNIT-II: Nearest Neighbor-Based Models: Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.

UNIT-III: Models Based on Decision Trees: Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. The Bayes Classifier: Introduction to the Bayes Classifier, Bayes' Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification, Class Conditional Independence and Naive Bayes Classifier (NBC)

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UNIT-IV: Linear Discriminants for Machine Learning: Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP.

UNIT-V: Clustering : Introduction to Clustering, Partitioning of Data, Matrix Factorization, Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.

Text Books:

1. "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024

Reference Books:

1. "Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017
2. "Machine Learning in Action",Peter Harrington, DreamTech
3. "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

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III Year II Semester	SOFTWARE PROJECT MANAGEMENT (PROFESSIONAL ELECTIVE-III)	L	T	P	C
		3	0	0	3

Course Objectives:
At the end of the course, the student shall be able to:

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course Outcomes: At the end of the course students will be able to

- Understand and analyze traditional software management models, economics, and strategies to improve software development effectiveness and quality. (L2, L4)
- Describe and differentiate the life cycle phases and key process artifacts involved in software engineering projects. (L1, L2)
- Analyze software architectures and workflows, and apply iterative process planning techniques for effective project execution. (L4, L3)
- Evaluate project organizational structures and utilize process automation and metrics to monitor and control software development. (L5, L3)
- Understand agile and DevOps principles, and apply them to enhance software delivery through automation, orchestration, and team collaboration. (L2, L3)

UNIT-I:
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-II:
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT- III:
Model based software architectures: A Management perspective and technical perspective.

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Work Flows of the process: Software process workflows, Iteration workflows.
Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT- IV:
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT-V:
Agile Methodology, ADAPTing to Scrum, Patterns for Adopting Scrum, Iterating towards Agility. **Fundamentals of DevOps:** Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Text Books:
1. Software Project Management, Walker Royce, PEA, 2005.
2. Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.
3. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.

Reference Books:
1. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki, Wiley,2006.
5. Project Management in IT, Kathy Schwalbe, Cengage

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III Year II Semester	MOBILE ADHOC NETWORKS (PROFESSIONAL ELECTIVE-III)	L	T	P	C
		3	0	0	3

Course Objectives:
From the course the student will learn

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

Course Outcomes: At the end of the course students will be able to

- Understand the fundamental concepts, characteristics, applications, and challenges of MANETs and analyze MAC protocols designed for ad hoc wireless networks. (L2, L4)
- Describe routing challenges and classify routing and transport layer protocols for ad hoc wireless networks, including TCP adaptations. (L2, L1)
- Examine security requirements, common attacks, and key management techniques, and evaluate secure routing and intrusion detection methods in MANETs. (L4, L5)
- Understand the architecture, design issues, energy considerations, and data retrieval mechanisms in wireless sensor networks along with their practical applications. (L2, L3)
- Analyze security challenges and key management in WSNs, and demonstrate knowledge of sensor network hardware, operating systems, and simulation tools. (L4, L3)

UNIT I: Introduction to Ad Hoc Wireless Networks- Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols.

UNIT II: Routing Protocols for Ad Hoc Wireless Networks- Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III: Security protocols for Ad hoc Wireless Networks- Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV: Basics of Wireless Sensors and Applications- The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors,

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Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V: Security in WSNs- Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, **Dataflow Style Language**-TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

Text Books:

1. Ad Hoc Wireless Networks – Architectures and Protocols, 1st edition, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, 2nd edition *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications / Cambridge University Press, March 2006

Reference Books:

1. Wireless Sensor Networks: An Information Processing Approach, 1st edition, *Feng Zhao, Leonidas Guibas,* Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, 1st edition, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3. Ad hoc Networking, 1st edition, *Charles E.Perkins*, Pearson Education, 2001
4. Wireless Ad hoc Networking, 1st edition, *Shih-Lin Wu, Yu-Chee Tseng,* Auerbach Publications, Taylor & Francis Group, 2007
5. Wireless Sensor Networks – Principles and Practice, 1st edition, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

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III Year II Semester	NATURAL LANGUAGE PROCESSING (PROFESSIONAL ELECTIVE-III)	L	T	P	C
		3	0	0	3

Course Objectives:

This course introduces the fundamental concepts and techniques of natural language processing (NLP).

- Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes: At the end of the course students will be able to

- Understand the foundational concepts of NLP, language modeling techniques, and apply regular expressions and finite-state automata for morphological analysis and spelling correction. (L2, L3)
- Analyze and evaluate word-level models such as N-grams and Part-of-Speech tagging using rule-based, stochastic, and machine learning approaches. (L4, L5)
- Explain syntactic structures using context-free grammars and dependency grammar, and apply probabilistic parsing techniques to resolve syntactic ambiguity. (L2, L3)
- Interpret semantic representations using logic and thematic roles, and evaluate methods for word sense disambiguation and word similarity measurement. (L2, L5)
- Demonstrate knowledge of discourse phenomena, perform coreference resolution, and utilize standard lexical resources and corpora for NLP tasks. (L3, L2)

UNIT I:

INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT II:

WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III:

SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing Probabilistic CFG,

Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures

UNIT IV:

SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V:

DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Text Books:

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin - Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

Reference Books:

1. Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2. Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3. Handbook of Natural Language Processing, Second, NitinIndurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
4. Natural Language Processing and Information Retrieval, 3rd Edition, TanveerSiddiqui, U.S. Tiwary, Oxford University Press,2008.

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III Year II Semester	Big Data Analytics (Professional Elective-III)	L	T	P	C
		3	0	0	3

Course Objectives: This course is aimed at enabling the students to

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSQL, Map Reduce, HIVE, Cassandra, Spark.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To optimize business decisions and create competitive advantage with Big Data analytics

Course Outcomes: At the end of the course students will be able to

- : Understand the fundamentals of big data, its industry applications, key trends, and foundational technologies including Hadoop and cloud-based analytics. (L2)
- Explain and apply different NoSQL data models, including key-value, document, and graph databases, and demonstrate data distribution and replication concepts using Cassandra. (L2, L3)
- Describe the Hadoop Distributed File System (HDFS) architecture and MapReduce framework, and apply HiveQL for data definition, manipulation, and query optimization in Hadoop. (L2, L3)
- Analyze Spark's architecture, including RDDs, DataFrames, and Spark SQL optimizations, and demonstrate deployment and debugging in cluster environments. (L4, L3)
- Apply techniques for Spark performance tuning and implement real-time stream processing using structured streaming concepts like event time, windows, and watermarks. (L3, L5)

UNIT I: big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer- peer replication, shardingand replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data

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integrity, compression, serialization. Introduction to Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames, Catalyst optimizer, Data Frame Transformations, Working with Dates and Timestamps, Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing - Event Time, State full Processing, Windows on Event Time- Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and AmbigaDhiraj, 1st edition ,2013
2. SPARK: The Definitive Guide, Bill Chambers &MateiZaharia, O'Reilley, 2018-first Edition.
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, First edition-2013.
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World Polyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012

Reference Books:

1. "Hadoop Operations", O'Reilley, Eric Sammer, First Edition -2012.
2. "Programming Hive", O'Reilley, E. Capriolo, D. Wampler, and J. Rutherglen, 2012.
3. "HBase: The Definitive Guide", O'Reilley, Lars George, September 2011: First Edition..
4. "Cassandra: The Definitive Guide", O'Reilley, Eben Hewitt, 2010.

"Programming Pig", O'Reilley, Alan Gates, October 2011: First Edition

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III Year II Semester	DISTRIBUTED OPERATING SYSTEM (PROFESSIONAL ELECTIVE-III)	L	T	P	C
		3	0	0	3

Course Objectives:
The main objective of the course is to introduce design issues and different message passing techniques in DOS, distributed systems, RPC implementation and its performance in DOS, distributed shared memory and resource management, distributed file systems and evaluate the performance in terms of fault tolerance, file replication as major factors

Course Outcomes: At the end of the course students will be able to

- Understand the fundamentals of distributed computing systems, operating systems, and message passing mechanisms along with design issues and case studies. (L2)
- Explain the architecture, implementation, and optimization of Remote Procedure Calls (RPC) and analyze their use in heterogeneous environments. (L2, L4)
- Analyze the design and implementation of Distributed Shared Memory (DSM) systems and apply synchronization techniques in distributed environments. (L4, L3)
- Evaluate global scheduling strategies and apply process and thread management techniques, including migration and load balancing. (L5, L3)
- Understand and assess the features, models, and fault tolerance mechanisms of distributed file systems. (L2, L5)

Unit I:Fundamentals:
What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE).

Message Passing:
Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism.

Unit II: Remote Procedure Calls:
Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC

Unit III: Distributed Shared Memory:
Introduction, General Architecture of DSM systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM.

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Synchronization: Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms

Unit IV:Resource Management:
Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach Process Management: Introduction, Process Migration, Threads.

Unit V: Distributed File Systems:
Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.

Text books
1. Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.

Reference Books:
1. Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2013.
2. Ajay D. Kshemkalyani and MukeshSinghal, Distributed Computing: Principles, Algorithms and Systems, Cambridge University Press, 2008
3. SunitaMahajan, Seema Shan, " Distributed Computing", Oxford University Press,2015

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III Year II Semester	CLOUD COMPUTING LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

- To introduce the various levels of services offered by cloud.
- To give practical knowledge about working with virtualization and containers.
- To introduce the advanced concepts such as serverless computing and cloud simulation.

Course Outcomes: At the end of the course, the student should be able to

- Demonstrate various service types, delivery models and technologies of a cloud computing environment.
- Distinguish the services based on virtual machines and containers in the cloud offerings.
- Assess the challenges associated with a cloud-based application.
- Discuss advanced cloud concepts such as serverless computing and cloud simulation.
- Examine various programming paradigms suitable to solve real world and scientific problems using cloud services.

List of Experiments:

1. Lab on web services
2. Lab on IPC, messagaging, publish/subscribe
3. Install VirtualBox/VMware Workstation with different flavours of Linux or windows OS on top of windows8 or above.
4. Install a C compiler in the virtual machine created using VirtualBox and execute Simple Programs.
5. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IP address with the instance. In the process, create a security group allowing access to port 80 on the instance.

OR

6. Do the same with OpenStack
7. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
8. Start a Docker container and set up a web-server (e.g. apache2 or Python based Flask micro web framework) on the instance. Map the host directory as a data volume for the container.
9. Find a procedure to transfer the files from one virtual machine to another virtual machine. Similarly, from one container to another container.
10. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
11. Install Hadoop single node cluster and run simple applications like word count.

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12. Utilize OpenFaaS – Serverless computing framework and demonstrate basic event driven function invocation.
13. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

Text Books:

1. Mastering Cloud Computing, 2nd edition, Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, Shivananda Poojara, Satish N. Srirama, McGraw Hill, 2024.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018.
2. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
3. Online documentation and tutorials from cloud service providers (e.g. AWS, Google App Engine)
4. Docker, Reference documentation, ***https://docs.docker.com/reference/***
5. OpenFaaS, Serverless Functions Made Simple, ***https://docs.openfaas.com/***

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III Year II Semester	CRYPTOGRAPHY & NETWORK SECURITY LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

- To learn basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
- To understand and implement encryption and decryption using Ceaser Cipher, Substitution Cipher, Hill Cipher.

Course Outcomes: At the end of the course students will be able to

- Students will be able to **implement classical and modern encryption algorithms** such as Caesar Cipher, Substitution Cipher, Hill Cipher, DES, AES (Rijndael), and Blowfish using programming languages like C and Java. (L3)
- Students will be able to **demonstrate secure communication techniques using public-key algorithms like RSA and Diffie-Hellman,** and understand the key exchange process via practical implementation. *(L2, L3)*
- Students will be able to **apply hashing techniques and cryptographic libraries (e.g., Java Cryptography API)** for securing messages and generating message digests using algorithms like SHA-1. *(L3)*

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result
3. Write a Java program to perform encryption and decryption using the following algorithms:
   a) Ceaser Cipher
   b) Substitution Cipher
   c) Hill Cipher
4. Write a Java program to implement the DES algorithm logic
5. Write a C/JAVA program to implement the BlowFish algorithm logic
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java key tool.
8. Write a Java program to implement RSA Algorithm
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

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III Year II Semester	TECHNICAL PAPER WRITING & IPR	L	T	P	C
		2	0	0	-

Course Objective : The course will explain the basic related to writing the technical reports and understanding the concepts related to formatting and structuring the report. This will help students to comprehend the concept of proofreading, proposals and practice

Unit I:

Introduction: An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing.

Planning and Structuring: Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.

Unit II:

Drafting report and design issues: The use of drafts, Illustrations and graphics.

Final edits: Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.

Unit III:

Proofreading and summaries: Proofreading, summaries, Activities on summaries. **Presenting final reports:** Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

Unit IV: Using word processor:

Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes , Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros,

Unit V:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of **Patenting and Development:** technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property

Text Books:

1. Kompal Bansal & Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.

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2. William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.
3. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.

Reference Books:

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press(2006)

E-resources:

1. ***https://www.udemy.com/course/reportwriting/***
2. ***https://www.udemy.com/course/professional-business-english-and-technical-report-writing/***
3. ***https://www.udemy.com/course/betterbusinesswriting/***

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Subjects offered by Department of CSE to other Departments- OPEN ELECTIVE-II

III Year II Semester	Principles of Database Management Systems	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course is to

- Introduce database management systems and to give a good formal foundation on the relational model of data
- Introduce the concepts of SQL
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing database storage techniques

UNIT I:

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT II:

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.
Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance.

UNIT III:

BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT IV:

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF).

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UNIT V:

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Text Books:

1) Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2) Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

Reference Books:

1) Introduction to Database Systems, 8thedition, C J Date, Pearson.
2) Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
3) Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022

Web-Resources:

1) https://nptel.ac.in/courses/106/105/106105175/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

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III Year - II Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To enable the students to lead meaningful professional life
- To enhance the students with Management skills
- To improve the students' writing skills
- To train the students in interview skills, group discussions and presentation skills
- To enhance the students' intrapersonal skills

UNIT – I

Analytical Thinking: Developing Positive Attitude, Personality development-Personal growth, Problem-solving, Critical thinking

Non-Verbal Communication: Importance – Facial Expressions- Eye Contact – Posture - Cross- Cultural awareness – Body language in Interview room - appearance and dress code.

UNIT – II

Self-Management Skills: Anger Management, Stress Management, develop Managerial skills, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

UNIT – III

Standard Operation Methods: Basic Grammars,-structures, Tenses, Prepositions, Remedial grammar- Pronunciation, E-Mail writing

UNIT-IV

Job-Oriented Skills: Presentation Skills, Mock Group Discussions, Resume Presentation, Interview Skills, Mock Interview Skills

UNIT-V

Intra-personal Communication Skills- SWOT analysis, Goal setting, Emotional intelligence-Attitudinal skills, Consequences of intrapersonal-relationships

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Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Black Swan, 2010.

Reference books:

1. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand & Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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ESTD: 2007

ThIRD BOARD OF STUDIES MEETING-MINUTES

SRK INSTITUTE OF TECHNOLOGY,
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Approved by AICTE, An Autonomous Institute with affiliation to JNTUK, Accredited by NAAC with 'A' grade
Department of CSE-Artificial Intelligence and Machine Learning

Date & Time: 23rd July 2025, 11.00 AM

Venue: IQAC Room

Agenda for the 3rd Board of Studies Meeting

Item No.	Contents - Item Description
1	To finalize the detailed Course- Structure of III Year semester I & II in SRK-23 Regulations
2	To finalize the detailed Course- Contents of B.Tech I and II semesters in SRK-23 Regulations.
3	To discuss and finalize the syllabus of Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering

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List of Members of the Board of Studies

SNo.	Name	Designation	Category
1	Dr.D.Anusha	Associate Professor & HOD	Chairman
(2 Subject Experts outside Parent University)			
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. B.N. Jagadesh	Associate Professor, CSE VIT-AP, Amaravathi.	Member
(I Subject Expert nominated by Vice-Chancellor)			
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(I Representative from Industry)			
5	Mr.K.Sudheer	Software Engineer Accenture, Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada.	Member
(Faculty of the Department)			
7	Dr.Ch.Rathna Jyothi	Associate Professor	Member
8	D.Sirisha	Assistant Professor	Member
9	Ch.Jeevana Priya	Assistant Professor	Member

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MINUTES OF BOS MEETING

SRKIT/BOS/CSE-AIML/2025-26/3 **Date**: 23/06/25

Department: CSE-AIML **Academic Year**: 2025-26

Venue: IQAC Room **Time**: 11.00 P.M

The Third Board of Studies meeting of the department CSE-AIML was held on 23rd July 2025 at 11:30 P.M. Through online mode in the IQAC room, Department of CSE-AIML, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr.D.Anusha	Associate Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Subject Expert	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Subject Expert	
(1 Representative from Industry)				
5	Mr. k. Sudheer	Software Engineer, Accenture ,Hyderabad	Industry Expert	
(Alumnus nominated by Principal)				
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada	Alumni	

(Faculty of the Department)

Dr.Ch.Rathna Jyothi	Associate Professor	Member
D.Sirisha	Assistant Professor	Member
Ch.Jeevana Priya	Assistant Professor	Member

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Dr.D.Anusha chaired the Third BOS virtual meeting through the following link: https://meet.google.com/xkb-gyxn-gfm

After a concise introduction about BOS Members, the HoD presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

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Andhra Pradesh, India-Pin 521 108.

AGENDA:

SRKIT/BOS/CSE-AML.2025-26/3//01	Welcome Address And Opening Remarks by Chairman, Board of Studies in the Department of CSE-Artificial Intelligence and Machine Learning
SRKIT/BOS/CSE-AML. 2025-26/3/01	To finalize the detailed Course- Structure of III Year Semester I & Semester II in SRK-23 Regulations
SRKIT/BOS/CSE-AML. 2025-26/3/01	To finalize the detailed Course- Contents of III B.Tech I and II semesters in SRK-23 Regulations.
SRKIT/BOS/CSE-AML.2024-25/2/01	To discuss and finalize the syllabus of the subject Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering

POINTS OF DISCUSSION:

1. About B.Tech IIIrd year Ist & IInd Semester Course structure and Syllabus of Regulation SRK-23.
2. About B.Tech IIIrd year Ist & IInd Semester Course outcomes of each course in the Regulation SRK-23.
3. To add a textbook for the subject Information Retrieval Systems entitled "**Information Retrieval – Data Structures and Algorithms, William B. Frakes, Ricardo Baeza-Yates**" in III BTECH II semester and any other suggestions from Subject Experts and other BOS members.
4. About the syllabus of Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering.

RESOLUTION:

The BOS resolved and approve the

1. About B.Tech Third year I & II Semester-Course Structure of SRK-23
2. About B.Tech Third year I & II Semester course contents of SRK-23
3. About the syllabus of the subject Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering
4. About the syllabus of Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering

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5. As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, the JNTUK proposed course structure, course outcomes and syllabus for the Department of CSE-Artificial Intelligence and Machine Learning and syllabus of Artificial Intelligence and Machine Learning of III BTECH II Semester in the department of Mechanical Engineering in the SRK Institute of Technology are approved.

At 1:00 p.m., Dr. D.Anusha, Chairman of BOS of the CSE-Artificial Intelligence and Machine Learning Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

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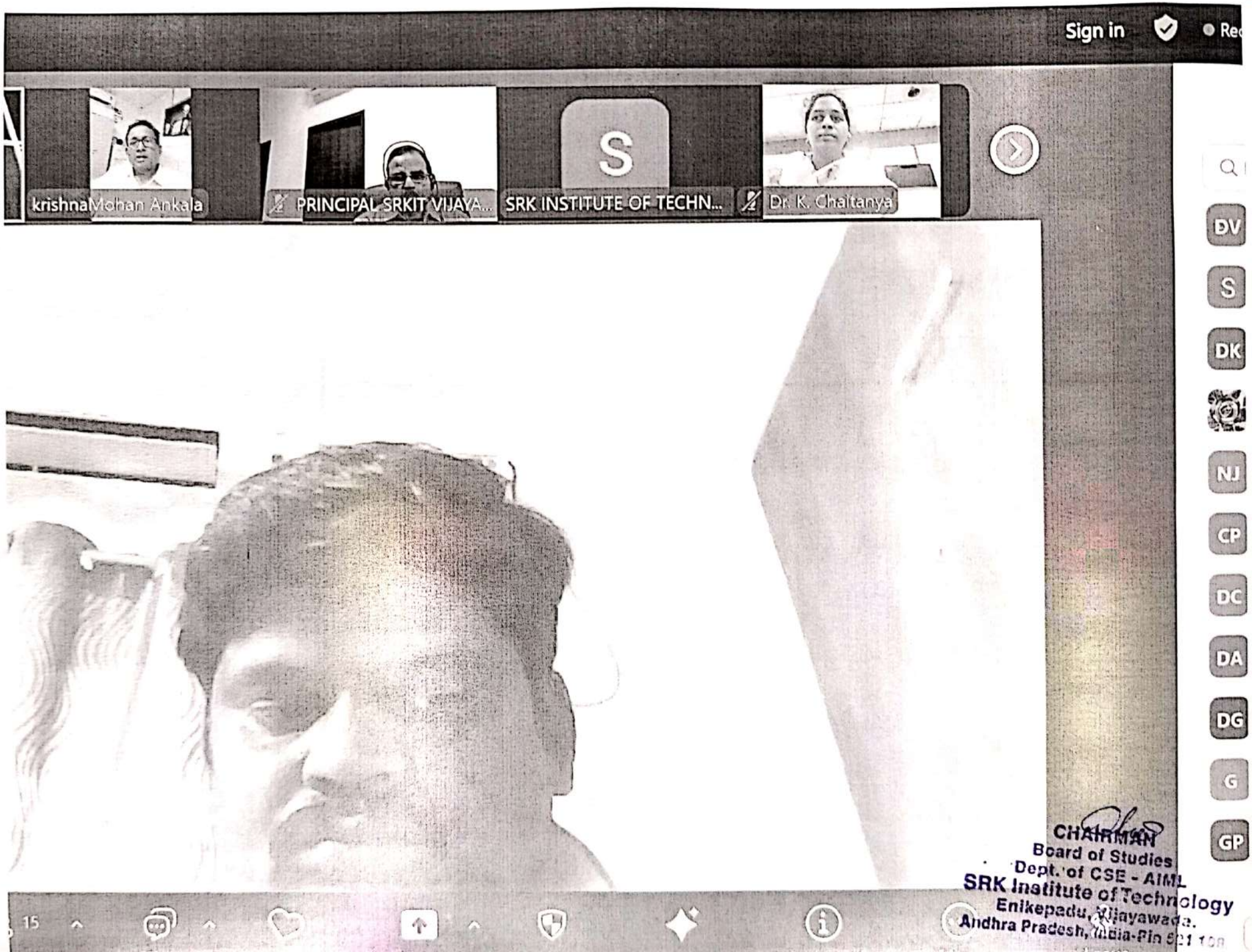

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B.Tech III Year Syllabus (Autonomous) For BOS in SRKIT

SRK CSD <srkcsdhod@gmail.com>

20 Jun 2025 15:00

to krishna.anikala, Jagadesh, kmarepalli, bcc: sudheer.kodunu, bcc: Bhagya

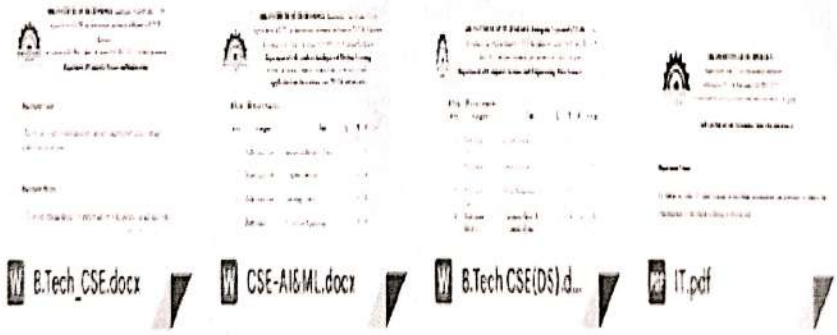
Dear sir,

I Dr V.Sreenivas. Academic Director for CSE-Allied Branches in SRKIT. As we discussed over the phone regarding BOS, iam attaching all the branch of Syllabus for your References. Please let us know any changes. we have planned the BOS meeting on Monday (23-06-2025) at 10.30 A.M IST. i will share the link through whatsapp. I request you please be available at that time.

Thanking you.

Dr V.Sreenivas

4 attachments • Scanned by Gmail



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B.Tech. – III Year I Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Information Retrieval Systems	3	0	0	3
2	Professional Core	Computer Networks	3	0	0	3
3	Professional Core	Operating Systems	3	0	0	3
4	Professional Elective-I	1. Software Engineering 2. Cloud Computing 3. Internet of Things (common to CSM & CSD) 4. Exploratory Data Analysis with Python 5. Automata Theory & Compiler Design (common to CSM & CSD)	3	0	0	3
5	Open Elective- I	OR Entrepreneurship Development & Venture Creation	3	0	0	3

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6	Professional Core	Information Retrieval Lab	0	0	3	1.5
7	Professional Core	Computer Networks Lab	0	0	3	1.5
8	Skill Enhancement course	Full Stack development -2 /SWAYAM Plus-Data Engineer/AI Engineer/	0	1	2	2
9	ES	Tinkering Lab *(User Interface Design using Flutter)*	0	0	2	1
10	Evaluation of Community Service Project Internship		-	-	-	2
11	Skill Enhancement course	Soft skills	0	1	2	1
	Total		**15**	**1**	**10**	**24**
MC	Student may select from the Same Minor Pool		3	0	3	4.5
MC	Minor Course through SWAYAM / NPTEL (Minimum 12 Week, 3 credit course)		3	0	0	3
HC	Student may select from the Same Honors Pool		3	0	0	3
HC	Student may select from the Same Honors Pool		3	0	0	3

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B. Tech– III Year II Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Natural Language Processing	3	0	0	3
2	Professional Core	Deep Learning	3	0	0	3
3	Professional Core	Data Visualization	3	0	0	3
4	Professional Elective-II	1. Software Testing Methodology 2. Cryptography & Network Security 3. DevOps 4. Recommender Systems 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
5	Professional Elective-III	1. Software Project Management 2. Mobile Adhoc Networks 3. Computer Vision 4. NoSQL Databases 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
6	Open Elective - II		3	0	0	3
7	Professional Core	Deep Learning Lab	0	0	3	1.5
8	Professional Core	Data Visualization Lab	0	0	3	1.5
9	Skill Enhancement course	Soft skills	0	1	2	1
10	Audit Course	Technical Paper Writing & IPR	2	0	0	-
Total			**20**	**1**	**8**	**22**

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Mandatory Industry Internship / Mini Project of 08 weeks duration during summer vacation					
MC	Student may select from the same minor pool	3	0	3	4.5
MC	Minor Course (Student may select from the same specialized minors pool)	3	0	0	3
HC	Student may select from the same honor's pool	3	0	0	3
HC	Honors Course (Student may select from the honors pool)	3	0	0	3

Under Industry Internship interested students can purse SWAYAM Plus courses viz, Hands on Masterclass on Data Analytics OR Artificial Intelligence for Real –World Applications.

Note: Student need to do at least ONE MOOC Course (3 credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)

Open Electives, offered to other department students:

Open Elective I: Operating Systems / Computer Organization and Architecture

Open Elective II: Database Management Systems

Open Elective III: Object Oriented Programming Through Java

Open Elective IV: Computer Networks / Software Engineering / IOT Based Smart Systems

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III B. Tech I Semester	INFORMATION RETRIEVAL SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

CO1: Understand information retrieval systems, their evaluation, and related data structures and algorithms.

CO2: implement inverted and signature file structures for efficient information retrieval

CO3: Apply PAT trees and stoplists for efficient text indexing.

CO4: Implement stemming techniques and build thesauri to improve text retrieval.

CO5: Analyse fundamental string matching algorithms

Unit I: Introduction to Information storage and retrieval systems: Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation **Introduction to Data structures and algorithms related to Information Retrieval**: Basic Concepts, Data structures, Algorithms.

Unit II: Inverted Files and Signature Files: Introduction, Structures used in Inverted Files, building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit III: New Indices for Text, Lexical Analysis and Stoplists: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stoplists.

Unit IV: Stemming Algorithms and Thesaurus Construction: Types of Stemming algorithms, Experimental Evaluations of Stemming, stemming to Compress Inverted Files.
Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

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Unit V: String Searching Algorithms: Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Information Retrieval – Data Structures and Algorithms, William B. Frakes, Ricardo Baeza-Yates
2. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
3. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

III B. Tech I Semester	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives:

- To understand the Fundamental Concepts related to sources, shadows and shading
- To understand the Geometry of Multiple Views

Course Outcomes:

CO1: Understand types of computer networks, OSI and TCP/IP models, and the history of the Internet.

CO2: Explain data link layer protocols, and multiple access methods in wired LANs.

CO3: Understand network layer design, routing, congestion control, and IP protocols including IPv4 and IPv6.

CO4: Analyze and compare key transport layer protocols: UDP, TCP, and SCTP

CO5: Understand the World Wide Web, HTTP, DNS, remote login, email, and file transfer protocols.

UNIT 1: Introduction: Types of Computer Networks, Reference Models- The OSI Reference Model, The TCP/IP Reference Model, A Critique of the OSI Model and Protocols, A Critique of the

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TCP/IP Reference Model. History of Internet.

UNITII: The Data Link Layer: Transmission Media, Guided and Un-guided media, Data Link Layer Design Issues, Services Provided to the Network Layer, Error detecting and Error Correcting codes, Elementary Data Link Protocols, Sliding Window Protocols, HDLC, PPP. Multiple Access Protocols Wired Lans: Ethernet, Fast Ethernet, Gigabit Ethernet

UNITIII: The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion, Congestion control algorithms. The Network Layer in the Internet, The IP Version 4 Protocol, IP Addresses- Classful, CIDR, NAT, IP Version 6 Protocol, Transition from IPV4 to IPV6

UNITIV: The Transport Layer: The Transport Layer Services, Transport Layer Protocols: UDP, TCP and SCTP

UNITV: The Application Layer: The World Wide Web, HTTP, Domain Name Space, Remote Loging, Electronic Mail and File Transfer

Text Books:

1. "Computer Networks", Andrew S Tanenbaum, David J Wetherall, 5th Edition, Pearson
2. "Data Communications and Networking", Behrouz A Forouzan, 4th Edition, Tata McGraw Hill Education

Reference Books:

1. "Data and Computer Communication", William Stallings, Pearson
2. "TCP/IP Protocol Suite", Behrouz Forouzan, McGraw Hill.

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		L	T	P	C
III B. Tech I Semester	**SOFTWARE ENGINEERING**	**3**	**0**	**0**	**3**

Course Objectives:

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

Course Outcomes:

CO 1: Understand software development evolution, life cycle models, and modern development practices including Agile and Spiral.

CO 2: Apply project management techniques and conduct requirements analysis for effective software development.

CO 3: Apply principles of software design and agile methodologies

CO 4: Analyze various testing methods, and quality standards to develop and maintain dependable software.

CO 5: Understand CASE tools, software maintenance processes, and strategies for effective software reuse.

UNIT-I: Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT-II: Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation

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techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.
Requirements Analysis and Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT-III: Software Design: Overview of the design process, how to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design. Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)
Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.
User Interface Design: Characteristics of a good user interface,Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

UNIT-IV: Coding and Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, testing object-oriented programs, Smoke testing, and Some general issues associated with testing.
Software Reliability and Quality Management: Software reliability. Statistical testing, Software quality Software quality management system, ISO9000.SEICapability maturity model. Few other Important quality standards, and Six Sigma.

UNIT-V: Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.
Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.
Software Reuse: Reuse-definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall,5thEdition,PHI.

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2. Software Engineering A Practitioner's Approach, Roger S. Pressman, 9th Edition, McGraw Hill International Edition.

Reference Books:

1. Software Engineering ,Ian Sommerville,10th Edition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105182/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

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III B. Tech I Semester	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives:

- To explain the evolving utility computing model called cloud computing.
- To introduce the various levels of services offered by cloud.
- To discuss the fundamentals of cloud enabling technologies such as distributed computing, service-oriented architecture and virtualization.
- To emphasize the security and other challenges in cloud computing.
- To introduce the advanced concepts such as containers, serverless computing and cloud-centric Internet of Things.

Course Outcomes:

- **CO1:** Understand, analyze, and apply fundamental concepts of the Cloud
- **CO2:** Demonstrate comprehensive knowledge of ubiquitous internet, parallel and distributed computing paradigms.
- **CO3:** Explain the characteristics and taxonomy of virtualization techniques and analyze the integration of virtualization with cloud computing
- **CO4:** Analyze the economic factors and technical challenges of cloud computing, including interoperability, scalability, and energy efficiency,
- **CO5:** Explain the principles of serverless computing and IoT architectures and utilize DevOps

UNIT -I: Introduction to Cloud Computing Fundamentals: Cloud computing at a glance, defining a cloud, cloud computing reference model, types of services (IaaS, PaaS, SaaS), cloud deployment models (public, private, hybrid), utility computing, cloud computing characteristics and benefits, cloud service providers (Amazon Web Services, Microsoft Azure, Google App Engine).

UNIT-II: Cloud Enabling Technologies: Ubiquitous Internet, parallel and distributed computing, elements of parallel computing, hardware architectures for parallel computing (SISD, SIMD, MISD, MIMD), elements of distributed computing, Inter-process communication, technologies for distributed

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computing, remote procedure calls (RPC), service-oriented architecture (SOA), Web services, virtualization.

UNIT-III: Virtualization and Containers: Characteristics of virtualized environments, taxonomy of virtualization techniques, virtualization and cloud Computing, pros and cons of virtualization, technology examples (XEN, VMware), building blocks of containers, container platforms (LXC, Docker), container orchestration, Docker Swarm and Kubernetes, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.

UNIT-IV: Cloud computing challenges: Economics of the cloud, cloud interoperability and standards, scalability and fault tolerance, energy efficiency in clouds, federated clouds, cloud computing security, fundamentals of computer security, cloud security architecture, cloud shared responsibility model, security in cloud deployment models.

UNIT -V: Advanced concepts in cloud computing: Serverless computing, Function-as-a-Service, serverless computing architecture, public cloud (e.g. AWS Lambda) and open-source (e.g. OpenFaaS) serverless platforms, Internet of Things (IoT), applications, cloud-centric IoT and layers, edge and fog computing, DevOps, infrastructure-as-code, quantum cloud computing.

Text Books:

1. Mastering Cloud Computing, 2nd edition, RajkumarBuyya, Christian Vecchiola, ThamaraiSelvi, ShivanandaPoojara, Satish N. Srirama, Mc Graw Hill, 2024.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018.
2. Essentials of cloud Computing, K. Chandrasekhran, CRC press, 2014.
3. Online documentation and tutorials from cloud service providers (e.g., AWS, Azure, GCP)

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III B. Tech I Semester	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Course Objectives:

- Vision and Introduction to Internet of Things(IoT).
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Understand Real World IoT Design Constraints, Industrial Automation and Commercial.

Course Outcomes:

- **CO 1 :** Understand the fundamental concepts and technologies of the Internet of Things
- **CO 2 :** Understand IoT business models, system architectures, standards, and communication technologies to design efficient and affordable IoT/M2M solutions.
- **CO 3 :** Explain design principles and communication protocols for web connectivity
- **CO 4:** Analyze data acquisition and management techniques, and evaluate their impact on business processes and enterprise system integration.
- **CO 5:** Demonstrate knowledge of cloud platforms and sensor networks for scalable data acquisition, storage, and processing

UNIT I:The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles for Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT II: Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High- level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT III: Design Principles for the Web Connectivity for Connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for Connected-Devices.

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UNIT IV: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications /Services /Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT V: Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

Text Books:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Books:

1. **Designing the Internet of Things, Adrian McEwen and Hakim Cassimally,Wiley**
2. Getting Started with the Internet of Things, CunoPfister ,Oreilly

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III B. Tech I Semester	EXPLORATORY DATA ANALYSIS WITH PYTHON	L	T	P	C
		3	0	0	3

Course Objectives: The main objectives of the course are to

- Introduce the fundamentals of Exploratory Data Analysis
- Cover essential exploratory techniques for understanding multivariate data by
- summarizing it through statistical methods and graphical methods.
- Evaluate the Models and select the best model

Course Outcomes:

- CO 1: Apply exploratory data analysis techniques using appropriate software tools to interpret and summarize numerical and categorical data effectively.
- CO 2: Demonstrate the ability to create and interpret visualizations for exploratory data analysis and apply data preprocessing techniques to real-world datasets.
- CO 3: Apply data transformation techniques such as merging, reshaping, handling missing data, discretization, and outlier detection to prepare datasets for effective analysis
- CO 4: Analyze data using statistical measures and techniques to interpret univariate, bivariate, multivariate, and time series datasets
- CO 5: Implement end-to-end machine learning workflows including data preparation, model training, evaluation, and deployment using practical case studies

UNIT-I: Exploratory Data Analysis Fundamentals: Understanding data science, the significance of EDA, steps in EDA, Making sense of data, Numerical data, Categorical data, Measurement scales, Comparing EDA with classical and Bayesian analysis, Software tools available for EDA, Getting started with EDA.

Sample Experiments:

1. a) Download Dataset from Kaggle using the following link :

https://www.kaggle.com/datasets/sukhmanibedi/cars4u

b) Install python libraries required for Exploratory Data Analysis (numpy, pandas, matplotlib, seaborn)

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2. Perform Numpy Array basic operations and Explore Numpy Built-in functions.
3. Loading Dataset into pandas dataframe
4. Selecting rows and columns in the dataframe

UNIT-II: Visual Aids for EDA: Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart

Case Study: EDA with Personal Email, Technical requirements, Loading the dataset, Data transformation, Data cleansing, Applying descriptive statistics, Data refactoring, Data analysis.

Sample Experiments:

1. Apply different visualization techniques using sample dataset
   a. Line Chart b. Bar Chart c. Scatter Plots d.Bubble Plot
2. Generate Scatter Plot using seaborn library for iris dataset
3. Apply following visualization Techniques for a sample dataset
   a. Area Plot b. Stacked Plot c. Pie chart d. Table Chart
4. Generate the following charts for a dataset.
   a. Polar Chart b. Histogram c.Lollipop chart
5. Case Study: Perform Exploratory Data Analysis with Personal Email Data

UNIT-III: Data Transformation: Merging database-style data frames, Concatenating along with an axis, Merging on index, Reshaping and pivoting, Transformation techniques, Handling missing data, Mathematical operations with NaN, Filling missing values, Discretization and binning, Outlier detection and filtering, Permutation and random sampling, Benefits of data transformation, Challenges.

Sample Experiments:

1. Perform the following operations
   a) Merging Dataframes b) Reshaping with Hierarchical Indexing
   c) Data Deduplication d) Replacing Values
2. Apply different Missing Data handling techniques
   a)NaN values in mathematical Operations b) Filling in missing data
   c) Forward and Backward filling of missing values d) Filling with index values
   e) Interpolation of missing values
3. Apply different data transformation techniques
   a) Renaming axis indexes b) Discretization and Binning
   c) Permutation and Random Sampling d) Dummy variables

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UNIT-IV : Descriptive Statistics: Distribution function, Measures of central tendency, Measures of dispersion, Types of kurtosis, Calculating percentiles, Quartiles, Grouping Datasets, Correlation, Understanding univariate, bivariate, multivariate analysis, Time Series Analysis

Sample Experiments:

1. Study the following Distribution Techniques on a sample data
   a) Uniform Distribution b) Normal Distribution c) Gamma Distribution
   d) Exponential Distribution e) Poisson Distribution f) Binomial Distribution
2. Perform Data Cleaning on a sample dataset.
3. Compute measure of Central Tendency on a sample dataset
   a) Mean b) Median c) Mode
4. Explore Measures of Dispersion on a sample dataset
   a) Variance b) Standard Deviation c) Skewness d) Kurtosis
5. a) Calculating percentiles on sample dataset
   b) Calculate Inter Quartile Range(IQR) and Visualize using Box Plots
6. Perform the following analysis on automobile dataset.
   a) Bivariate analysis b) Multivariate analysis
7. Perform Time Series Analysis on Open Power systems dataset

UNIT-V: Model Development and Evaluation: Unified machine learning workflow, Data preprocessing, Data preparation, Training sets and corpus creation, Model creation and training, Model evaluation, Best model selection and evaluation, Model deployment

Case Study: EDA on Wine Quality Data Analysis

Sample Experiments:

1. Perform hypothesis testing using stats models library
   a) Z-Test b)T-Test
2. Develop model and Perform Model Evaluation using different metrics such as prediction score, R2 Score, MAE Score, MSE Score.
3. Case Study: Perform Exploratory Data Analysis with Wine Quality Dataset

Text Book:

1. Suresh Kumar Mukhiya, Usman Ahmed, Hands-On Exploratory Data Analysis with Python, Packt Publishing, 2020.

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Reference Books:

1. Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press, 2020
2. RadhikaDatar, Harish Garg, Hands-On Exploratory Data Analysis with R: Become an expert in exploratory data analysis using R packages, 1st Edition, Packt Publishing, 2019

Web References:

1. https://github.com/PacktPublishing/Hands-on-Exploratory-Data-Analysis-with-Python
2. https://www.analyticsvidhya.com/blog/2022/07/step-by-step-exploratory-dataanalysis-eda-using-python/#h-conclusion
3. https://github.com/PacktPublishing/Exploratory-Data-Analysis-with-Python-Cookbook

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III B.Tech I Semester	AUTOMATA THEORY AND COMPILER DESIGN	L	T	P	C
		3	0	0	3

Course Outcomes:

CO 1: Understand finite automata and formal language concepts, and perform conversions between NFA, and DFA for language processing applications.

CO 2: *Apply regular expressions and finite automata to model regular languages, and use the pumping lemma to analyze language regularity.*

CO 3 : Understand the structure and functioning of Turing Machines

CO 4: analyze context-free grammars, and parsing techniques

CO 5: Apply syntax-directed translation techniques, generate intermediate code using syntax trees and three-address code

UNIT – I: Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions. **Deterministic Finite Automata:** Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with Є-transitions to NFA without Є-transitions. Conversion of NFA to DFA

UNIT – II: Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma. **Context-Free Grammars:** Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT – III: Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state Turing Machines: Introduction to

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Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT - IV Introduction: The structure of a compiler, Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers R18 B.Tech. CS&D Syllabus JNTU Hyderabad

UNIT - V Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
3. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
4. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

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		L	T	P	C
III B. Tech I Semester	**INFORMATION RETRIEVAL LAB**	**0**	**0**	**3**	**1.5**

Course Outcomes: On completion of this course, the student will be able to

- Compute the similarity between text documents
- Apply all pre-processing steps for text-data
- Implement classification of text documents.
- Perform document clustering using different algorithms.
- Implement PageRank algorithm for any network.

Programming Language: Python/R

Lab Experiments:

1. Representation of a Text Document in Vector Space Model and Computing Similarity between two documents.
2. Pre-processing of a Text Document: stop word removal and stemming
3. Construction of an Inverted Index for a given document collection comprising of at least 50 documents with a total vocabulary size of at least 1000 words.
4. Classification of a set of Text Documents into known classes (You may use any of the Classification algorithms like Naive Bayes, Max Entropy, Rochio's, Support Vector Machine). Standard Datasets will have to be used to show the results.
5. Text Document Clustering using K-means. Demonstrate with a standard dataset and compute performance measures- Purity, Precision, Recall and F-measure.
6. Crawling/ Searching the Web to collect news stories on a specific topic (based on user input). The program should have an option to limit the crawling to certain selected websites only.
7. To parse XML text, generate Web graph and compute topic specific page rank
8. Implement Matrix Decomposition and LSI for a standard dataset.
9. Mining Twitter to identify tweets for a specific period (and/or from a geographical location) and identify trends and named entities.
10. Implementation of PageRank on Scholarly Citation Network.

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		L	T	P	C
III B. Tech I Semester	**COMPUTER NETWORKS LAB**	**0**	**0**	**3**	**1.5**

Course Outcomes:

CO 1: Implement data link layer framing techniques including character stuffing, bit stuffing, and checksum for reliable data transmission.

CO 2: Develop error detection and correction mechanisms using Hamming codes and Cyclic Redundancy Check (CRC) algorithms.

CO 3: Analyze and apply congestion control algorithms, particularly the leaky bucket algorithm, to manage network traffic effectively.

List of Experiments:

1. Study of Network devices in detail and connect the computers in Local Area Network.
2. Write a Program to implement the data link layer farming methods such as
   i) Character stuffing ii) bit stuffing.
3. Write a Program to implement data link layer farming method checksum.
4. Write a program for Hamming Code generation for error detection and correction.
5. Write a Program to implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
6. Write a Program to implement Sliding window protocol for Goback N.
7. Write a Program to implement Sliding window protocol for Selective repeat.
8. Write a Program to implement Stop and Wait Protocol.
9. Write a program for congestion control using leaky bucket algorithm
10. Write a Program to implement Dijkstra's algorithm to compute the Shortest path through a graph.
11. Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node (Take an example subnet graph with weights indicating delay between nodes).
12. Write a Program to implement Broadcast tree by taking subnet of hosts.
13. Wireshark
    i. Packet Capture Using Wire shark

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ii. Starting Wire shark

iii. Viewing Captured Traffic

iv. Analysis and Statistics & Filters.

14. How to run Nmap scan

15. Operating System Detection using Nmap

16. Do the following using NS2 Simulator

i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

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III Year - I Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To equip the students with the skills to effectively communicate in English
- To motivate the students to develop confidence
- To improve the students' writing skills
- To train the students in interview skills, group discussions and Resume Preparation
- To enhance the students' interpersonal skills

UNIT – I

Listening Skills: Shaping Young Minds - A Talk by Azim Premji (Listening Activity-Self analysis and Perception), Self-Introduction, Public speaking –JAM, Pronunciation- Accent Neutralization.

UNIT – II

Etiquette:- Office etiquettes- Polite language-improving listening -Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

Verbal Communication: Speaking task- Modeling (IELTS), Corporate Communication Skills Reading – need – types, Importance - Improving

UNIT – III

Writing Skills-Remedial Grammar with a focus on Sentence Structures Basic Sentence Structures, Transformation of Sentences, Paragraph writing, Letter-Writing, Note Making, Note Taking, Minutes of the Meeting

UNIT-IV

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Interview Skills– Group Discussion, Debate, Do's & Don'ts of Interviews, Cover letter, Written and Video resume preparation.

UNIT-V

Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting

Interpersonal relationships, Consequences of interpersonal relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

Reference books:

1. R.S.Aggarwal, A Modern Approach to Verbal &Non-Verbal Reasoning, S.Chand&Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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		L	T	P	C
III B. Tech II Semester	**NATURAL LANGUAGE PROCESSING**	**3**	**0**	**0**	**3**

Course Objectives: This course introduces the fundamental concepts and techniques of natural language processing (NLP).

- Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes:

After completion of this course

- Demonstrate a given text with basic Language features
- To design an innovative application using NLP components
- Explain a rule based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To compare and contrast the use of different statistical approaches for different types of NLP applications.

UNIT I: INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT II: WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

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UNIT III: SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures

UNIT IV: SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Text Books:

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin -Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

Reference Books:

1. Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2. Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3. Handbook of Natural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
4. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008

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		L	T	P	C
III B. Tech II Semester	**DEEP LEARNING**	**3**	**0**	**0**	**3**

Course Objectives:

1. The objective of this course is to cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short-term memory cells and convolution neural networks.

Course Outcomes:

After completion of course, students would be able to:

CO1: Explore feed forward networks and Deep Neural networks

CO2: Mathematically understand the deep learning approaches and paradigms

CO3: Apply the deep learning techniques for various applications

CO 4: Demonstrate understanding of advanced neural network models such as LSTM, GRU, CNNs, and generative models, and their applications in deep learning.

CO 5: Apply the deep learning techniques for various applications

UNIT-I: Basics- Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Convergence theorem for Perceptron Learning Algorithm.

UNIT-II: Feed forward Networks-Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, auto encoders.

Deep Neural Networks: Difficulty of training deep neural networks, Greedylayer wise training.

UNIT-III: Better Training of Neural Networks-Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT IV: Recurrent Neural Networks- Back propagation through time, Long Short Term

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Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs.

Convolutional Neural Networks: LeNet, AlexNet. Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

UNITV: Recent trends-Variational Auto encoders, Transformers, GPT Applications: Vision, NLP, Speech

Text Books:

1. DeepLearning, Ian Good fellow and YoshuaBengio and Aaron Courville, MIT Press, 2016.

Reference Books:

1. NeuralNetworks:ASystematicIntroduction,RaúlRojas,1996
2. PatternRecognitionandMachineLearning,ChristopherBishop,2007
3. DeepLearningwithPython,FrançoisChollet,ManningPublications,2017

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		L	T	P	C
III B. Tech II Semester	**DATA VISUALIZATION**	3	0	0	3

Course Objective:

- Familiarize students with the basic and advanced techniques of information visualization and scientific visualization
- Learn key techniques of the visualization process
- A detailed view of visual perception, the visualized data and the actual visualization. interaction and distorting techniques

Course Outcomes:

- CO1: understand the fundamental principles of data visualization
- CO2: develop effective data visualizations by applying principles of visual perception, visual mapping, and Gestalt theory
- CO3: analyze and implement various visualization techniques
- CO4: integrate various visualization techniques to create cohesive visual narratives
- CO5: develop the skills to design and evaluate interactive visualizations for dynamic and spatial data

UNIT-1: Introduction: What Is Visualization? History of Visualization, Relationship between Visualization and Other Fields the Visualization Process, Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.

UNIT-II: Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.

UNIT-III: Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

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UNIT-IV: Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization

UNIT-V: Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations **Recent trends** in various perception techniques, various visualization techniques, data structures used in data visualization.

TEXTBOOK:

1. WARD, GRINSTEIN, KEIM. Interactive Data Visualization: Foundations, Techniques, and Applications. Natick : A K Peters, Ltd.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

Resources:

1. https://kdd.cs.ksu.edu/Courses/CIS536/Lectures/Slides/Lecture-34-Main_6up.pdf

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		L	T	P	C
III B. Tech II Semester	**RECOMMENDER SYSTEMS**	3	0	0	3

Course Objectives:

- This course covers the basic concepts of recommender systems, including personalization algorithms, evaluation tools, and user experiences

Course Outcomes:

- CO1: analyze recommender systems, understanding ratings and common challenges.
- CO2: understand attacks on collaborative recommender systems and use use nearest neighbor methods
- CO3: apply content and knowledge-based techniques to build personalized recommendation systems.
- CO4: implement different hybrid recommendation techniques to enhance recommendation accuracy
- CO5: analyze recommender system evaluation methods

UNIT-I: Introduction: Recommender system functions, Linear Algebra notation: Matrix addition, Multiplication, transposition, and inverses, covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system.

UNIT-II: Collaborative Filtering: User-based nearest neighbour recommendation, Item-based nearest neighbour recommendation, Model based and pre-processing based approaches, Attacks on collaborative recommender systems.

UNIT-III: Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, discovering features of documents, obtaining item features from tags, representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

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Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders.

UNIT-IV: Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.

UNIT-V: Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centred metrics.

Recommender Systems and communities: Communities, collaboration and recommender systems in personalized web search, Social tagging recommender systems, Trust and recommendations

Text Books:

1. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1st ed.
2. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, Springer(2011), 1st ed.

References:

1. Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, Springer (2013), 1st ed.

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	MOBILE ADHOC AND SENSOR NETWORKS	L	T	P	C
III B .Tech II Semester		3	0	0	3

Course Outcomes:

CO1: understand mobile ad-hoc networks and IEEE 802.11 standards in wireless communication.

CO2: understand protocols and key techniques in wireless ad hoc networks.

CO3: Understand key concepts of ad hoc networks

CO4: Model and simulate wireless and ad hoc networks with focus on cross-layer design and algorithmic challenges

CO5: Explore sensor network platforms, tools, and research trends for real-world industrial applications

UNIT-I: Introduction- Adhoc networks. Mobile Ad-Hoc networking with a View of 4G Wireless, Off-the-Shelf Enables of Ad Hoc, IEEE 802.11 in Ad Hoc Networks:

UNIT-II: Protocols, Performance and Open Issues, Scatternet Formation in Bluetooth Networks, Antenna Beamforming and Power Control for Ad Hoc Networks, Topology Control in Wireless Ad Hoc Networks, Broadcasting and Activity Scheduling in Ad Hoc Networks.

UNIT-III: Location Discovery, Routing Approaches in Mobile AdHoc Networks, Energy-Efficient Communication in AdHoc Wireless, AdHoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking.

UNIT-IV: Simulation and Modeling of Wireless, Mobile, and AdHoc Networks, Modeling Cross-Layering Interaction Using Inverse Optimization Algorithmic Challenges in Ad Hoc Networks.

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UNIT-V: Sensor Networks: Introduction to sensor network, Unique constraints and challenges, Localization and Tracking, Networking Sensors, Infrastructure establishment, Sensor Tasking and Control, Sensor network databases, Sensor Network Platforms and tools, Industrial Applications and Research directions.

Text Books:

1. Mobile Adhoc Networks–Aggelou, George(McGraw-Hill).
2. Mobile Adhoc Networking –Stefano Basagni (Editor), Marco Conti(Editor), Silvia Giordano(Editor),Ivan Stojmenovi&Cacute (Editor) (Wiley-IEEE Press).

References:

1. Wireless Sensor Networks: An Information Processing Approach–Feng Zhao,Leonidas Guibas(Elsevier).
2. Hand book of Sensor Networks: Algorithms and Architectures–Ivan Stojmenovi& Cacute(Wiley).

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		L	T	P	C
III B. Tech II Semester	**COMPUTER VISION**	**3**	**0**	**0**	**3**

Course Objectives:

- To understand the Fundamental Concepts related to sources, shadows and shading
- To understand the Geometry of Multiple Views

Course Outcomes:

1. **CO1:** Understand imaging principles involving light, shading, and color in camera systems.
2. **CO2:** Understand and apply filtering, edge detection, and texture analysis in images
3. **CO3:** Apply concepts of stereopsis and clustering to achieve accurate image segmentation
4. **CO4:** Apply model fitting and probabilistic methods for segmentation and object tracking in images and video
5. **CO5:** Understand and implement camera calibration, geometric modeling, and model-based vision for real-world applications

UNIT–I:CAMERAS: Pinhole Cameras Radiometry –Measuring Light: Lightin Space, Light Surfaces, Important Special Cases Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, **inter reflections**: Global Shading Models Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II: Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, **Edge Detection:** Noise, Estimating Derivatives, Detecting Edges Texture0: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III: The Geometry of Multiple Views: Two Views Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What is Segmentation? Human Vision: Grouping and Get stalt, **Applications:** Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-

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Theoretic Clustering,

UNIT-IV: Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, fitting as a Probabilistic Inference Problem, Robustness Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, tracking with Linear Dynamic Models : Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT-V: Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection EquationsGeometricCameraCalibration:Least-SquaresParameterEstimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry,
Case study: Mobile Robot Localization Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Case study: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

Text Books:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

Reference Books:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008. 3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-Verlag London Limited 2011.

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III B. Tech II Semester	No SQL Databases	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the Course the student will be able to

CO1: Explain and compare different types of NoSQL Databases

CO2: Compare and contrast RDBMS with different NoSQL databases.

CO3: Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.

CO4: Explain performance tune of Key-Value Pair NoSQL databases.

CO5: Apply NoSQL development tools on different types of NoSQL Databases.

UNIT-I: Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.

UNIT-II: Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases. Replication and sharding, Map Reduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT-III: NoSQL Key/Value databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT-IV: Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging,

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Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

UNIT-V: NoSQL Key/Value databases using Riak, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets. Graph NoSQL databases using Neo4, NoSQL database development tools and programming languages. Graph Databases, Graph Database. Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

TEXT BOOKS:

1. Sadalage,P.&Fowler,NoSQLDistilled:ABriefGuidetotheEmergingWorldof PolyglotPersistence, Wiley Publications,1st Edition,2019.

WEB REFERENCES:

1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-databa

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III B. Tech II Semester	DEEP LEARNING LAB	L	T	P	C
		0	0	3	1.5

Course Outcomes: On completion of this course, the student will be able to

- Implement deep neural networks to solve real world problems
- Choose appropriate pre-trained model to solve real time problem
- Interpret the results of two different deep learning models

Software Packages required:

- Keras
- Tensorflow
- PyTorch

List of Experiments:

1. Implement multi-layer perceptron algorithm for MNIST Handwritten Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.
5. Build a Convolution Neural Network for MNIST Handwritten Digit Classification.
6. Build a Convolution Neural Network for simple image(dogs and Cats) Classification
7. Use a pre-trained convolution neural network (VGG16) for image classification.
8. Implement one hoten coding of words or characters.
9. Implement word embedding's for IMDB dataset.
10. Implement a Recurrent Neural Network for IMDB moviereview classification problem.

Text Books:

1. Reza ZadehandBharath Ram sundar, "Tensorflow for Deep Learning", O'Reilly publishers, 2018

References:

1. https://github.com/fchollet/deep-learning-with-python-notebooks

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III B. Tech II Semester	DATA VISUALIZATION LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

- To visualize the different datasets using histograms, line charts.
- To understand the use of bar charts and box plots.
- To understand Scatter plots, mosaic plots
- To understand different Map visualizations
- To learn advanced graphs such as correlogram, heatmap and 3D graphs.

Course Outcomes: At the end of the course student will be able to

- Visualize the different datasets using histograms, line charts.
- Makeuse of bar charts and box plots on different datasets
- Apply Scatter plots, mosaic plots in R for different datasets
- Apply different Map visualizations in R
- Create advanced graphs such as correlogram, heatmap and 3D graphs.

List of Experiments:

1. a) Load VADeaths(Death Rates in Virginia)dataset in R and visualize the data using different histograms.

   b) Load air quality dataset in R and visualize La Guardia Airport's dialy maximum temperature using histogram.
2. Load AirPassengers dataset in R and visualize the data using line chart that shows increase in air passengers over given time period.
3. a) Load iris dataset in R, visualize the data using different Bar Charts and also demonstrate the use of stacked plots.

   b)Load air quality dataset in R and visualize ozone concentration in air.
4. a) Load iris dataset in R, visualize the data using different Box plots including group by option and also use color palette to represent species.

   b) Load air quality dataset in R and visualize air quality parameters using box plots.
5. Visualize iris dataset using simple scatter, multivariate scatter plot and also visualize scatter plot matrix to visualize multiple variables across each other.
6. Load diamonds dataset in R and visualize the structure in datasets with large data points using hexagon binning and also add color palette then use the

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7. Load HairEyeColor dataset in R and plot categorical data using mosaic plot.
8. Load mtcars dataset in R and visualize data using heat map.
9. Install leaflet library in R and perform different map visualizations.
10. Visualize iris dataset using 3d graphs such as scatter3d, cloud, xyplot.
11. Make use of correlogram to visualize data in correlation matrices for iris dataset.
12. Install maps library in R and draw different map visualizations.

Web References:

1. https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/
2. https://www.geeksforgeeks.org/data-visualization-in-r/

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III Year - II Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To enable the students to lead meaningful professional life
- To enhance the students with Management skills
- To improve the students' writing skills
- To train the students in interview skills, group discussions and presentation skills
- To enhance the students' intrapersonal skills

UNIT – I

Analytical Thinking: Developing Positive Attitude, Personality development-Personal growth, Problem-solving, Critical thinking

Non-Verbal Communication: Importance – Facial Expressions- Eye Contact – Posture -

Cross- Cultural awareness – Body language in Interview room - appearance and dress code.

UNIT – II

Self-Management Skills: Anger Management, Stress Management, develop Managerial skills, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

UNIT – III

Standard Operation Methods: Basic Grammars,-structures, Tenses, Prepositions, Remedial grammar- Pronunciation, E-Mail writing

UNIT-IV

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Job-Oriented Skills: Presentation Skills, Mock Group Discussions, Resume Presentation, Interview Skills, Mock Interview Skills

UNIT-V

Intra-personal Communication Skills- SWOT analysis, Goal setting, Emotional intelligence-Attitudinal skills, Consequences of intrapersonal-relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Black Swan, 2010.

Reference books:

1. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand & Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
DEPARTMENT OF ELECTRONICS ENGINEERING AND VLSI TECHNOLOGY

Ref: SRKIT/ECE/BOS/MOM-3 Date: 24.06.2025

The Board of Studies Meeting of the Department of Electronics and Communication engineering &Department of Electronics Engineering and VLSI Technology was held online on 24.06.2025 at 10:00AM Via Zoom platform to finalize curriculum for the semesters I & II for III B.Tech (ECE and EVT branches), M.Tech (SRK25 VLSI Design)

S.No	Name	Designation	Category	Signature
1	Dr. S. Sri Gowri	Professor & HoD, SRKIT	Chairman	
2	Dr. A.M. Prasad	Professor, ECE, JNTUK	University Nominee	
3	Dr. G Mamatha	Associate Prof. & HoD ECE, JNTUA, Anantapuram.	Member	
4	Dr P. Satyanarayana	Professor &HoD ,KL University, Vaddeswaram	Member	
5	Mr. D. R Sekhar Reddy	MD, Hypo Soft global solutions Pvt. Ltd,	Member	
6	Ms. N. Mounika	Research Assistant, NIT Warangal	Member	
7	Dr. D.S. P. Kishore	Associate Professor, SRKIT	Member	
8	Dr. D. Ravi Tej	Associate Professor, SRKIT	Member	
9	Dr. T. Anil Chowdary	Associate Professor, SRKIT	Member	
10	Dr V Sekhar Babu	Associate Professor, SRKIT	Member	
11	Mr. B. Ravi	Assistant Professor, SRKIT	Member	
12	Ms SLVS Jyothi	Assistant Professor, SRKIT	Member	
13	Ms N Rama Priya	Assistant Professor, SRKIT	Member	

The following members were presented

At the onset of the meeting, the Chairman of BOS, Dr. S. Sri Gowri, welcomed all the members and introduced internal BOS members to external BOS members. The meeting began with presentation of curriculum by chair for semesters I, II for III B.Tech (ECE & EVT) and M.Tech (VLSI Design). She then presented the syllabus of relevant subjects of I and II semesters of III B Tech prepared by internal BOS members.

General Comments

1. The BoS members unanimously agreed to implement the finalized syllabus for V and VI semesters and approved the course structure with the changes suggested by university for both ECE Department and also small changes in EVT program
2. Some references books and web links for online courses are added by the suggestion of external BoS members for some ECE and EVT courses.
3. External BoS members suggested offering the open electives based on the need of other departments.

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Curriculum related Comments

1. The External BOS member Dr AM Prasad suggested that the syllabus to be adopted from the JNTUK with minor changes for ECE department. All the members of BoS agreed to follow that and with minor modifications the curriculum proposed was approved.
2. The Subject Expert Dr G Mamata suggested the below changes for EVT curriculum
   - Which subject are in core and which are in electives
   - She suggested to reduce the syllabus for some subjects based on the difficult level
   - Suggested the textbooks to be students friendly and easy to understand
3. As far as the curriculum of VLSI Technology is concerned VLSI Design, Embedded Systems, Analog IC Design, MPMC are directly adopted from JNTUK with relevant changes. Remaining subjects in VI semester are developed by internal BoS members and approved with small changes.
   - Dr G Mamatha Suggested the changes in core subjects and professional electives interchange for some which was undertaken
4. Dr AM Prasad discussed about the contents to be added in the subjects for V&VI semester with other members in the committee and suggested.
   - To remove the topics which are not related to present day scenario
   - Add the topics which are value added to the course and cover the advanced technology
5. Curriculum for the Subjects in the V and VI semester EVT are developed by internal BoS members with the help of JNTUK syllabus for some subjects (MPMC, VLSI Design, Analog IC Design, and Embedded Systems) and approved with minor changes in BoS.
6. As an autonomous Institution BoS Members felt the need for Design thinking and Innovation for EVT students, so added that lab also as skill oriented lab in V semester.

After due deliberations, the external BoS committee accepted the syllabus of V and VI semester B.Tech (ECE and EVT) along with course structures

The External BoS members expressed their satisfaction towards the contents for each subject prepared by internal BoS members and approved the syllabus with whatever modifications suggested in BoS meeting.

S. Sri Gowri

Resolutions of BoS Meeting

Agenda 1:
To finalize the detailed courses contents of I and II semesters of III B.Tech ECE & EVT Programs.

Resolution 1:
Course Structure and contents of I & II Semester III B.Tech (ECE and EVT) programs under SRK 23 (Autonomous) regulations are approved by members of BoS.

Agenda 2: To introduce the Honors and Minor courses

Resolution 2:
The list of honors courses and minors courses are prepared and their syllabus also approved by members of BoS

Agenda 3 Any other matter with the permission chair.

Resolution 3:
External BoS members suggested offering the open electives based on the need of other departments and to offer the professional electives depending on their difficulty level.

Resolution 4:
It is resolved all the text books and Reference books are carefully selected for the subject keeping in view of slow and advanced learners.

S. Sri Gowri

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Date: 23.06.2025

Sir/Madam,

Sub: EEE-BoS meeting on 26/06/2025- Invitation: Reg.

It is proposed to convene the EEE Board of Studies meeting at 10:00AM on 26/06/2025 (Thursday) in the Electrical and Electronics Engineering Department to discuss the following agenda.

Agenda:-

1. To finalize the detailed course content of I & II semesters of III year of SRK23.
2. To finalize the minor engineering courses offered by EEE department for other branches (except EEE branch)
3. To finalize the honors engineering courses offered EEE Branch students
4. Any other matter with the permission of chair.

The BoS meeting is proposed to be in digital mode and the link for the meeting will be shared a day before. You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely

S. Nag

(Mr. S. Nageswara Rao)

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For circulating among all BoS members

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Department of Electrical and Electronics Engineering

MINUTES of BoS MEETING

BoS/EEE/03
Department: EEE
Venue: IQAC Room

Date: 30.06.2025
Academic Year: 2025-26
Time: 10:00AM

Members Present

S.No.	Name	Designation	Category
1	Mr. S. Nageswara Rao	Asst. Professor & HoD	Chairman
Two Subject Experts Outside Parent University			
2	Dr. B. Loveswara Rao	Professor, (KL Deemed to be University, Vaddeswaram.)	Member
3	Dr. K. Chandra Sekhar	Professor & HoD EEE RVR & JC College of Engineering	Member
One Subject Expert Nominated by Vice Chancellor			
4	Dr. S. Siva Nagaraju	Professor, University College of Engineering, JNTUK.	Member
One Representative from Industry			
5	Mr. V. Samson Deva Kumar	Project Manager, SCR WWO, Vijayawada	Member
Alumnus Nominated by Principal			
6	Mr. P. Varun Kumar	Project Engineer, Wipro Ltd., Bengaluru	Member
Faculty of the Department			
7	All Faculty	SRK Institute of Technology, EEE Dept.	Members

Mr. S. Nageswara Rao, chaired the meeting online at https://us02web.zoom.us/j/89503292963?pwd=vrC0ASd2b0OBAlUyWofmURksMIpaCe.1 and welcomed all members to BoS meeting. He gave an overview of the department and the academic activities undertaken. After a short introduction, the listed topics were discussed and the following resolutions were passed.

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Department of Electrical and Electronics Engineering

S.No.	Name	Designation	Category	Signature
1	Dr. M. Sathis Kumar	Professor	Member	
2	Mr. K. Narendra Babu	Asst. Professor	Member	
3	Ms. T. Maha Lakshmi	Asst. Professor	Member	
4	Mr. G. Sri Harsha	Asst. Professor	Member	
5	Ms. V. Siva Kumari	Asst. Professor	Member	
6	Ms. M. Supriya	Asst. Professor	Member	
7	Ms. S. Sandhya	Asst. Professor	Members	
8	Ms. V. Susmitha	Asst. Professor	Members	

AGENDA:

BoS/EEE/03/01	To finalize the detailed course content of I & II semesters of III year of SRK23
BoS/EEE/03/02	To finalize the minor engineering courses offered by EEE department for other branches (except EEE branch)
BoS/EEE/03/03	To finalize the honors engineering courses offered EEE Branch student
BoS/EEE/03/04	Any other matter with the permission of chair.

POINTS DISCUSSED IN THE MEETING:

1. III B.Tech course structure and I & II semesters syllabus including Minors engineering courses offered by EEE department for other branches (except EEE branch) and Honors engineering courses offered EEE Branch student for III B.Tech
2. Credit distribution as per APSCHE and Titles of courses
3. Arrange I & II Semester subjects to balance the workload of the teachers
4. Departmental Course Syllabus for Semesters I & II

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III Year I Semester

5. The committee reviewed the elective structure and discussed interchanging "Communication Systems" and "Renewable and Distributed Energy Technologies" between Professional Elective–I (III-I) and Professional Elective–II (III-II).
6. The need for updating course resources in Power Electronics was discussed.
7. The addition of updated learning resources for Renewable and Distributed Energy Technologies was deliberated.
8. The syllabus of Renewable Energy Sources was examined.
9. Enhancing the Power Electronics Lab with simulation-based experiments was considered.
10. The restructuring of the Soft Skills Lab into two separate courses with added topics, to be offered in Semester–I and Semester–II, was discussed.

III Year II Semester

11. The syllabus of Electrical Measurements and Instrumentation was reviewed, including a proposal to split the existing Unit–IV into two separate units and remove the existing Unit–V on Digital Meters.
12. The addition of a new textbook to Power System Analysis was discussed.
13. The inclusion of an updated textbook in Switchgear and Protection was proposed.
14. The Advanced Control Systems course was reviewed, including discussion on the addition of multiple textbooks and a reference book.
15. The Electric Drives course was discussed in relation to adding an additional textbook.
16. The sequencing of experiments in the Electrical Measurements and Instrumentation Lab was discussed.
17. The arrangement of experiments in the IoT Applications of Electrical Engineering Lab was reviewed.

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18. The addition of an updated textbook to the Concepts of Control Systems course was considered.
19. Suggestions from Subject Experts and other BoS members

RESOLUTIONS:

The following changes were made by the BoS committee:

1. III B.Tech course structure and I & II semesters syllabus including Minors engineering courses offered by EEE department for other branches (except EEE branch) and Honors engineering courses offered EEE Branch student for III B.Tech was approved
2. Credit distribution as per APSCHE and Titles of courses are accepted.
3. I & II Semester subjects to balance the workload of the teachers approved without changes
4. Syllabus of Courses by the Department for I & II Semesters

III year I semester:

5. The subjects "Communication Systems" and "Renewable and Distributed Energy Technologies" were interchanged between Professional Elective–I (III-I) and Professional Elective–II (III-II).
6. New textbooks were added to multiple courses, including Power Electronics, Renewable and Distributed Energy Technologies, and Renewable Energy Sources, in line with syllabus requirements.
7. Four simulation-based experiments were added to the Power Electronics Lab to enhance students' understanding through software tools alongside hardware experiments.
8. The Soft Skills Lab syllabus was split into two courses with additional topics, placing one in Semester–I as Soft Skills-I Lab and the other in Semester–II as Soft Skills-II Lab.

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III year II semester:

9. In the Electrical Measurements and Instrumentation course, the original Unit–IV was split into Unit–IV and Unit–V for better clarity, while the earlier Unit–V on Digital Meters was removed.
10. New textbooks were added across multiple courses as per syllabus requirements, including Electrical & Electronic Measurement & Instruments, Power Electronics, Renewable and Distributed Energy Technologies, Renewable Energy Sources, Power System Analysis, Switchgear and Protection, Advanced Control Systems, Electric Drives, and Concepts of Control Systems, along with one new reference book for Advanced Control Systems.
11. Experiments in the Electrical Measurements and Instrumentation Lab & IoT Applications of Electrical Engineering Lab were reordered to align with the syllabus sequence.
12. Control Systems Lab and Power Electronics Lab were included in the Minors curriculum.
13. Recommendations provided by subject matter experts and other BoS members

After extensive deliberations, the BoS committee accepted III B.Tech course structure and I & II semesters syllabus including Minors engineering courses offered by EEE department for other branches (except EEE branch) and Honors engineering courses offered EEE Branch student for III B.Tech.

The external BoS members have conveyed their satisfaction with the curriculum and have expressed their contentment with the course syllabus that were developed for each course by the internal BoS members.

S. Nag

Chairman BoS

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hod eee <srkeeehod@gmail.com>

MINUTES OF MEETING ,III B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I & II SEM and MINORS & HONORS

HOD Electrical & Electronics <hodeee@rvrjc.ac.in> Tue, Aug 19, 2025 at 4:04 PM
To: hod eee <srkeeehod@gmail.com>

Dear BOS Chairman
I am herewith submitting that you can proceed further

with best regards
[Quoted text hidden]

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hod eee <srkeeehod@gmail.com>

MINUTES OF MEETING ,III B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I & II SEM and MINORS & HONORS

Mon, Aug 18, 2025 at 3:26 PM

sivanagaraju S <sirigiri70@yahoo.co.in>
Reply-To: sivanagaraju S <sirigiri70@yahoo.co.in>
To: srkeeehod@gmail.com, loveswararao@kluniversity.in, hodeee@rvrjc.ac.in, Varun <patnala.varun997@gmail.com>, Samson Devakumar <vemusamson@gmail.com>, Nageswara Rao Sikha <snageswararao030@gmail.com>, mahalakshmi srk <srkmahalakshmi@gmail.com>

Dear sir,
Please proceed for further process from your side.

Yahoo Mail: Search, organise, conquer
[Quoted text hidden]

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Gmail

hod eee <srkeeehod@gmail.com>

MINUTES OF MEETING ,III B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I & II SEM and MINORS & HONORS

loveswra rao Burthi <loveswararao@kluniversity.in> Mon, Aug 18, 2025 at 12:33 PM
To: hod eee <srkeeehod@gmail.com>

Sir,

After discussion in the BOS Meeting which was held on 26/06/2025, as a BOS member I approved of the following points:

1. III B.Tech course structure and I & II semesters syllabus including Minors engineering courses offered by EEE department for other branches (except EEE branch) and Honors engineering courses offered EEE Branch student for III B.Tech was approved.

2. Credit distribution as per APSCHE and Titles of courses are accepted.

3. I & II Semester subjects to balance the workload of the teachers approved without Changes.

4. Syllabus of Courses by the Department for I & II Semesters.

Please proceed with further processing.

With Thanks and Regards

Yours

Dr B Loveswara Rao, M.Tech., Ph.D., SMIEEE

Professor
PH NO: 9866290922
EEE Dept
K L University
https://www.scopus.com/authid/detail.uri?authorId=57209464044

https://publons.com/researcher/3478468/loveswara-rao-burthi/

Burthi Loveswara Rao - Google Scholar

Burthi LOVESWARA RAO | Professor | PhD | Department of EEE (researchgate.net)

From: hod eee <srkeeehod@gmail.com>
Sent: Monday, August 11, 2025 4:34 PM
To: loveswra rao Burthi <loveswararao@kluniversity.in>; sirigiri70@yahoo.co.in <sirigiri70@yahoo.co.in>; hodeee@rvrjc.ac.in <hodeee@rvrjc.ac.in>; Varun <patnala.varun997@gmail.com>; Samson Devakumar <vemusamson@gmail.com>; Nageswara Rao Sikha <snageswararao030@gmail.com>; mahalakshmi srk

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B.Tech. III Year-I Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Power Electronics	3	0	0	3
2	Professional Core	Digital Circuits	3	0	0	3
3	Professional Core	Power Systems-II	3	0	0	3
4	Professional Elective- I	1. Signals and Systems 2. Computer Architecture and Organization 3. Renewable and Distributed Energy Technologies	3	0	0	3
5	Open Elective-I	OR Entrepreneurship Development & Venture Creation	3	0	0	3
6	Professional Core	Power Electronics Lab	0	0	3	1.5
7	Professional Core	Analog and Digital Circuits Lab	0	0	3	1.5
8	Skill Enhancement course	Soft skills-I Lab	0	1	2	1
9	Engineering Science	Tinkering Lab	0	0	2	1
10	Evaluation of Community Service Internship		-	-	-	2
		Total	**15**	**1**	**10**	**22**
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	3	4.5
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	0	3
HC	Honors Course (Student may select from the same Honors pool)		3	0	0	3
HC	Honors Course (Student may select from the same Honors Pool)		3	0	0	3

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B.Tech. III Year-II Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Electrical Measurements and Instrumentation	3	0	0	3
2	Professional Core	Microprocessors and Microcontrollers	3	0	0	3
3	Professional Core	Power System Analysis	3	0	0	3
4	Professional Elective-II	1. Switchgear and Protection 2. Advanced Control Systems 3. Communication Systems	3	0	0	3
5	Professional Elective-III	1. Electric Drives 2. Digital Signal Processing 3. High Voltage Engineering	3	0	0	3
6	Open Elective - II		3	0	0	3
7	Professional Core	Electrical Measurements and Instrumentation Lab	0	0	3	1.5
8	Professional Core	Microprocessors and Microcontrollers Lab	0	0	3	1.5
9	Skill Enhancement course	IoT Applications of Electrical Engineering Lab	0	1	2	2
10	Skill Enhancement course	Soft skills- II Lab	0	1	2	1
11	Audit Course	Research Methodology	2	0	0	-
		Total	**20**	**2**	**10**	**24**
MC	Student may select from the same minors pool		3	0	3	4.5
MC	Minor Course through SWAYAM / NPTEL (Minimum 12 Week, 3 credit course)		3	0	0	3
HC	Student may select from the same honors pool		3	0	0	3
HC	Honors Course (Student may select from the honors pool)		3	0	0	3

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OPEN ELECTIVES

S.No.	Category	Title	L	T	P	C
1	Open Elective-I (III-I)	1. Renewable Energy Sources 2. Concepts of Energy Auditing & Management	3	0	0	3
2	Open Elective – II (III-II)	1. Fundamentals of Electric Vehicles 2. Electrical Wiring Estimation and Costing	3	0	0	3
3	Open Elective – III (IV-I)	1. Battery Management Systems and Charging Stations 2. Concepts of Smart Grid Technologies	3	0	0	3
4	Open Elective-IV (IV-I)	1. Concepts of Power Quality 2. Intelligent Control Systems	3	0	0	3

*Minor Engineering Courses offered by EEE Department for Other Branches (Except EEE Branch)

S.No.	Course	Title	L	T	P	C
1	I	Concepts of Control Systems	3	0	0	3
2	II	Fundamentals of Electrical Measurements and Instrumentation	3	0	0	3
3	III	Concepts of Power System Engineering	3	0	0	3
4	IV	Fundamentals of Power Electronics	3	0	0	3
5	V	Fundamentals of utilization of Electrical Energy	3	0	0	3
6	VI	Basics of Electric Drives and applications	3	0	0	3
7	VII	Control Systems Lab	0	0	3	1.5
8	VIII	Power Electronics Lab	0	0	3	1.5
		Total	**18**	**0**	**6**	**21**

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Department of Electrical and Electronics Engineering

Honors Engineering Courses offered EEE Branch students
Need to Acquire 18 credits
Power Systems

S.No.	Course	Title	L	T	P	C
1	I	Electric Power Quality	3	0	0	3
2	II	Smart Grid Technologies	3	0	0	3
3	III	Power System Deregulation	3	0	0	3
4	IV	Real Time Control of Power Systems	3	0	0	3
5	V	Advanced Power Systems Protection	3	0	0	3
6	VI	Flexible AC Transmission Systems	3	0	0	3
7	VII	AI applications in Power Systems	3	0	0	3
8	VIII	Power Systems Lab	0	0	3	1.5
9	IX	Advanced Power Systems Simulation Lab	0	0	3	1.5

Power Electronics

S.No.	Course	Title	L	T	P	C
1	I	Special Electrical Machines	3	0	0	3
2	II	Machine Modeling and Analysis	3	0	0	3
3	III	Power Electronic Converters	3	0	0	3
4	IV	Power Quality and Custom Power Devices	3	0	0	3
5	V	Power Electronics for Renewable Energy systems	3	0	0	3
6	VI	Industrial Applications of Power Electronic Converters	3	0	0	3
7	VII	Advanced Electrical Drives	3	0	0	3
8	VIII	FACTS Controllers	3	0	0	3
9	IX	Power Converters Laboratory	0	0	3	1.5
10	X	Electric Drives Laboratory	0	0	3	1.5
11	XI	Renewable Technologies Laboratory	0	0	3	1.5
12	XII	Electric Vehicles Laboratory	0	0	3	1.5

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Date; 23-07-2025

Circular

This is to inform you that the department of S&H is going to conduct BoS meeting on 24-07-2025, at 3.00pm in IQAC Room, for finalizing Soft Skills lab syllabus of two semesters III-I, III-II - CSE & Allied branches and EEE.

Principal.
PRINCIPAL
SRK INSTITUTE OF TECHNOLOGY
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CSE CSM CSD S&H EEE

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VIJAYAWADA

SRK Institute of Technology

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Date: 24-07-2025

Sir/ Madam,

Sub: Invitation for English BOS meeting on 24-07-2025- Reg.

It is proposed to convene a meeting of Board of Studies for English syllabus SRK-23 at **03:00pm** onwards on **24.07.2025(Thursday)** in the Department of English to discuss the following agenda.

Agenda:

1. To finalize the detailed Course- Contents of III- I & III-II Semesters of - CSE & allied branches and EEE in SRK-23.
2. To suggest intensifying the Soft Skills -syllabus for the sake of student's benefited.
3. Based on suggestions, splitting the Soft-Skills modified -lab syllabus for two semesters. It is implemented to III-I & III-II for CSE, allied branches and EEE
4. Any other matter with the permission of Chairman:

The BOS Meeting is proposed to be held in Digital mode (Zoom). The link for the meeting will be shared a day before.

You are requested to make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

B.R. Nagavalli

Yours sincerely,
B.Ranga Nagavalli

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For circulation among all BOS Members

B.R. Nagavalli

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DEPARTMENT OF ENGLISH

BOS MEMBERS (R23)

S.NO	NAME	Designation	Category
1	Ms.B.Ranga Nagavalli	Assistant Professor	Chairman
(Subject Expert Outside Parent University)			
2	Dr.G.Suvarna Lakshmi	Professor, EFLU(English and Foreign language University) Hyderabad Telangana	Member
3.	Prof.N.Usha	Professor of English Department of English Krishna University Machilipatnam-521004. Andhra Pradesh	Member
Representative from Industry			
4	G.Vijaya Lakshmi	PEOPLE 10 Technosof t private Limited, Associate Development Lead,Bangalore,8074514648	Member
(Subject Expert Nominated By Vice-Chancellor)			
5	Dr.A.Savithri	Assistant professor, JNTU Kakinada, Andhra pradesh	University Nominee
Alumnus Nominated by Principal			
6	G.Basava sri Gowri	Amazon,US	Member
(Faculty of the Department)			
7	All Faculty	SRK Institute of Technology Department of English.	Members

B.R.Nagavalli
Chairman BOS
CHAIRMAN
Board of Studies
Dept. of English
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Andhra Pradesh, India-Pin 521 108.

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Minutes of BoS Meeting

BoS/English/01 Date: 24-07-2025

Department: English Academic Year: 2025-2026

Venue: Soft skills lab Time: 03: 00 PM

Members Present

S.No	Name	Designation	Category	Signature
1	Ms. B. Ranga Naga Valli	Assistant Professor	Chairman	BRNali
2	Prof. N. Usha	Professor, KU Machalipatnam	Subject Expert	online
3	Prof. G. Suvarna Lakshmi	Professor, EFLU, Hyderabad	Subject Expert	online
4	Dr. A. Savithri	Assistant Professor, JNTUK	JNTUK Nominee	online
5	Ms. G. Vijaya Lakshmi	People 10 Techno soft Private limited, Associate Development Lead, Bangalore.	Member- Industary	online
6	Ms. G. Basava Sri Gowri	Amazon, US	Member- Alumini	online
7	Mr. G. Praveen	Assistant Professor	Member	Gp
8	Ms. P. Farzeena Khanum	Assistant Professor	Member	[illegible]
9	Ms.P.Theresamma	Assistant Professor	Member	P. Thera
10	Ms. P. Chandrakala	Assistant Professor	Member	Chand

B.Ranga Nagavalli, chaired the meeting online https://us02web.zoom.us/j/85954831562?pwd=NGdxd00vaThGVGx4bGMrRG5DejVCZz0a nd welcomed all the members to the first BoS meeting. She gave a brief presentation of the department and the academic activities carried out. After a brief introduction, the agenda items listed were taken up for discussion and the following resolutions were passed.

AGENDA:

BoS/English/01	To consider and approve the III. B. Tech, I & II Semester of Course structure and Syllabus to be implemented w.e.f. the academic year 2025-2026.

Points of discussion in the meeting:

1. Introduced & finalised syllabus the Soft Skills Lab for III-I & III-II for CSE,-Allied branches and EEE.
2. Discussed about the syllabus of Soft Skills Lab for III. B. Tech- I & II Semester for CSE –allied branches and EEE.
3. Suggestions from Subject Experts and other BOS members
4. Any other issue with the Permission of the Chair.

Resolutions:

As per the discussions during the BoS meeting, changes have been made in the syllabus. We have decided to continue with the intensifying and prepared to regulate the syllabus of Soft Skills Lab, for two semesters of II and III. B.Tech

At 04.10 PM, Ranga Nagavalli, concluded the meeting by accepting all the suggestions of BOS members and assured to reflect all in the syllabus and course structure.

B.R. Nagavalli
Chairman, BOS

B.Ranga Nagavalli
CHAIRMAN
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DEPARTMENT OF ENGLISH

Agenda 1

To introduce the skill enhancement course -Soft skills- lab for the students of III B.Tech CSE, allied branches and EEE in I and II semesters.

Resolution 1

The contents of the course, Soft skills I and Soft skills II are approved by the BoS Members.
In order to introduce it in III year I semester and II semester respectively for the students of CSE, allied branches and EEE.

Agenda 2

To introduce the course Soft skills lab-by adding contents (student benefited-topics) to the given syllabus for the students of the III B.Tech CSE and its allied branches, EEE in I and II semesters.

Resolution 2

The contents of the course Soft skills I and Soft skills II are modified and approved by the BoS Members
In order to introduce it in III year -I semester and II semester respectively for the students of CSE and Allied branches, EEE.

Agenda 3

Any other matter with the permission of Chair person.

Resolution 3:

The Text books given below are added for reference

1. Ajay Singh, Verbal Ability and Reading Comprehension Arihanth publications India. New Delhi. 2018.
2. R S Agarwal A Modern approach to verbal reasoning, S Chand Publishing, New Delhi. 2008.

Resolution 4

According to the experts suggestion it is decided to make the students successfully face the day to day challenges.

B.R. Nagamalli

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III Year - II Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- ☐ To enable the students to lead meaningful professional life
- ☐ To enhance the students with Management skills
- ☐ To improve the students' writing skills
- ☐ To train the students in interview skills, group discussions and presentation skills
- ☐ To enhance the students' intrapersonal skills

UNIT – I

Analytical Thinking: Developing Positive Attitude, Personality development-Personal growth, Problem-solving, Critical thinking

Non-Verbal Communication: Importance – Facial Expressions- Eye Contact – Posture -

Cross- Cultural awareness – Body language in Interview room - appearance and dress code.

UNIT – II

Self-Management Skills: Anger Management, Stress Management, develop Managerial skills, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

UNIT – III

Standard Operation Methods: Basic Grammars,-structures, Tenses, Prepositions, Remedial grammar- Pronunciation, E-Mail writing

UNIT-IV

Job-Oriented Skills: Presentation Skills, Mock Group Discussions, Resume Presentation, Interview Skills, Mock Interview Skills

UNIT-V

Intra-personal Communication Skills- SWOT analysis, Goal setting, Emotional intelligence-Attitudinal skills, Consequences of intrapersonal-relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Black Swan, 2010.

Reference books:

1. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand & Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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III Year - I Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To equip the students with the skills to effectively communicate in English
- To motivate the students to develop confidence
- To improve the students' writing skills
- To train the students in interview skills, group discussions and Resume Preparation
- To enhance the students' interpersonal skills

UNIT – I

Listening Skills: Shaping Young Minds - A Talk by Azim Premji (Listening Activity-Self analysis and Perception), Self-Introduction, Public speaking –JAM, Pronunciation- Accent Neutralization.

UNIT – II

Etiquette:- Office etiquettes- Polite language-improving listening -Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

Verbal Communication: Speaking task- Modeling (IELTS), Corporate Communication Skills Reading – need – types, Importance - Improving

UNIT – III

Writing Skills-Remedial Grammar with a focus on Sentence Structures Basic Sentence Structures, Transformation of Sentences, Paragraph writing, Letter-Writing, Note Making, Note Taking, Minutes of the Meeting

UNIT-IV

Interview Skills– Group Discussion, Debate, Do's & Don'ts of Interviews, Cover letter, Written and Video resume preparation.

UNIT-V

Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting

Interpersonal relationships, Consequences of interpersonal relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

Reference books:

1. R.S.Aggarwal, A Modern Approach to Verbal &Non-Verbal Reasoning, S.Chand&Company Ltd., 2018.

2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

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III Year - II Semester - SOFT SKILLS

(SKILL ENHANCEMENT COURSE)

L	T	P	C
0	1	1	1

Course Objectives:

- To enable the students to lead meaningful professional life
- To enhance the students with Management skills
- To improve the students' writing skills
- To train the students in interview skills, group discussions and presentation skills
- To enhance the students' intrapersonal skills

UNIT – I

Analytical Thinking: Developing Positive Attitude, Personality development-Personal growth, Problem-solving, Critical thinking

Non Verbal Communication: Importance – Facial Expressions- Eye Contact – Posture - Cross- Cultural awareness – Body language in interview room - appearance and dress code.

UNIT – II

Self-Management Skills: Anger Management, Stress Management, develop Managerial skills, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

UNIT – III

Standard Operation Methods: Basic Grammars,-structures, Tenses, Prepositions, Vocabulary

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DEPARTMENT OF INFORMATION TECHNOLOGY

REF:SRKIT/BOS/IT 2025-2026/3 DATE:18-06-2025

Respected Sir/Madam

Sub: IT-BOS meeting on 23-06-2025 - INVITATION-REG

It is proposed to convene the Department of IT -Board of Studies Meeting at 10:30 A.M on 23-06-2025 (MONDAY) in the Information Technology Department to discuss the following agenda.

Agenda:

1. To finalize the detailed Course structure and Course-Contents of I & II Semesters of III B.Tech in SRK-23.
2. To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IIIrd B.Tech in SRK-23 regulations.
3. Any other matter with the permission of the chair..

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking You

Yours Sincerely

(Dr.G.D.K.Kishore)
HOD of IT
SRK Institute of Technology

CHAIRMAN
Board of Studies
Dept. of Information Technology
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

For circulation among all BOS Members

IT DEPARTMENT BOS MEMBERS(SRK23)

S.NO	Name	Designation	Category
1	Dr. G.D.K. Kishore	Associate Professor & HOD	Chairman
(1 Subject Expert nominated by Vice-Chancellor)			
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(2 Subject Experts outside Parent University)			
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
4	Dr. B.N. Jagadesh	Professor, VIT-AP University	Member
(1 Representative from Industry)			
5	Mr. k. Sudheer Koduru	Software Engineer, Accenture ,Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. A. Chandra sekhar Reddy	MS: Computer Engineering Designation: Software Engineer Company: Cornerstone on Demand	Member
(Faculty of the Department)			
All IT Faculty Members			

CHAIRMAN BOS
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Dept. of Information Technology
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MINUTES OF BOS MEETING

SRKIT/BOS/IT/2024-25/3 **Date**: 23-06-2025

Department: Information Technology **Academic Year**: 2024-2025

Venue: IQAC Room **Time**: 10:30 A.M

The Third Board of Studies meeting of Information Technology was held on 23th June 2025 at 10:30 A.M. Through online mode in the IQAC room, Department of IT, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr. G.D.K. Kishore	Associate Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Member	
(1 Representative from Industry)				
5	Mr. k. Sudheer	Software Engineer, Accenture ,Hyderabad	Member	Sudheer
(Alumnus nominated by Principal)				
6	Mr. A. Chandra sekhar Reddy	Software Engineer Cornerstone on Demand	Member	chandrasekhar
(Faculty of the Department)				
7	Dr.G. Srilakshmi	Associate Professor	Member	Lakshmi
8	Amritha Mishra	Assistant Professor	Member	
9	M.Prasanthi	Assistant Professor	Member	

Dr. G. D. K. Kishore chaired the Third BOS virtual meeting through the following link:

https://us02web.zoom.us/j/89929765860?pwd=FavsFDZSIa2LyT8jUDrhORY8aj6At0.1

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were

AGENDA:

SRKIT/BOS/IT.2024-2025/3/01	Welcome Address And Opening Remarks by Chairman, Board of Studies in the Department of Information Technology.
SRKIT/BOS/IT.2024-2025/3/02	To finalize the detailed Course structure and Course-Contents of I & II Semesters of III B.Tech in SRK-23.
SRKIT/BOS/IT.2024-2025/3/03	To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IIIrd B.Tech in SRK-23 regulations.
SRKIT/BOS/IT.2024-2025/3/04	Discuss about the Minor and Major courses
SRKIT/BOS/IT.2024-2025/3/05	Any other matter with the permission of the chairman.

POINTS OF DISCUSSION:

1. About B.Tech IIIrd year Ist & IInd Semester Course structure and Syllabus of Regulation SRK-23.
2. About B.Tech IIIrd year Ist & IInd Semester Course outcomes of each course in the Regulation SRK-23.
3. About B.Tech IV th year Ist & IInd Semester Course structures of Regulation SRK-23.
4. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About B.Tech Third year I & II Semester-Course Structure, course outcomes and Syllabus of SRK-23
2. About B.Tech Fourth year I & II Semester-Course Structure of SRK-23

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of Information Technology in the SRK Institute of Technology.

As per the Request the panel members have agreed to include the Soft Skill Course in III-I Semester and Syllabus framed by English Department and Both III-I and III-II English Syllabus was approved by BOS panel members of English and IT Departments.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 1:20 p.m., Dr. G.D.K Kishore, Chairman of BOS of the IT Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Chairman BOS

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Board of Studies
Dept. of Information Technology
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'oval of III Year B.Tech Syllabus for IT dept of SRKIT

Inbox ×

12

I Dr.G.D.K.Kishore Associate Professor &HOD for Information Technology In SRK Institute of Technology As per BOS Conducted in June Mo

imagani

s & Regards, Dr.B.N.Jagadesh

Ankala

s and Regards Dr.A.Krishna Mohan BTech . MTech . MBA . PhDDirector Student AffairsJNTUK Kakinada

er

12:09 (1 minute ago)

oo.com, Jagadesh, avuthu25@gmail.com, me, krishna.ankala@gmail.com ▾

ıpproved from my side.

u.

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Board of Studies
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Inbox 461
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Drafts 16
Categories
Social
Updates 40
Forums
Promotions 1
More

Upgrade

9 of

Fwd: Zoom Link For BOS Meeting on 23-06-2025 (Monday)

Inbox x

S SRK CSD <srkcsdhod@gmail.com> Sat, Jun 21, 12:05 PM
to SRK, srkcsmhod, me

---------- Forwarded message ---------
From: **SRK CSD** <srkcsdhod@gmail.com>
Date: Sat, 21 Jun 2025 at 12:04
Subject: Zoom Link For BOS Meeting on 23-06-2025 (Monday)
To: <krishna.ankala@gmail.com>, <kmarecali@yahoo.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>, <sudheer.kodurupi@g
<pb.raj587@gmail.com>

Dear Sir,

please check the below Zoom Link for BOS Meeting on 23-06-2025 (Monday) at 10.30 A.M IST. So I request all BOS Members to attend

SRK INSTITUTE OF TECHNOLOGY is inviting you to a scheduled Zoom meeting.

Topic: SRK INSTITUTE OF TECHNOLOGY's Zoom Meeting -CSE ALLIED BRANCHES BOS
Time: Jun 23, 2025 10:00 AM Mumbai, Kolkata, New Delhi
Join Zoom Meeting
https://us02web.zoom.us/j/89929765860?pwd=FavsFDZSIa2LyT8jUDrhORY8aj6At0.1

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B.Tech III Year Syllabus (Autonomous) For BOS in SRKIT

SRK CSD <srkcsdhod@gmail.com>
to krishna ankala, Jagadesh, kmarepalli, bcc: sudheer.koduru, bcc: Bhagya

20 Jun 2025, 16:00

Dear sir,

I Dr V.Sreenivas, Academic Director for CSE-Allied Branches in SRKIT. As we discussed over the phone regarding BOS, iam attaching all the branch of Syllabus for your References. Please let us know any changes. we have planned the BOS meeting on Monday (23-06-2025) at 10.30 A.M IST. i will share the link through whatsapp. I request you please be available at that time.

Thanking you.

Dr V.Sreenivas

4 attachments • Scanned by Gmail

B.Tech_CSE.docx

CSE-AI&ML.docx

B.Tech CSE(DS).d...

IT.pdf

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Dept. of Information Technology
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

SRK INSTITUTE OF TECHNOLOGY, Enikepadu, Vijayawada 521108,
Approved by AICTE, An Autonomous Institution, Affiliated to JNTUK, Kakinada,
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Department of Business Administration

MINUTES OF BoS MEETING

BoS/MBA/03 **Date: 29-07-2025**

Department: MBA **Academic Year: 2024-25**

Venue: Online Zoom meeting **Time: 3:00 P.M.**

Department of Business Administration
MBA & Integrated MBA - BOS Members Present

S.No	Name	Designation	Category	Signature
1	**Dr. B. Krishnaiah**	Associate Professor & HoD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	**Prof. D. Surya Chandra Rao,**	**Professor,** Department of Business Management, College of Arts & Science, Krishna University, Machilipatnam, Member Secretary & CEO APHERMC.	University Nominee	
(2 Subject Experts outside Parent University)				
3	**Dr. B. Hari Babu**	**Associate Professor,** Department of Management Studies, Siddhartha Academy of Higher Education Deemed to be University.	Subject Expert	
4	**Dr. R. Sreenivasa Rao**	**Professor,** Dept of MBA. Sir C.R. Reddy College PG Courses, Eluru,	Subject Expert	
(1 Representative from Industry)				
5	**Mr. Ch. Agamana Raju,**	**Managing Director,** Agamen Elevators, Vijayawada- 520010	Member Industry	
(Alumnus nominated by Principal)				
6	**Mr. V. Gopi Chandra**	**Sr. Consultant,** Infosys Limited, Hyderabad.	Member Alumni	
(Faculty of the Department)				
7	Mr. G. Kiran	Assistant Professor	Member	
8	Mr. P. Naga Srinivasa Rao	Assistant Professor	Member	
9	Mr. Sk. Shafiuallah	Assistant Professor	Member	
10	Mrs. G. Sri Lalitha	Assistant Professor	Member	
11	Mr. B. Chinni	Assistant Professor	Member	

12	Mrs. B. Indira	Assistant Professor	Member	
13	Mr. Srinivas V	Assistant Professor	Member	
14	Ms N Safalya	Assistant Professor	Member	
15	Mr B Srinivas	Assistant Professor	Member	
16	Mr A Althaf	Assistant Professor	Member	
17	Mrs CHLN Pratyusha	Assistant Professor	Member	
18	Mrs B Subhashini	Assistant Professor	Member	

Dr. B. Krishnaiah HoD of Business administration chaired the online zoom meeting https://us02web.zoom.us/j/86975981113?pwd=Y77nZOQDMSN0FtgIKcaa8EtSVytpQt.1 and welcomed all the members to the third BoS meeting. He gave a brief presentation of the department and the academic activities carried out. After a brief introduction, the agenda items listed were taken up for discussion and the following resolutions were passed.

AGENDA OF THE MEETING:

BoS/MBA/03/01	To consider and approve the first- & second-year MBA (I, II, III &IV Sems) course structure and syllabus to be implemented w.e.f. the A.Y:20 25-26.
BoS/IMBA/03/02	To consider and approve the first year IMBA (I, & II Sems) course structure and syllabus to be implemented w.e.f. the A.Y: 2025-26.

POINTS OF DISCUSSION:

1. About the first- & second-year MBA (I, II, III &IV Sems) course structure and syllabus.
2. About the first year IMBA (I, & II Sems) course structure and syllabus.
3. Deletion of obsolete and outdated units.
4. Addition of new and advance units that fits the students' needs.
5. Suggestions from subject experts and other BoS members.

Resolutions:

i) About the course syllabus of SRK-25 M.B.A I Sem.

1. In Unit III of MOB Subject the concepts of Beliefs and critical thing was deleted because of duplication, the same was accepted by the BoS members.
2. In Unit III of ME Subject, Iso Cost, MRTS and Least Cost concepts was proposed to add in first Sem., the same was accepted by the BoS members because it is emerging concepts.
3. In Unit I of AFM Subject Depreciation Methods (SLM, and DBM) was proposed to add, because these concepts are important to prepare Final Accounts, the same was accepted by the BoS members.
4. In Unit I of IPR Subject International Agencies of IPR and from Unit III Likely hood and Confusions were proposed to add , the same was accepted by the BoS members.
5. In Tally in V unit Payroll Accounting, Employee Creation, Salary Define, Employee Attendance registration, Pay heads creation, Salary Reports were added same were accepted by the BoS members because it is needed for preparation of salary statement.

ii) About the course syllabus of M.B.A. II Sem.

1. In FM III unit Concept of personal finance, Financial Goal planning, Budgeting, Protect money, Grow money, Retirement planning was added because these concepts are helps in personal financing of an individual; same were accepted by the BoS members because students should know financial planning.
2. In Unit III of MM Subject Methods of Pricing was deleted because of duplication in ME subject, the same was accepted by the BoS members.
3. In II unit of CCM subject Barriers of Inter Cultural Communication and from Unit V Conflicts and Cultural differences were added same were accepted by the BoS members.
4. In R- Programming from Unit I Type Conversion as Numeric, as character etc., and from Unit IV Data Visualization, Best Practices were added same were accepted by the BoS members.

iii) About the course syllabus of M.B.A. III Sem.

1. National Payment Corporation of India and UPI Payments were added in Unit II in BIFM Subject because of emerging topics.

IV) About the course structure of I.M.B.A. (BBA) II Sem.

1. In Multi Disciplinary Elective Subject Introduction to Public Administration is replaced with Media Literacy and Critical Thinking because of concepts of public administration was covered in some BBA courses.

V) About the course structure and syllabus of I.M.B.A. (BBA) I Sem.

1. The Business Statistics and Logic course was replaced with Business Statistics because logic concepts are not relevant to business statistics the same were accepted by the BoS members, the Unit V Logic concept is replaced with Introduction to statistics as first Unit, and the same were accepted by the BoS members.

VI) About the course syllabus of I.M.B.A. (BBA) II Sem.

1. In Business Mathematics subject from Unit II Rank of Matrix is deleted as it is not suitable for BBA Students and from Unit V Problems relating to sinking fund were deleted because this topic is covered in Financial Accounting and the same were accepted by the BoS members.
2. Advance MS Excel Concepts were added in MS Excel subject under unit I & II same were accepted by the BoS members.
3. In Business Organization Subject International Business Organization topic was added and the same was accepted by the BoS members.
4. In Business Economics Unit I Role of Micro Economist and from Unit II Demand Forecasting Methods were proposed to add and the same were accepted by the BoS members.

At 4:30 p.m., the Chairman of BoS Dr. B. Krishnaiah HOD of MBA Department concluded the meeting by accepting all the suggestions of BoS members and assured to reflect all in the syllabus and course structure.

B.Krishna

Chairman BoS

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Minutes of BoS Meeting

BoS/ME/03 **Date:** 17-06-2025

Department: Mechanical Engineering **A.Y:** 2025-26

Venue: Board Room Block-A **Time:**2:30 PM

Members Present

1.	Dr. P Kishorekumar	Head of the Department	Chairman	
2	Dr. N Mohan Rao	Professor, JNTUK, Kakinada	University Nominee	
3	Dr. T Babu Rao	Assistant Professor, NIT-Andhra Pradesh	Subject Expert	
4	Dr. M Ramakrishna	Professor, Vignan's Foundation for Science, Technology & Research, Guntur	Subject Expert	
5	Mr. T Raghava Prasad	Managing partner, Kristna Engineering works, Vijayawada	Member – Industry	
6	Mr. A Jayakanth	Staff Assistant, Krishna District co-operative Bank, Nagaya Lanka	Member-Alumni	
7	Dr. A Stanly Kumar	Associate Professor	Member	
8	Dr. D Rognadth Rao	Assistant Professor	Member	
9	Mr. V Bala China lingam	Assistant Professor	Member	
10	Ms. P Bhagya Lakshmi	Assistant Professor	Member	

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11	Ms. Y Durga Bhavani	Assistant Professor	Member	
12	Mr. U Tanoj	Assistant Professor	Member	
13	Mr. P Tarun Naga Venkatesh	Assistant Professor	Member	
14	Mr. M Hari Krishna	Assistant Professor	Member	
15	Mr.K.Ramu	Assistant Professor	Member	
16	Mr M Siva Nayak	Assistant Professor	Member	
17	Mr. R Murali	Assistant Professor	Member	
18	Mr. P Muttaiah	Assistant Professor	Member	
19	Ms. D Haritha Bramha	Assistant Professor	Member	
20	Mr U Sai Krishna	Assistant Professor	Member	

Dr. P. Kishorekumar, Head of the Mechanical Engineering Department, chaired the meeting online (via https://us05web.zoom.us/j/84175155073?pwd=EK9epaAwhegnmX2Ya9lDXjAd5UNOsI.1) and welcomed all members to the third BoS meeting. He gave a brief presentation on the department and the academic activities undertaken. Following the introduction, the listed agenda items were discussed, and the following resolutions were passed.

Agenda 1:	To consider and approve the III B. Tech course structure and I semester course syllabus to be implemented w.e.f A.Y. 2025-26.
Discussed Points:	1. Chairman Dr. P Kishorekumar briefed out the courses that are in I and II semesters for III B. Tech Program. 2. The courses offered in III B.Tech I Semester for the Mechanical Engineering branch include: *Machine Tools and Metrology, Thermal Engineering, Design of Machine Elements, Professional Elective–I, Open Elective–I, Thermal Engineering Lab, Theory of Machines Lab, Machine Tools and Metrology Lab, Tinkering Lab, and Community Service Internship.*

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	3. Internal member, Dr A Stanly Kumar explained the insights of course structure in a brief manner.
Resolutions:	1. External BoS members suggested ensuring that each course has an equal number of course objectives and course outcomes. 2. Based on the suggestions of the external BoS members, the course objectives and course outcomes were reviewed and refined, and the updated versions were added to the respective courses.
Agenda 2:	To consider and approve the III B. Tech II semester courses syllabus to be implemented w.e.f A.Y 2025-26.
Discussed Points:	1. The courses offered in III B.Tech II Semester for the Mechanical Engineering branch include: *Heat Transfer, Artificial Intelligence and Machine Learning, Finite Element Methods, Professional Elective-II, Professional Elective-III, Open Elective – II, Heat Transfer Lab, Artificial Intelligence and Machine Learning Lab & Robotics and Drone Technologies Lab*. 2. Internal member, Dr D Rognatha Rao explained the insights of course structure in a brief manner.
Resolutions:	1. External BoS members suggested ensuring that each course has an equal number of course objectives and course outcomes. 2. Based on the suggestions of the external BoS members, the course objectives and course outcomes were reviewed and refined, and the updated versions were added to the respective courses. 3. The Board approved the proposal to rearrange the syllabus to maintain uniformity in courses in Mechanical Engineering.
Agenda 3:	To consider and approve the inclusion of tutorial classes for the course *Thermal Engineering* in III B. Tech I Semester syllabus to be implemented w.e.f A.Y. 2025–26.
Discussed Points:	1.Chairman Dr. P KishoreKumar conveyed the suggestion made by subject expert Ms. Y. Durga Bhavani that the *Thermal Engineering* course is now a combination of two previous courses: Thermal Engineering–I and Thermal Engineering–II. 2. Since the course contains several numerical problems, it requires additional

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	instructional hours to enhance students' understanding.
Resolutions:	The Board approved the addition of tutorial classes for the Ist semester course Thermal Engineering.
Agenda 4:	To consider and approve the introduction of *Theory of Machines–II (TOM–II)* as Professional Elective–I in III B.Tech I Semester to be implemented w.e.f A.Y. 2025–26.
Discussed Points:	1. Chairman Dr. P KishoreKumar explained that *Theory of Machines–II (TOM–II)* is proposed as Professional Elective–I for further continuation of topics studied in *Theory of Machines–I (TOM–I)*, such as basic mechanisms, cam profiles, and gear trains. 2. *TOM–II* includes advanced topics like Brakes and Clutches to meet industry requirements and enhance students' practical knowledge.
Resolutions:	The Board approved the introduction of *TOM–II* as Professional Elective–I in III B.Tech I Semester.
Agenda 5:	To consider and approve changes in the syllabus of *Design of Machine Elements (DME)* for III B.Tech I Semester to be implemented w.e.f A.Y. 2025–26.
Discussed Points:	1. Chairman Dr. P Kishorekumar conveyed the suggestion made by subject expert Ms. P. Bhagyalakshmi to remove the topics 'Brakes and Clutches' from the course of *DME*. 2.These topics were instead included in the new course *Theory of Machines–II (TOM–II)* introduced as Professional Elective–I.
Resolutions:	The Board approved the removal of 'Brakes and Clutches' from DME and their inclusion in TOM–II.
Agenda 6:	To consider and approve the use of data books for the course *Design of Machine Elements (DME)* in III B.Tech I Semester to be implemented w.e.f A.Y. 2025–26.
Discussed Points:	1.Chairman Dr. P Kishorekumar proposed the suggestion made by internal members and subject expert permitting the use of data books during final examinations to support students in solving problems related to the design of bearings, gears, etc. 2.The following data books were suggested: (a) PSG Design Data Handbook by PSG College of Technology, Coimbatore. (b) Design Data Handbook by S. Md. Jalaluddin, Anuradha Publications.

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Resolutions:	The Board approved the use of the recommended data books in final examinations for the course *DME*.
Agenda 7:	To consider and approve the addition of an extra textbook for *Design of Machine Elements (DME)* based on expert recommendation.
Discussed Points:	Chairman Dr. P KishoreKumar conveyed the suggestion made by subject expert Ms. P. Bhagyalakshmi to include one more textbook to help students better understand course topics. The recommended textbook is: *A Textbook of Machine Design* by R. S. Khurmi and J. K. Gupta, S Chand & Company Ltd., New Delhi, 25th Edition (2005).
Resolutions:	The Board approved the inclusion of the suggested textbook as an additional reference for *DME*.
Agenda 8:	To consider and approve modification in the syllabus of Open Elective–I: *Solar Energy Technologies (SET)* to be implemented w.e.f A.Y. 2025–26.
Discussed Points:	Chairman Dr. P KishoreKumar presented the changes done by subject expert Mr K,Ramu in Unit–II of the course *Solar Energy Technologies (SET)*. The topic 'SOLAR PV MODULES AND PV SYSTEMS' was replaced with 'PHOTO VOLTAIC ENERGY CONVERSION' to better match current technological trends.
Resolutions:	The Board approved the change in Unit–II topic as proposed.
Agenda 9:	To consider and approve the adoption of courses for minors and hours from JNTUK R23 syllabus.
Discussed Points:	Chairman Dr. P KishoreKumar informed the members that this alignment would ensure uniformity and compliance with the university's latest curriculum structure.
Resolutions:	The Board approved adopting the courses for minors and hours as per JNTUK R23 syllabus.

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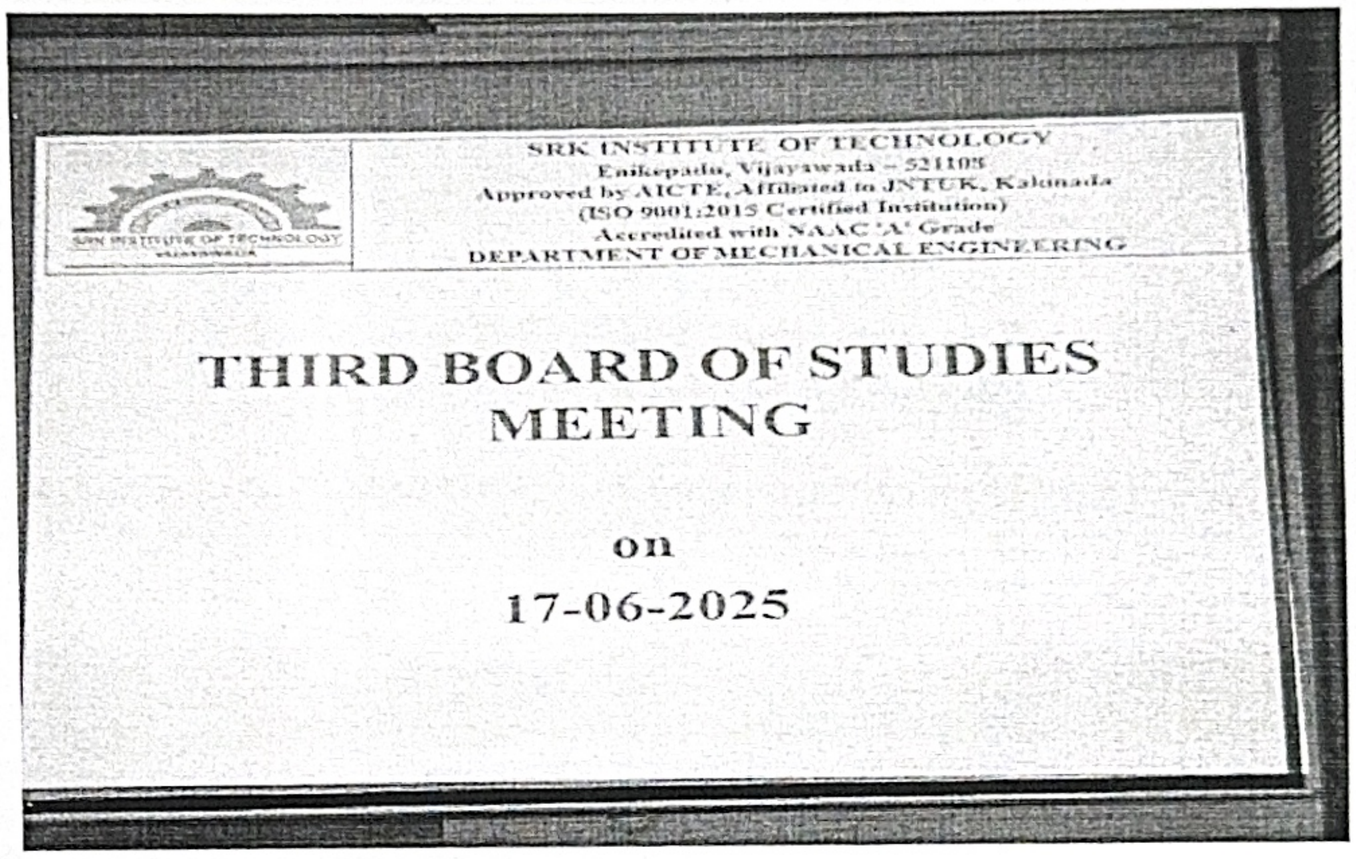

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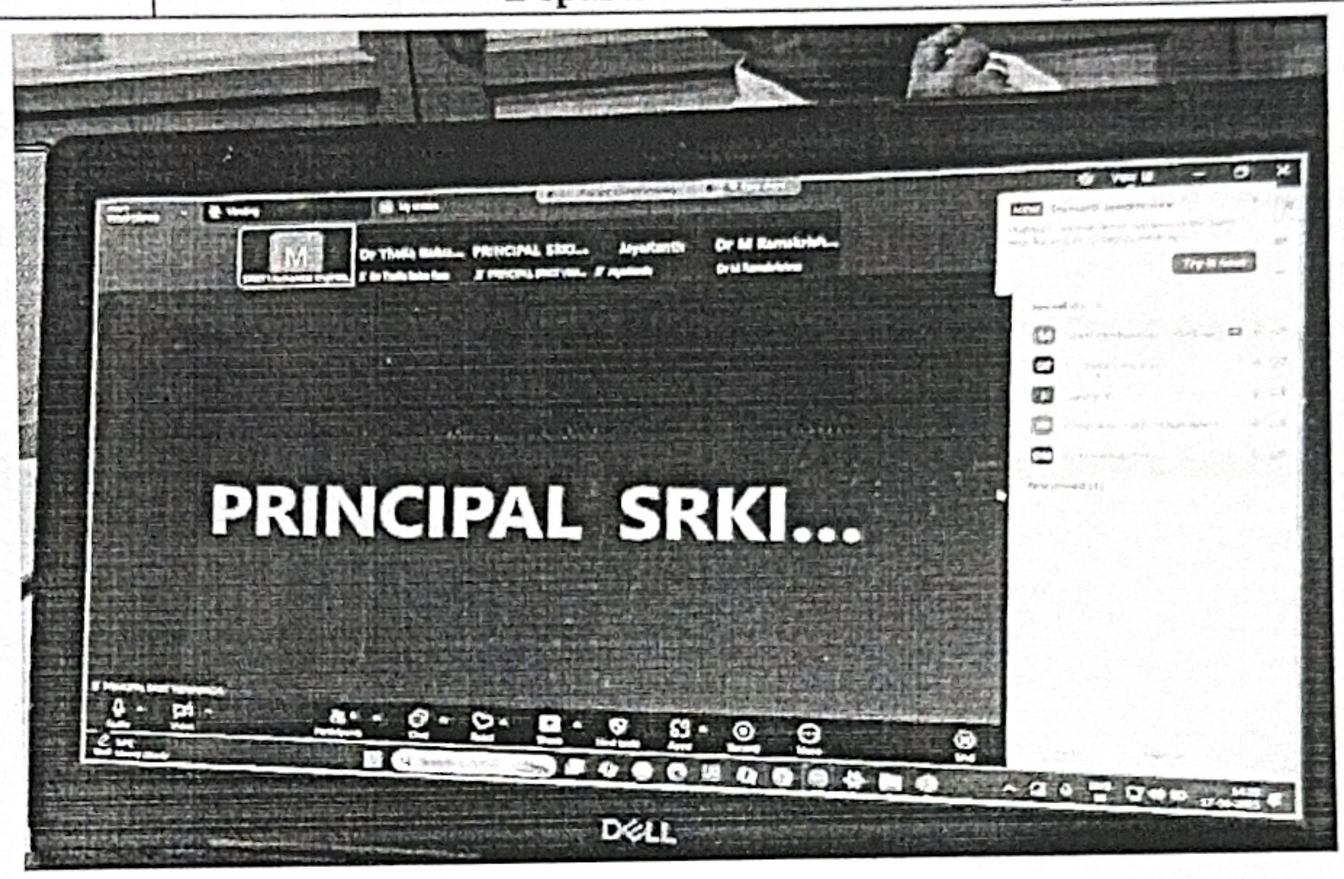

All the BoS members have asked to email all the related documents, so that they can go through for any further constructive comments. At 4:30 PM, Dr. P Kishorekumar, HOD, ME concluded the meeting by accepting all the suggestions of the BoS members and assured us to reflect all in syllabus and course structure.

Chairman- BoS

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Gmail

Mechanical Dept <hodme.srk@gmail.com>

Approval for SRK23 Mechanical Engineering IIIrd Yr Syllabus -Reg

2 messages

Mechanical Dept <hodme.srk@gmail.com> Tue, Jul 1, 2025 at 11:49 AM
To: "Dr M.Ramakrishna" <drmramakrishnaa@gmail.com>

Respected Professor,

I hope this message finds you well. With reference to the BoS Meeting held on 17-06-2025, based on the suggestions proposed, we have made the necessary changes. Here I am attaching the proposed course structure and syllabus along with BoS Minutes of the Meeting.

I kindly request that you review the attached syllabus at your earliest convenience and provide any suggestions you may have.

Your prompt attention to this matter would be greatly appreciated, as it will help ensure a smooth start to the upcoming semester.

Thank you for your time and consideration.

Sincerely,

--
Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Phone No: 91-9500154433

2 attachments

3rd BOS Minutes_final.pdf
597K

SRK23 ME III rd year syllabus_Final.pdf
2425K

Dr.M.RAMAKRISHNA <drmramakrishnaa@gmail.com> Fri, Jul 4, 2025 at 4:22 PM
To: Mechanical Dept <hodme.srk@gmail.com>

Yes
Approved
[Quoted text hidden]

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Andhra Pradesh, India-Pin 521 108.

Gmail

Mechanical Dept <hodme.srk@gmail.com>

Approval for SRK23 Mechanical Engineering IIIrd Yr Syllabus -Reg

2 messages

Mechanical Dept <hodme.srk@gmail.com> Tue, Jul 1, 2025 at 11:55 AM
To: thellababurao@nitandhra.ac.in

Respected Professor,

I hope this message finds you well. With reference to the BoS Meeting held on 17-06-2025, based on the suggestions proposed, we have made the necessary changes. Here I am attaching the proposed course structure and syllabus along with BoS Minutes of the Meeting.

I kindly request that you review the attached syllabus at your earliest convenience and provide any suggestions you may have.

Your prompt attention to this matter would be greatly appreciated, as it will help ensure a smooth start to the upcoming semester.

Thank you for your time and consideration.

Sincerely,

--
Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Phone No: 91-9500154433

2 attachments

SRK23 ME III rd year syllabus_Final.pdf
2425K

3rd BOS Minutes_final.pdf
597K

Dr. THELLA BABU RAO <thellababurao@nitandhra.ac.in> Tue, Jul 1, 2025 at 12:24 PM
To: Mechanical Dept <hodme.srk@gmail.com>

Dear Sir,

Thank you for sharing the minutes of the 3rd BoS meeting held on 17th June 2025, along with the modified syllabus.

I hereby approve the submitted syllabus. Kindly proceed with the necessary formalities and record the approval as required.

Regards,
Babu Rao

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Andhra Pradesh, India-Pin 521 108.

On 1 Jul 2025, at 11:55 AM, Mechanical Dept <hodme.srk@gmail.com> wrote:

[Quoted text hidden]

Gmail

Mechanical Dept <hodme.srk@gmail.com>

Approval for SRK23 Mechanical Engineering IIIrd Yr Syllabus -Reg

5 messages

Mechanical Dept <hodme.srk@gmail.com> Tue, Jul 1, 2025 at 11:57 AM
To: nmohan72@gmail.com

Respected Professor,

I hope this message finds you well. With reference to the BoS Meeting held on 17-06-2025, based on the suggestions proposed, we have made the necessary changes. Here I am attaching the proposed course structure and syllabus along with BoS Minutes of the Meeting.

I kindly request that you review the attached syllabus at your earliest convenience and provide any suggestions you may have.

Your prompt attention to this matter would be greatly appreciated, as it will help ensure a smooth start to the upcoming semester.

Thank you for your time and consideration.

Sincerely,

--
Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Phone No: 91-9500154433

2 attachments

3rd BOS Minutes_final.pdf
597K

SRK23 ME III rd year syllabus_Final.pdf
2425K

Mechanical Dept <hodme.srk@gmail.com> Thu, Jul 10, 2025 at 9:42 AM
To: nmohan72@gmail.com

[Quoted text hidden]

2 attachments

3rd BOS Minutes_final.pdf
597K

SRK23 ME III rd year syllabus_Final.pdf
2425K

Mechanical Dept <hodme.srk@gmail.com> Thu, Jul 17, 2025 at 9:40 AM
To: nmohan72@gmail.com

Head of the Department
Department of Mechanical Engineering

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Andhra Pradesh, India-Pin 521 108

SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Phone No: 91-9500154433

---------- Forwarded message ---------
From: **Mechanical Dept** <hodme.srk@gmail.com>
Date: Tue, 1 Jul 2025, 11:57
Subject: Approval for SRK23 Mechanical Engineering IIIrd Yr Syllabus -Reg
To: <nmohan72@gmail.com>

[Quoted text hidden]

2 attachments

3rd BOS Minutes_final.pdf
597K

SRK23 ME III rd year syllabus_Final.pdf
2425K

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mohan rao <nmohan72@gmail.com> Thu, Jul 17, 2025 at 9:48 AM
To: Mechanical Dept <hodme.srk@gmail.com>

Approved the III B.Tech course structure and Syllabus for R23 regulations
[Quoted text hidden]

Mechanical Dept <hodme.srk@gmail.com> Thu, Jul 17, 2025 at 9:56 AM
To: mohan rao <nmohan72@gmail.com>

Good morning sir, thank you for the confirmation sir.

Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
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Andhra Pradesh-521108
Phone No: 91-9500154433
[Quoted text hidden]

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COURSE STRUCTURE ME

B. Tech III Year I semester

S. No.	Category	Title	L	T	P	Credits
1	Professional Core	Machine Tools and Metrology	3	0	0	3
2	Professional Core	Thermal Engineering	3	1	0	3
3	Professional Core	Design of Machine Elements	3	0	0	3
4	Professional Elective	Professional Elective - I	3	0	0	3
5	Open Elective-I	Entrepreneurship Development & Venture Creation OR 1. Sustainable Energy Technologies 2. Applied Operations Research 3. Nano Technology 4. Thermal Management of Electronic systems 5. Entrepreneurship	3	0	0	3
6	Professional Core	Thermal Engineering Lab	0	0	3	1.5
7	Professional Core	Theory of Machines Lab	0	0	3	1.5
8	Skill Enhancement course	Machine tools and Metrology Lab	0	0	4	2
9	Engineering Science	Tinkering Lab	0	0	2	1
10	Evaluation of Community Service Internship	Community Service Internship	-	-	-	2
		Total	**15**	**0**	**10**	**23**
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	3	4.5
MC	Minor Course through SWAYAM / NPTEL (Minimum 12 Week, 3 credit course)		3	0	0	3
HC	Honors Course (Student may select from the same Honors pool)		3	0	0	3
HC	Honors Course (Student may select from the same Honors Pool)		3	0	0	3

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B.Tech III Year II semester

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	Heat Transfer	3	0	0	3
2	Professional Core	Artificial Intelligence and Machine Learning	3	0	0	3
3	Professional Core	Finite Element Methods	3	0	0	3
4	Professional Elective	Professional Elective-II	3	0	0	3
5	Professional Elective	Professional Elective-III	3	0	0	3
6	Open Elective - II	1.Introduction to Industrial Robotics 2. Industrial Management 3. Additive Manufacturing 4.Vechicle Technology 5. Industrial Safety	3	0	0	3
7	Professional Core	Heat Transfer Lab	0	0	3	1.5
8	Professional Core	Artificial Intelligence and Machine Learning Lab	0	0	3	1.5
9	Skill Enhancement course	Robotics and Drone Technologies Lab	0	0	4	2
10	Audit Course	Technical paper writing and IPR	2	0	0	-
Total			**20**	**0**	**10**	**23**
Mandatory Industry Internship of 08 weeks duration during summer vacation						
MC	Student may select from the same minors pool		3	0	3	4.5
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	0	3
HC	Student may select from the same honors pool		3	0	0	3
HC	Honors Course (Student may select from the honors pool)		3	0	0	3

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Dept. of Mechanical Engg.
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Andhra Pradesh, India-Pin 521 108.

Professional Elective – I

1) Design for Manufacturing
2) Conventional and futuristic vehicle technology
3) Renewable Energy Technologies
4) Non-destructive Evaluation
5) Theory of Machines-II

Professional Elective-II

1) Mechanical Vibrations
2) Advanced Manufacturing Processes
3) Micro Electro Mechanical Systems
4) Sensors and Instrumentation

Professional Elective-III

1) Energy Storage Technologies
2) Industrial Hydraulics and Pneumatics
3) Industrial Robotics
4) Refrigeration & Air-Conditioning

MINORS:

I. **Mechanical Engineering design and Robotics (Any 5 theory and 2 Labs)**

1. Advanced Mechanics of solids
2. Design of Machine Members
3. Theory of machines
4. Advanced Finite element methods
5. Mechanical vibrations
6. Robotics
7. Product design
8. Design for manufacturing
9. CAD Lab
10. Mechanisms and Robotics Lab

II. **Smart Manufacturing (Any 5 theory and 2 Labs)**

1. Automation in manufacturing
2. MEMS
3. Mechatronics
4. CIM
5. Smart manufacturing
6. Robotics
7. Manufacturing processes
8. Artificial intelligence and Machine learning
9. AI & ML Lab
10. Mechatronics Lab

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III. Thermal Systems Engineering (Any 5 theory and 2 Labs)

1. Advanced Thermodynamics
2. Thermal Engineering
3. Advanced Heat transfer
4. Refrigeration and Air-conditioning
5. Power plant engineering
6. Advanced Fluid mechanics
7. Automobile Engineering
8. Computation fluid dynamics
9. Heat transfer Lab
10. Advanced Thermal Engineering Lab

HONORS (Any 5 theory and 2 Labs):

- Advanced Mechanics of Solids
  Advanced Finite Element Methods
  Advanced CAD
- Advanced Manufacturing Processes
- Advanced Fluid Mechanics
- Advanced Heat Transfer
- Advanced Mechanisms & Robotics
- Optimization & Reliability
- Mechanisms and Robotics Lab

- Advanced Manufacturing Processes lab
- Modeling & Simulation of Manufacturing Systems Lab
- Computational Fluid Dynamics Lab

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Department of Master of Computer Applications

MINUTES OF BoS MEETING

BoS/MCA/02
Department: MCA
Venue: MCA Lab

Date: 29/07/2025
Academic Year: 2025-2026
Time: 11:30AM

SNo.	Name	Designation	Category
1	Mrs. M. Anitha	Assistant Professor & HOD	Chairman
(2 Subject Experts outside Parent University)			
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. M. S. Jagadeesh	Professor, VIT-AP University	Member
(I Subject Expert nominated by Vice-Chancellor)			
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(I Representative from Industry)			
5	Mr. K. Sudheer	Software Engineer, Accenture, Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. P. Siva Surendra	Senior Consultant Deloitte Consulting	Member
(Faculty of the Department)			
7	All MCA Faculty Members		Members

Ms. M. Anitha, Chaired the meeting online and welcomed all the members to the first BoS Meeting. She gave a brief presentation of the department and the academic activities carried out after a brief introduction, the agenda items listed were taken up for discussion and the following resolutions were passed.

M. Anitha

CHAIRMAN
Board of Studies
Dept. of Computer Applications
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

AGENDA:

BoS/MCA/02/01	To discuss and finalize the course structure of SRK MCAR25 (Autonomous) regulations for I year and syllabus of the proposed I and II Semesters.
BoS/MCA/02/02	Any other point by the permission of chair.

POINTS OF DISCUSSION:

1) About I and II semester Course Structure and Syllabus.
2) Adding the mandatory course in the I and II semesters
3) Suggestions from Subject Experts and other BOS members

RESOLUTION

Course Structure of MCA Program of SRK MCA-R25 (Autonomous) regulations and syllabus of I and II Semesters is approved by the Board of Studies Committee.

1. The BOS given acceptance to add mandatory course in I and II Semester
2. All External BOS members are accepted the suggested changes in the curriculum.
3. All BOS members suggested to keep a maximum of two textbooks per subject so that, the question paper setter will be comfortable.

4.All the BOS members have asked to email all the related documents, so that they can go- through for any further constructive comments.

At 12:00 P.M Ms. M. Anitha HOD, MCA concluded the meeting by accepting all the suggestions of BOS members and assured to reflect all in the syllabus and course structure

Chairman BOS

CHAIRMAN
Board of Studies
Dept. of Computer Applications
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Gmail

SRK MCA <srkmca2008@gmail.com>

SRK MCA R25 Regulation Syllabus

2 messages

SRK MCA <srkmca2008@gmail.com> Mon, Jul 28, 2025 at 4:56 PM
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>, sudheer.koduru@accenture.com, kmarepalli@yahoo.com, siva surendra <p.sivasurendra@gmail.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>

Respected Sir/Madam ,
Please find the attachment regarding the SRk MCA Department I year detailed syllabus

MCA_Ist_Year_Course_Structure_and_Syllabus_2025_26.docx
171K

KrishnaMohan Ankala <krishna.ankala@gmail.com> Tue, Jul 29, 2025 at 9:59 PM
To: SRK MCA <srkmca2008@gmail.com>

Approved

On Mon, Jul 28, 2025 at 4:56 PM SRK MCA <srkmca2008@gmail.com> wrote:
> Respected Sir/Madam ,
> Please find the attachment regarding the SRk MCA Department I year detailed syllabus

--
Thanks and Regards

Dr.A.Krishna Mohan
BTech , MTech , MBA , PhD
Director
Student Affairs
JNTUK
Kakinada

M. S. the

CHAIRMAN
Board of Studies
Dept. of Computer Applications
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Department of Computer Science and Engineering

M. Tech Programme

CSE COURSE STRUCTURE & SYLLABUS

(Common to M. Tech Computer Science & Engineering)

R25 M. Tech (CSE) Programme Structure

M. Tech(CSE) I – Semester

S.No	Course Title	L	T	P	C
1	**Program Core – 1** Data Structures and Algorithm Analysis	3	1	0	4
2	**Program Core – 2** Advanced Data warehousing and Data Mining	3	1	0	4
3	**Program Core – 3** Mathematical foundations of computer science	3	1	0	4
4	**Program Elective – I**	3	0	0	3
5	**Program Elective – II**	3	0	0	3
6	**Laboratory – 1** Data Structures and Algorithm Analysis lab	0	1	2	2
7	**Laboratory – 2** Advanced Data warehousing and Data Mining lab	0	1	2	2
8	Seminar-I	0	0	2	1
	TOTAL	**15**	**5**	**6**	**23**

<u>List of Professional Elective Courses in I Semester (Electives – I & II)</u>

S.No.	Course Title
1	1. Image Processing 2. Soft computing 3. Advanced Computer Networks 4. Advanced Software Engineering 5. Time Series Analysis 6. High Performance Computing 7. Agile Methodologies 8. Advanced Compiler Design 9. Any minimum12 weeks MOOCS/NPTEL courses suggested by BOS

@ Minimum 2/3 themes per elective

M. Tech (CSE) II – Semester

Sl. No.	Course Title	L	T	P	C
1	**Program Core – 4** Machine Learning	3	1	0	4
2	**Program Core – 5** Natural Language Processing	3	1	0	4
3	**Program Core – 6** Introduction to Quantum computing	3	1	0	4
4	**Program Elective – III**	3	0	0	3
5	**Program Elective - IV**	3	0	0	3
6	**Laboratory – 3** Machine Learning Lab	0	1	2	2
7	**Laboratory – 4** Natural Language Processing Lab	0	1	2	2
8	Seminar – II	0	0	2	1
	TOTAL	**15**	**5**	**6**	**23**

List of Professional Elective Courses in II Semester (Electives III & IV)

S. No.	Course Title
1	1. Feature Engineering 2. Generative AI 3. Adhoc Sensor Networks 4. Cryptography and Network Security 5. Block Chain Technologies 6. DevOps 7. Secure Coding 8. Design Patterns 9. Any minimum12 weeks MOOCS/NPTEL courses suggested by BOS

@ Minimum 2/3 themes per elective

M. Tech (CSE) - III Semester

S. No	Course Title	L	T	P	C
1	Research Methodology and IPR / *Swayam 12 week MOOC course – RM&IPR*	3	0	0	3
2	Summer Internship/ Industrial Training (8-10 weeks)*	-	-	-	3
3	Comprehensive Viva#	-	-	-	2
4	Dissertation Part – A$	-	-	20	10
	TOTAL	**3**	**-**	**20**	**18**

* Student attended during summer / year break and assessment will be done in 3rd Sem.
# Comprehensive viva can be conducted courses completed upto second sem.
$ Dissertation – Part A, internal assessment

M Tech. (CSE) – IV Semester

S. No.	Course Title	L	T	P	C
1	Dissertation Part – B%	-	-	32	16
	TOTAL	**-**	**-**	**32**	**16**

% External Assessment

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DEPARTMENT OF CSE – AI & ML

SRK INSTITUTE OF TECHNOLOGY

VIJAYAWADA

ESTD: 2007

FOURTH BOARD OF STUDIES MEETING-MINUTES

Date & Time: 02th September 2025, 02.30 PM

Venue: HoD Room

Agenda for the 4th Board of Studies Meeting

Item No.	Contents - Item Description
1	To finalize the detailed Course- Structure of M Tech CSE – AI & ML in SRK 25 Regulations
2	To finalize the detailed Course- Contents of Semesters I, II, III and IV of M Tech CSE – AI & ML in SRK 25 Regulations.
3	To discuss and finalize the course outcomes of M Tech CSE – AI & ML in SRK 25 Regulations
4	To discuss and finalize the course structure and course contents of Honors Degree in B Tech CSE – AI & ML in SRK 23 regulations.
5	To discuss and finalize the course structure and course contents of Minors Degree in B Tech CSE – AI & ML in SRK 23 regulations.
6	Any other matter with the permission of the chair.

CHAIRMAN
Board of Studies
Dept. of CSE - AIML
SRK Institute of Technology
Enikepadu, Vijayawada.
Andhra Pradesh, India-Pin 521 108.

MINUTES OF BOS MEETING

SRKIT/BOS/CSE-AIML/2025-26/4

Date: 03/09/2025

Department: CSE-AIML

Academic Year: 2025-26

Venue: HoD Room

Time: 02: 30 P.M

The Fourth Board of Studies meeting of CSE – AI & ML was held on 2nd September 2025 at 02:30 P.M. Through online mode in the HoD room, Department of CSE-AIML, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr.D.Anusha	Associate Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Subject Expert	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Subject Expert	
(1 Representative from Industry)				
5	Mr. k. Sudheer	Software Engineer, Accenture ,Hyderabad	Industry Expert	
(Alumnus nominated by Principal)				
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada	Alumni	
(Faculty of the Department)				
7	Ms.M.Sampath Kumari	Associate Professor	Member	
8	Ms. B. Kanaka Durga	Assistant Professor	Member	

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Board of Studies
Dept. of CSE-AIML
SRK Institute of Technology
Enikepadu, Vijayawada.
Andhra Pradesh, India-Pin 521 108

9	Ms. Ch. Jeevana Priya	Assistant Professor	Member	
10	Ms. B. Jessi Kiranmai	Assistant Professor	Member	

Dr.D.Anusha chaired the Fourth BOS virtual meeting through the following link: https://us02web.zoom.us/j/86783792888?pwd=tG6vvs8GQrCKYMtGBUItO0iSQshYL8.1.

After a concise introduction about BOS Members, Hod presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

CHAIRMAN
Board of Studies
Dept. of CSE - AIML
SRK Institute of Technology
Enikepadu, Vijayawada.
Andhra Pradesh, India-Pin 521 108.

AGENDA:

SRKIT/BOS/CSE-AML.2025-26/4/01	To finalize the detailed Course- Structure of M Tech CSE – AI & ML in SRK 25 Regulations
SRKIT/BOS/CSE-AML. 2025-26/4/01	To finalize the detailed Course- Contents of Semesters I, II, III and IV of M Tech CSE – AI & ML in SRK 25 Regulations.
SRKIT/BOS/CSE-AML. 2025-26/4/01	To discuss and finalize the course outcomes of M Tech CSE – AI & ML in SRK 25 Regulations
SRKIT/BOS/CSE-AML. 2025-26/4/01	To discuss and finalize the course structure and course contents of Honors Degree in B Tech CSE – AI & ML in SRK 23 regulations.
SRKIT/BOS/CSE-AML. 2025-26/4/01	To discuss and finalize the course structure and course contents of Minors Degree in B Tech CSE – AI & ML in SRK 23 regulations.
SRKIT/BOS/CSE-AML. 2025-26/4/01	Any other matter with the permission of the chair.

POINTS OF DISCUSSION:

1. About M Tech I, II, III and IV Semester Course structure, Course Outcomes and Syllabus of Regulation SRK-25.
2. About B.Tech Honors and Minors Course structure, Course Outcomes and Syllabus in the Regulation SRK-23.
3. About B.Tech III rd and IV th year I st & II nd Semester Course structures of Regulation SRK-23.
4. Suggestions from Subject Experts and other BOS members.

RESOLUTION:

_The BOS resolved and approve the

1. About B.Tech second year I & II Semester-Course Structure, course outcomes and Syllabus of SRK-23
2. About B.Tech Third and Fourth year I & II Semester-Course Structure of SRK-23

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of CSE-Artificial Intelligence and Machine Learning in the SRK Institute of Technology.

Chairman
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Dept. of CSE - AIML
SRK Institute of Technology
Enikepadu, Vijayawada.
Andhra Pradesh - 521 108.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 1:00 p.m., Dr. D.Anusha, Chairman of BOS of the CSE-Artificial Intelligence and Machine Learning Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Chairman BOS

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Ref: SRKIT/ECE/BOS/MOM-4 Date: 24.08.2025

The Board of Studies Meeting of the Department of Electronics and Communication engineering &Department of Electronics Engineering for M.Tech VLSI design was held online on 24.08.2025 at 10:00AM Via Zoom platform to finalize curriculum for all the semesters
The following members were presented

S.No	Name	Designation	Category	Signature
1	Dr. S. Sri Gowri	Professor & HoD, SRKIT	Chairman	
2	Dr. A.M. Prasad	Professor, ECE, JNTUK	University Nominee	
3	Dr. G Mamatha	Associate Prof. & HoD ECE, JNTUA, Anantapuram.	Member	
4	Dr P. Satyanarayana	Professor &HoD ,KL University, Vaddeswaram	Member	
5	Mr. D. R Sekhar Reddy	MD, Hypo Soft global solutions Pvt. Ltd,	Member	
6	Ms. N. Mounika	Research Assistant, NIT Warangal	Member	
7	Dr. D.S. P. Kishore	Associate Professor, SRKIT	Member	
8	Dr. D. Ravi Tej	Associate Professor, SRKIT	Member	
9	Dr. T. Anil Chowdary	Associate Professor, SRKIT	Member	
10	Dr V Sekhar Babu	Associate Professor, SRKIT	Member	
11	Mr. B. Ravi	Assistant Professor, SRKIT	Member	
12	Ms SLVS Jyothi	Assistant Professor, SRKIT	Member	
13	Ms N Rama Priya	Assistant Professor, SRKIT	Member	

At the onset of the meeting, the Chairman of BOS, Dr. S. Sri Gowri, welcomed all the members and introduced internal BOS members to external BOS members. The meeting began with presentation of curriculum by chair for all the semesters of M.Tech (VLSI Design).

General Comments

1. The BoS members unanimously agreed to implement the finalized syllabus for all the semesters and approved the course structure with the changes suggested by university for M Tech VLSI Design
2. Some references books and web links for online courses are added by the suggestion of external BoS members.
3. External BoS members suggested offering the open electives based on the need of other departments.

Curriculum related Comments

1. The External BOS member Dr AM Prasad suggested that the syllabus to be adopted from the JNTUK with minor changes. All the members of BoS agreed to follow that and with

S. Sri Gowri
CHAIRMAN
Board of Studies
Dept. of Electronics & Communication Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

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minor modifications the curriculum proposed was approved.

2. The Subject Expert Dr G Mamata suggested the below changes
   - Which subject are in core and which are in electives
   - Suggested the textbooks to be students friendly and easy to understand

After due deliberations, the external BoS committee accepted the syllabus of all semesters of M.Tech along with course structure

The External BoS members expressed their satisfaction towards the contents for each subject prepared by internal BoS members and approved the syllabus with whatever modifications suggested in BoS meeting.

Resolutions of BoS Meeting

Agenda 1:
To finalize the detailed courses contents of all the semesters of M.Tech VLSI Design.

Resolution 1:
Course Structure and contents of all the semesters of M.Tech VLSI Design under SRK25 (Autonomous) regulations are approved by members of BoS.

S. Sri Gowri

CHAIRMAN
Board of Studies
Dept. of Electronics & Communication Engg.
SRK Institute of Technology
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Andhra Pradesh, India-Pin 521 108.

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CIVIL DEPARTMENT
IV BOS MEETING
01-05-2026

Dt:30/4/2026

To

The Honourable Members of Board of Studies

Sir,

Sub: Invitation of Civil Engineering BOS meeting on 1/5/2026 -Reg

Happy to inform you that the Department of Civil Engineering Board Of Studies Meeting is proposed to conduct on 1/5/2026 (Friday) at the Department to discuss the following agenda:

Agenda

1. To Finalize the Course Structure of IV B.Tech I semester & II Semester of SRK23.
2. To Discuss and Ratify the detailed Course content of IV B.Tech I Semester & II Semester Syllabus.
3. Any other matter with the permission of Chair.

In view of the above, the BOS is proposed to conduct online mode. The link for the meeting will be shared a day before. So, you are requested to kindly make it convenient to participate in the BOS meeting and extend your valuable guidance and suggestions.

Awaiting for your acceptance for Filing purpose.

Thanking you,

With Regards

K. Kiran 30/4/26
(K.Kiran)
CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108.

Copy to All BOS members

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Department of Civil Engineering

Dt:30/4/2026

To

The Honourable Members of Board of Studies

Sir,

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Awaiting for your acceptance for Filing purpose.

Thanking you,

With Regards

K. Kiran 30/4/26

(K.Kiran)

CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
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Copy to All BOS members

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Department of Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING
BoS Members (SRK23)

S.No	Name	Designation	Category
1	Mr.Kiran	Assistant Professor & HOD	Chairman
1 Subject Expert nominated by Vice-Chancellor			
2	Dr.V.Ravindra	Professor, Department of Civil Engineering University College of Engineering, JNTU, Kakinada	University Nominee
2 Subject Experts outside Parent University			
3	Dr.T.Gunneswara Rao	Professor, Department of Civil Engineering NIT, Warangal	Member
4	Dr.A.Ramesh	Professor, Department of Civil Engineering VNR Vignana Jyothi Institute of Engineering and Technology,Hyderabad	Member
1 Representative from Industry			
5	Sri.Ch.Chandrasekhar Srinivas	Design Engineer & Consultant, CS Associates, Machavaram, Vijayawada	Member
Alumnus nominated by Principal			
6	Sri.J.Purnachandra Rao	Proofreader Bridge International Academics India LLP Hi-Tech City,Hyderabad-500081	Member
Principal			
7	Dr. K.Ramesh	Professor, Department of Civil Engineering, SRK Institute of Technology	Member
All Faculty of the Department			
8	G.Sahithi	Asst. Professor	Member
9	A.Krishna Priya	Asst. Professor	Member
10	B.Sai Kumar Reddy	Asst. Professor	Member
11	Ch.Rajesh	Asst. Professor	Member
12	P.Vamsi Krishna	Asst. Professor	Member
13	S.Nagaraju	Asst. Professor	Member
14	R.Sravanthi	Asst. Professor	Member

K. Kiran
CHAIRMAN
Board of Studies
Dept. of Civil Engg.
SRK Institute of Technology
Enikepadu, Vijayawada
Andhra Pradesh, India-Pin 521 108

Chairman BoS

PRINCIPAL
SRK INSTITUTE OF TECHNOLOGY
ENIKEPADU, VIJAYAWADA

Principal

12:09 63%

Dr.A. Ramesh Garu...

April 30, 2026

To
The Honourable Members of Board of Studies
Sir,
Sub: Invitation of Civil Engineering BOS meeting on 1/5/2026 -Reg
Happy to inform you that the Department of Civil Engineering Board Of Studies Meeting is proposed to conduct on 1/5/2026 (Friday) at the Department to discuss the following agenda:
Agenda

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2. To Discuss and Ratify the detailed Course content of IV B.Tech I Semester & II Semester Syllabus.
3. Any other matter with the permission of Chair.

In view of the above, the BOS is proposed to conduct online mode. The link for the meeting will be shared a day before.
So, you are requested to kindly make it convenient to participate in the BOS meeting and extend your valuabl... Read more

Edited 3:29 PM

Ok
Thank you 8:36 PM

Purna Sir (Srkit)

Click here to get older messages from your phone.

4/30/2026

To
The Honourable Members of Board of Studies
Sir,
Sub: Invitation of Civil Engineering BOS meeting on 1/5/2026 - Reg
Happy to inform you that the Department of Civil Engineering Board Of Studies Meeting is proposed to conduct on 1/5/2026 (Friday) at the Department to discuss the following agenda:
Agenda

1. To Finalize the Course Structure of IV B.Tech I semester & II Semester of SRK23.
2. To Discuss and Ratify the detailed Course content of IV B.Tech I Semester & II Semester Syllabus.
3. Any other matter with the permission of Chair.

In view of the above, the BOS is proposed to conduct online mode. The link for the meeting will be shared a day before. So, you are requested to kindly make it convenient to participate in the BOS meeting and extend your valuable guid... **Read more**

3:31 PM

Thank you! 3:33 PM

GPS Map Camera
Prasadampadu, Andhra Pradesh, India
Gp92+53w, Enikepadu, Prasadampadu, Andhra Pradesh
521108, India
Lat 16.518156° Long 80.700373°
Friday, 01/05/2026 10:56 AM GMT +05:30
Google

Textbook:

1. Demers, M.N. (2013). 'Fundamentals of Geographic Information Systems' Wiley India Pvt Ltd.,
2. Burrough, P.A., and Mc Donnell R.A (1998). Principles of Geographical Information Systems. Oxford University Press, New York
3. Kang-tsung Chang (2006). Introduction to Geographical Information Systems. Tata McGraw- Hill Publishing Company Ltd , Third Edition, New Delhi
4. George Joseph. (2013). 'Fundamentals of Remote Sensing' University Press.

References:

1. Sabins F.F. Jr (1978) Remote Sensing Principles and Interpretations. W H Freeman and Company, San Francisco.
2. Ter Bernhardsen. (2002). Geographical Information System. Wiley India (P) Ltd., Third Edition, New Delhi.
3. Hofmann-Wellenhof. B. et al (1997) GPS Theory and Practice Fourth Edition, Springer Wien, New York.
4. Lilys and T.M . and Kiefer R W (2002). Remote Sensing and Image Interpretation John Wiley and Sons, Fourth Edition, New York.
5. Choudhury S., Chakraborty. D., and Choudhury S. (2009). An Introduction to Geographic Information Technology. IK International Publishing House (P) Ltd.

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Approval of Syllabus Discussed and Question papers Setters in Board of Studies Meeting

Inbox ×

civil engineering <civilengineering.srkit@gmail.com>
to Gunneswara, ramesh_a, Purna

Thu, May 14, 11:25 AM

Good morning Sir,

This is to request your approval for the syllabus and Question paper setters that was discussed and finalized in the Board of :

Kindly review and approve the same for further proceedings.

Thank you.

Regards,
Mr.K.Kiran,
Assistant Professor & HOD,
Department of Civil Engineering,
SRK Institute of Technology

2 Attachments • Scanned by Gmail

Add all to Drive

R23 B.Tech Civil E..

Question papers ...

Gmail ramesh_a@vnrvjiet.in

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1 of 1

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Gunneswara Rao T.D. Thu, May 14, 11:49 AM
to me, ramesh_a, Purna

Approved please go ahead

Dr.T.D.Gunneswara Rao
Professor of Civil Engineering
National Institute of Technology,
Warangal - 506 004, INDIA.
tdgtdg@gmail.com
tdg@nitw.ac.in

Ramesh A Thu, May 14, 11:50 AM
to me

Sir
Approved
Pl. proceed

--
with kind regards
****
Dr. A.Ramesh Ph.D.
Professor
Department of Civil Engineering
VNR Vignana Jyothi Institute of Engineering & Technology,
Bachupally, Nizampet (S.O.)
Hyderabad - 90

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S.No	Name	Designation	Category	Signature
1	Mr.Kiran	Assistant Professor & HOD	Chairman	
		1 Subject Expert nominated by Vice-Chancellor		
2	Dr.V.Ravindra	Professor, Department of Civil Engineering University College of Engineering, JNTU, Kakinada	University Nominee	Online
		2 Subject Experts outside Parent University		
3	Dr.T.Gunneswara Rao	Professor, Department of Civil Engineering NIT, Warangal	Member	Online
4	Dr.A.Ramesh	Professor, Department of Civil Engineering VNR Vignana Jyothi Institute of Engineering and Technology,Hyderabad	Member	Online
		1 Representative from Industry		
5	Sri.Ch.Chandrasekhar Srinivas	Design Engineer & Consultant, CS Associates, Machavaram, Vijayawada	Member	Online
		Alumnus nominated by Principal		
6	Sri.J.Purnachandra Rao	Proofreader Bridge International Academics India LLP Hi-Tech City,Hyderabad-500081	Member	Online
		Principal		
7	Dr. K.Ramesh	Professor, Department of Civil Engineering, SRK Institute of Technology	Member	K. Ramesh
		All Faculty of the Department		
8	G.Sahithi	Asst. Professor	Member	
9	A.Krishna Priya	Asst. Professor	Member	
10	B.Sai Kumar Reddy	Asst. Professor	Member	
11	Ch.Rajesh	Asst. Professor	Member	
12	P.Vamsi Krishna	Asst. Professor	Member	
13	S.Nagaraju	Asst. Professor	Member	
14	R.Sravanthi	Asst. Professor	Member	

K Kiran
Chairman BoS

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MINUTES OF BOARD OF STUDIES MEETING

BoS/CE/04
Department: CIVIL
Venue: IQAC ROOM

Date: 01/05/2026
Academic Year: 2026-27
Time: 10.00 AM

Board of Studies Members

S. No	Name	Designation	Category	Signature
1	K.Kiran	Assistant Professor & HOD	Chairman	K.Kiran
2	Dr.V.Ravindra	Professor, Department of Civil Engineering, Director Research and Development, University College of Engineering, JNTU, Kakinada	University Nominee	online
3	Dr.T.Gunneswara Rao	Professor, Department of Civil Engineering, NIT, Warangal	Subject Expert Outside University	Online
4	Dr.A.Ramesh	Professor, Department of Civil Engineering, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad	Subject Expert Outside University	Online
5	Sri.Ch.Chandrasekhar Srinivas	Design Engineer & Consultant, CS Associates, Machavaram, Vijayawada	Representation from Industry	Online
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9	Sri B.Sai Kumar Reddy	Asst. Professor	Member	
10	Sri Ch.Rajesh	Asst. Professor	Member	
11	Sri P.Vamsi Krishna	Asst. Professor	Member	
12	Sri.S.Naga Raju	Asst. Professor	Member	
13	Smt.R.Sravanthi	Asst. Professor	Member	

Mr.K.Kiran chaired the meeting online https://us02web.zoom.us/j/86976637308?pwd=qmqn4WvufbwabTdRqIzX1B8xhAkJNt.1 and welcomed the University nominee Dr. V.Ravindra, Two Subject Experts outside University, Member Representation from Industry, Alumni member and all the Faculty members of the department to the fourth BoS Meeting of Civil Engineering Department held on 1/05/2026 at 10AM. After a brief introduction of all the members of BoS, the agenda items given are taken up for discussion and the resolutions were passed.

AGENDA:

1. To Finalize the Course Structure of IV B.Tech I semester & II Semester of SRK23.
2. To Discuss and Ratify the detailed Course content of IV B.Tech I Semester & II Semester Syllabus.
3. To Discuss and Ratify Question paper setters
4. Any other matter with the permission of Chair.

POINTS OF DISCUSSION:

1) About the Course Structure of IV B.Tech I semester & II Semester of SRK 23.

2 About the IV B.Tech I Semester & II Semester Syllabus-All the civil engineering core subjects.

3) Suggestions from University nominee, Subject Experts, Industry Expert, Alumni Expert and all other BoS members were taken

RESOLUTIONS

About IV B.Tech, I Semester & II Semester Course Structure & Syllabus:

1) Environmental Management subject is added in IV B.Tech I Semester in the Course Structure of SRK23 in Open elective-III and was approved University Nominee Dr.V.Ravindra, Subject Experts, Dr.A.Ramesh & Dr.T.Gunneswara Rao and all the BOS members.

2) Course Outcomes (CO's) of all subjects in IV B.Tech I & II Semesters were updated as per the syllabus requirements, approved by all the BOS members.
3) University Nominee Dr.V.Ravindra suggested to some Standard Textbooks and any Reference Text books.
4) All the suggestions are taken from the University Nominee, Subject Experts, Expert from Industry, Alumni Member and all the faculty members of Civil Engineering Department to make small changes in the Course Syllabus.

BoS CHAIRMAN
Mr.K.Kiran
Head of the department

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B.Tech IV Year I Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	GEOTECHNICAL ENGINEERING-II	3	0	0	3
2	Management Course- II	ADVANCED CONSTRUCTION MANAGEMENT	2	0	0	2
3	Professional Elective-IV	1. PRE-STRESSED CONCRETE 2. ADVANCED ENVIRONMENTAL ENGINEERING 3. DESIGN & DRAWING OF IRRIGATION STRUCTURES 4. NPTEL	3	0	0	3
4	Professional Elective-V	1. ADVANCED STRUCTURAL ENGINEERING 2. ENVIRONMENTAL IMPACT ASSESSMENT 3. RAILWAYS AND AIRPORT ENGINEERING 4. NPTEL	3	0	0	3
5	Open Elective - III	1. BUILDING MATERIALS FOR ENGINEERS 2. ENVIRONMENTAL IMPACT ASSESSMENT 3. INTELLIGENT TRANSPORTATION SYSTEMS 4. ENVIRONMENTAL MANAGEMENT	3	0	0	3
6	Open Elective-IV	1. GEO-SPATIAL TECHNOLOGIES 2. SOLID WASTE MANAGEMENT 3. APPLIED MECHANICS 4. QUANTUM SCIENCE AND TECHNOLOGY	3	0	0	3
7	Skill Enhancement Course	SKILLS ON CIVIL ENGINEERING SOFTWARE. (STAAD-PRO/E TABS/CAD/REVIT/ BIM)	0	1	2	2
8	Audit Course	CONSTITUTION OF INDIA	2	0	0	-
9	Internship	EVALUATION OF INDUSTRY INTERNSHIP	-	-	-	2
		Total	**19**	**1**	**02**	**21**

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B. Tech. IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	PR	Internship and Project	-	-	**24**	**12**

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IV Year I Semester	PROFESSIONAL CORE GEOTECHNICAL ENGINEERING- II	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

Upon the successful completion of this course:

CO1: Able to understand Soil exploration methods and field tests.

CO2: Able to understand earth pressure theories.

CO3: Able to understand stability of slopes.

CO4: Able to analyze the shallow foundations.

CO5: Able to analyze the deep foundations.

SYLLABUS:

UNIT – I

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Plate load test – Standard Penetration and cone penetration. Earth Pressure theories: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

UNIT – II

Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Bishop's method -- Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT-III

Shallow Foundations – Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays. Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity.

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– Factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory Meyerhof theory- IS Methods – effect of water table.

UNIT-IV

Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

Design of Shallow Foundations:

Proportioning of footings for Equal Settlement — Combine footing -- Rectangular, Trapezoidal and Strap footing – Principles of Design of Raft Foundation.

UNIT -V

Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load test – Pile under lateral loading -- Load carrying capacity of pile groups in sands and clays – Negative Skin Friction.

TEXTBOOKS:

1. 'Principles of Foundation Engineering' by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. 'Basic and Applied Soil Mechanics' by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
3. Soil mechanics & foundation engineering by Arora

REFERENCES:

1. Foundation Analysis and Design' by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, New york.
2. 'Theory and Practice of Foundation Design' by N.N.SOM & S.C.DAS PHI Learning Private limited.

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IV Year I Semester	MANAGEMENT COURSE-II ADVANCED CONSTRUCTION MANAGEMENT	L	T	P	C
		2	0	0	2

Course Learning Objectives:

- To Impart to the Student, Knowledge of Core Quality Management and Quality assurance and Quality Control differentiation and know when and how to apply each effectively.
- To impart to the Student knowledge of Application of different Cost estimation techniques, understanding of key Components of Project budget, implementation of cost control techniques
- To Impart to the Student knowledge about Key functions of materials management, inventory management, Selection & Suppliers, Material requirement planning
- To import to the Student knowledge about fundamental Concepts of Building Information modelling, understanding the integration of BIM with other project documentation Etc.,
- To Impart to the Student knowledge about Core principals & Sustainable Construction and green building, including energy efficiency, Water Conservation and waste seduction, Sustainable techniques and practices, knowledge about GRIHA rating, IGEC rating, LEED rating etc,

Course Outcomes:

1. Able to apply Quality assurance principles, implement Safety protocols, perform Risk Assessment, manage documentation etc
2. Able to develop accurate cost estimates, Analyse Project costs, Analyse project costs, Implement Cost Control methods, Utilize Predictive Models.
3. Able to utilize BIM for data integration, improve Collaboration, perform clash detection, Apply BIM for Sustainability analysis.
4. Able to Incorporate Green Building Principles, Reduce Environmental Impacts, Implement green building Strategies, address Sustainability Challenges

SYLLABUS:

UNIT-I

Quality and Safety Management, Quality assurance and Control Principles and managing On-Site safety procedure to minimize risks

UNIT-II

Cost Estimation and Control methods for calculating project cost, managing budgets, and performing economic analysis such as benefit cost analysis

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UNIT-III

Material and machinery management optimizing the procurement, use and maintenance of construction materials and heavy equipment.

UNIT-IV

Building Information Modeling (BIM)- The use of 3D Modeling and other technologies to improve Project Management, Collaboration and efficiency

UNIT-V

Sustainable Construction and Green Buildings techniques and Practices for reducing a project's Environmental impacts, including Green Building certification and waste management strategy

TEXT BOOKS:-

1. Construction Safety Management, 1st Edition by Neeraj and Amarjit
2. Construction Quality management: Principles and practice by Tim Howrath

REFERENCES:

1. Estimating and Costing in Civil Engineering by B.N.Dutta
2. Construction Management and Machinery by B.Gupta
3. BIM for Dummies by Stefen Mordue, Paul Swaddle and David Philip
4. GRIHA Manual
5. Safety management in Construction (Principles and Practices) by Sk. Bhattacharjee
6. Construction Quality Management Principles and Practice by Tim Howrath
7. Cost management of Construction Projects by Donald Towey
8. BIM and Construction Management: Proven tools, methods and work flocas by Brad Hurdin and Daure Mccod
9. Sustainable Construction: Green building design and delivery by Charles J. Kibert

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IV Year I Semester	**PROFESSIONAL ELECTIVE IV PRESTRESSED CONCRETE**	L	T	P	C
		3	0	0	3

Course Learning Objectives

- To understand the flexure, shear and Torsional stresses in prestressed concrete Members
- To Understand important concepts in designing continuous beams
- To Understand role of end block and different types and their design procedures
- To Apply the concepts to statically indeterminate structure.
- To Apply the concepts to design composite construction

Course Outcomes

1. Design of sections for flexure, Axial Tension, Compression and bending, shear, bond
2. Analysis and design of continuous beams and procedure for calculation of deflections
3. Analysis and design of end blocks adopting different methods of anchoring procedure for calculation of stresses
4. Understand and Design of Continuous Prestressed Concrete Beams and Portal Frames
5. Understand and concept of composite and continuous construction using pre stressed concrete

Unit I

Flexural, shear; Torsional resistance and design of Prestressed concrete section. Types of flexural failure– code procedures- shear and principal stresses– Prestressed concrete members in torsion– Design of sections for flexure, Axial Tension, Compression and bending, shear, Bond

Unit II

Analysis of continuous beams –Elastic theory- Linear transformation and Concordant tendons-Deflections of pre-stressed concrete beams: Importance of control of deflections-factors influencing deflections -short term deflections of un-cracked member–prediction of long term deflections.

Unit III

Analysis of end blocks: By Guyon's method and Magnel's method, Anchorage zone stresses-Approximate method of design-anchorage zone reinforcement-transfer of prestresses-pretensioned members-Composite sections: Introduction Analysis for stresses- differential shrinkage- general design considerations.

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Unit IV

Statically Indeterminate Structures: Advantages of Continuous Members—Effect of Prestressing Indeterminate Structures--Methods of Achieving Continuity--Definitions of Common Terms--Methods of Analysis of Secondary Moments---Concordant Cable Profile- Guyon's Theorem-- Effect of Axial Deformation and Tertiary Moments---Ultimate Load Analysis of Continuous Prestressed Members ---Determination of Concordant Tendon Profile-- Design of Continuous Prestressed Concrete Beams---Design of Prestressed Portal Frames.

Unit V

Composite Construction of Prestressed and in situ Concrete: Composite Structural Members Types of Composite Construction --Analysis of Stresses--Differential Shrinkage ---Deflection of Composite Members -- Stresses at Serviceability Limit State---Flexural Strength of Composite Sections -- Shear Strength of Composite Sections -- Design of Composite Sections.

TEXT BOOKS:

1. Prestressed Concrete, 4 e by N. Krishna Raju, McGraw Hill Pu
2. Prestressed Concrete by N. Rajagopalan, Narosa Publishing
3. Prestressed Concrete by S. Ramamrutham, Dhanpatrai Publishing Company

REFERENCES:

1. Prestressed Concrete Analysis and Design, Antone E.Naaman2e,TechnoPress3000
2. Design of Prestressed Concrete-T.Y.Lin, Ned H. Burns 3e,Wiley Publications

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IV Year I Semester	**PROFESSIONAL ELECTIVE- IV ADVANCED ENVIRONMENTAL ENGINEERING**	L	T	P	C
		3	0	0	3

Course Objectives:

- To explain the importance of self-purification of streams and to derive Streeter- Phelps equation and to discuss the effects of various pollutants on receiving streams.
- To introduce new concepts in biological treatment like nitrogen and phosphorous removal, anaerobic filters, RBC and U-tube aeration systems, their working principles and suitability.
- To understand the characteristics and the treatment and disposal methods of liquid wastes produced in Dairy industry, Sugar industry and Pulp & paper industry.
- To introduce various functional elements of urban solid waste management and to introduce various methods of solid waste treatment methods with special emphasis on recovery and reuse of solid waste.
- To introduce sources, global effects and the effects on human health, plants and materials of air pollution.
- To discuss about the effects of various meteorological parameters on air pollution and to explain various equipment for controlling particulate pollution and their suitability.
- To introduce sources, effects and controlling measures of noise pollution and to discuss noise rating systems and acceptable noise levels for various places.

Course Outcomes:

At the end of the course the student will be able to:

1. Understand the importance of self-purification and the effects of various pollutants on receiving streams.
2. Determine the critical D.O. deficit and the degree of treatment required for wastewater at the treatment plant to maintain a minimum D.O. at any point in the stream.
3. Update his knowledge in biological treatment with new and more advanced treatment methods.
4. Understand the characteristics and suggest suitable methods of treatment and disposal of industrial wastewater.
5. Suggest suitable methods for collection, transport, recovery, reuse and treatment of urban solid waste.
6. Understand global implications of air pollution and suggest suitable methods of control of particulate pollution depending on concentration and size of the particulate matter.
7. Acquire knowledge on noise pollution and suggest suitable noise control techniques according to the situation.

UNIT – I

Stream Sanitation Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen

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Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

Unit- II

New Concepts in Biological Waste Treatment (theory only)

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.

UNIT – III

Industrial Wastewater Treatment

Introduction to Industrial Wastewater treatment; Sugar Plant: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal. Dairy Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal. Pulp and Paper Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – IV

Urban Solid Waste Management

Sources; Quantities and characteristics; Classification; Collection and transportation; Recovery and reuse; Treatment methods such as compositing, incineration, sanitary landfill and pyrolysis. Sources and Classification of Air Pollution Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants;

Particulate matter; Aerosols; Gaseous pollutants. Meteorology and Air Pollution Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.

UNIT – V

Effects of Air Pollution

Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects. Control of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers. Noise Pollution

Introduction; Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

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TEXT BOOKS:

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., 2008.
2. Environmental Pollution Control Engineering by C.S. Rao, New Age International, 2006.

REFERENCES:

1. Clarence, J. Velz, "Applied Stream Sanitation", Krieger Pub Co., 1984.
2. C. S Rao, "Environmental Pollution Control Engineering", New Age Publications, 2006.
3. Nevers, Noel De, "Air Pollution Control Engineering", McGraw-Hill, 1999.

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DEPARTMENT OF CIVIL ENGINEERING

IV Year I Semester	**PROFESSIONAL ELECTIVE- IV DESIGN & DRAWING OF IRRIGATION STRUCTURES**	L	T	P	C
		3	0	0	3

Course Learning Objectives:

1. The course is designed to make the students learn the hydraulic design principles of irrigation structures.

Course Outcomes:

1. At the end of the course the student will be able to understand, design and draw hydraulic structures of Surplus weir, Tank sluice with a tower head, Canal drop-Notch type, Canal regulator, Syphon aqueduct type III

SYLLABUS:

Unit I:
Design and drawing of Surplus weir
Unit II:
Design and drawing of Tank sluice with a tower head
Unit III:
Design and drawing of Canal drop-Notch type
Unit IV:
Design and drawing of Canal regulator
Unit V:
Design and drawing of Syphon aqueduct type III

Final Examination pattern: Any two question of the above five designs may be asked out of which the candidate has to answer one question. The duration of the examination is three hours.

TEXT BOOKS:

1. Water Resources Engineering – Principles and Practice by C. Satyanarayana Murthy, New age International Publishers.

REFERENCES:

1. Irrigation Engineering and Hydraulic Structures by S.K. Garg, Standard Book House.
2. Irrigation and Water Power Engineering by B.C Punmia & Lal, Lakshmi Publications pvt. Ltd., New Delhi.

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IV Year I Semester	**PROFESSIONAL ELECTIVE- V ADVANCED STRUCTURAL ENGINEERING**	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

- Familiarize students with the analysis and design of Raft Foundations and Retaining walls
- Equip student with the concepts of designing different types of RCC water tanks
- Understand concepts of flat slabs
- Familiarize different types of Bunkers, Silos and Chimneys
- Understand different types of transmission towers

Course Outcomes:

At the end of this course, the student will be able to

1. Design raft foundations and different types of RCC retaining walls
2. Carryout analysis and design of different types of RCC water tanks
3. Solve the problems regarding design of RCC Bunkers, Silos and Chimneys
4. Understand the concepts of prefabricated construction.

SYLLABUS:

UNIT – I

Analysis and Design of Raft Foundations – Design of RCC Retaining walls: Cantilever and Counter fort

UNIT – II

Analysis and Design of RCC Water Tanks, Circular and Rectangular types- Intze tank including staging.

UNIT – III

Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear

UNIT – IV

Analysis and Design of RCC Chimney, Concepts of loading

UNIT-V

Analysis and design of Pressed Steel Tanks

TEXT BOOKS:

1. 'Reinforced Concrete Structures' Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. 'Reinforced Concrete Structures' by N. Subramanian, Oxford Publishers
3. 'Design Drawing of Concrete and Steel Structures' by N. Krishna Raju University Press 2005.

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REFERENCES:

1. 'Essentials of Bridge Engineering' by D. Johnson Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. 'Reinforced concrete design' by S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company
3. Codes: Relevant IS: codes.

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DEPARTMENT OF CIVIL ENGINEERING

IV Year-I Semester	**PROFESSIONAL ELECTIVE- V ENVIRONMENTAL IMPACT ASSESSMENT**	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objective of this course is:

- To impart knowledge on different concepts of Environmental Impact Assessment
- To know procedures of risk assessment
- To learn the EIA methodologies and the criterion for selection of EIA methods
- To know pre-requisites for ISO 14001certification
- To know the procedures for environmental clearances and audit
- To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes

1. Upon successful completion of this course, the students will be able to:
2. Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
3. Selection of an appropriate EIA methodology
4. Evaluation of impacts on environment
5. Evaluation of risk assessment
6. Know the latest acts and guidelines of MoEF & CC

UNIT-I:
Basic concepts of EIA: Elements of EIA-factors affecting EIA-Initial Environmental Examination- life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities-application of remote sensing and GIS for EIA.

UNIT-II:
EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods. Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

UNIT-III
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, generalized approach for assessment of Air pollution Impact.

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UNIT-IV:

Assessment of Impact of development Activities on Vegetation and wildlife, Environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

UNIT-V

EIA: MoEF & CC Acts, Notifications and Guidelines: Provisions in the EIA notification, procedure for environmental clearance, and procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports. Case studies and preparation of EIA statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

REFERENCES:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. Katania& Sons Publication, New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

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DEPARTMENT OF CIVIL ENGINEERING

IV Year I Semester	**PROFESSIONAL ELECTIVE- V RAILWAY AND AIRPORT ENGINEERING**	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objectives of this course are:

- To know various components and their functions in a railway track
- To acquire design principles of geometrics in a railway track.
- To know various techniques for the effective movement of trains.
- To acquire design principles of airport runway geometrics and pavements.

Course Outcomes:

At the end of course, Student will be able to

1. Design geometrics in a railway track.
2. Plan track layouts and control movement of trains
3. Design airport geometrics and airfield pavements.

UNIT- I

Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints-Introduction to Metro Rail System.

UNIT – II

Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

UNIT – III

Turnouts & Controllers: Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

UNIT – IV

Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose

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diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

UNIT – V

Runway Design: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

TEXT BOOKS:

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
2. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.

REFERENCES:

1. 'Railway Engineering' by Saxena & Arora - Dhanpat Rai, New Delhi.
2. 'Transportation Engineering Planning Design' by Wright P.H. & Ashfort N.J. - John Wiley & Sons.
3. 'Airport Engineering' by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
4. 'Transportation Engineering' by Srinivasa Kumar R, University Press, Hyderabad
5. 'Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, Scitech

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		L	T	P	C
IV Year I Sem	**OPEN ELECTIVE III** **BUILDING MATERIALS FOR ENGINEERS**	3	0	0	3

Objectives of the Course:

- Initiating the student with the knowledge of basic building materials and their properties.
- Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
- The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
- Imparting the students with the techniques of form work and scaffolding.
- The students should be exposed to classification of aggregates, moisture content of the aggregate.

Course Outcomes:

1. Upon the successful completion of the course:
2. The student should be able to identify different building materials and their importance in building construction.
3. The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
4. The student should have learnt the importance of building components and finishings.
5. The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

UNIT I:

Stones, Bricks and Tiles:

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II

Masonry:

Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminum.

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UNIT III:

Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.Cement: Portland cement-Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT IV:

Building Components:

Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNITV:

Finishings and Aggregates:

Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings. Aggregates - Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate-Bulking of sand – Sieve analysis.

TEXT BOOKS:

1. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
2. Building Construction, B.C. Punmia, Laxmi Publications (p)ltd.
3. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
4. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.

REFERENCES:

1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning(P)ltd.
3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction, P. C. Verghese, PHI Learning(P)Ltd.
5. Building Materials, Construction and Planning, S.Mahaboob Basha, Anuradha Publications, Chennai.

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IV Year I sem	**OPEN ELECTIVE III ENVIRONMENTAL IMPACT ASSESSMENT**	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objective of this course:

- To impart knowledge on different concepts of Environmental Impact Assessment
- To know procedures of risk assessment
- To learn the EIA methodologies and the criterion for selection of EIA methods
- To know pre-requisites for ISO14001certification
- To know the procedures for environmental clearances and audit
- To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes

1. Upon successful completion of this course, the students will be able to:
2. Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
3. Selection of an appropriate EIA methodology
4. Evaluation of impacts on environment
5. Evaluation of risk assessment
6. Know the latest acts and guidelines of MoEF & CC

SYLLABUS:

UNIT-I:
Basic concepts of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination- life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities-application of remote sensing and GIS for EIA.

UNIT-II:
EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods. Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

UNIT-III
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

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UNIT-IV:

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

UNIT-V

EIA: MoEF & CC Acts, Notifications and Guidelines: Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports. Case studies and preparation of EIA statement for various Industries.

TEXT BOOKS:

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3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi.

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IV Year I sem	**OPEN ELECTIVE III INTELLIGENT TRANSPORTATION SYSTEMS**	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To know the fundamentals of ITS
- To study sensor technologies and Data requirements of ITS
- To know ITS functional areas and user services
- To study various kinds of ITS architecture
- To study ITS applications in various fields of transportation engineering

Course Outcomes:

1. Identify the benefits of ITS from various types
2. Determine various sensor applications and ITS data collection techniques
3. Identify ITS user services and functional areas
4. Determine various ITS models, evaluation methods and ITS planning.
5. Determine the suitable ITS technology and assess its effectiveness to solve transportation problems

SYLLABUS

UNIT-I

Fundamentals of ITS: Definition of ITS s, the historical context of ITS from both public policy and market economic perspectives, Types of ITS; Historical Background, Benefits of ITS.

UNIT-II

Sensor technologies and Data requirements of ITS: Importance of telecommunications in the ITS system, Information Management, Traffic Management Centers (TMC). Application of sensors to Traffic management; Traffic flow sensor technologies; Transponders and Communication systems; Data fusion at traffic management centers; Sensor plan and specification requirements; Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, video data collection.

UNIT-III

ITS functional areas – Advanced Traffic Management systems (ATMS), Advanced Trav Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS).

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ITS User Needs and Services – Travel and Traffic management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle safety systems, Information Management.

UNIT-IV

ITS Architecture – Regional and Project ITS architecture; Concept of operations; ITS Models and Evaluation Methods; Planning and human factor issues for ITS, Case studies on deployment planning and system design and operation; ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS planning.

UNIT-V

ITS applications: Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing.; Transportation network operations; commercial vehicle operations and intermodal freight; public transportation applications; ITS and regional strategic transportation planning, including regional architectures: ITS and changing transportation institutions Automated Highway Systems- Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries

TEXT BOOKS:

1. Fundamentals of intelligent transportation systems planning By Mashrur A. Chowdhury, Adel Wadid Sadek
2. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.

REFERENCES:

1. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.
2. National ITS Architecture Documentation, US Department of Transportation, 2007

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IV Year I Semester	**OPEN ELECTIVE- IV ENVIRONMENTAL MANAGEMENT**	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The course will address the following:
1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of air pollution control with various methods
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems
5. Impart knowledge on Industrial Wastewater management
6. Visit at least one Water and Wastewater Treatment Plant and supply system.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:
a. Plan and design the water and wastewater systems
b. Identify the source of emissions and select proper control systems
c. Design & estimation of water supply system for a city
d. to get knowledge about various environmental aspects
e. Selection of suitable treatment flow for raw water treatments

SYLLABUS:

UNIT I
Energy and Environment: Definition- Energy demand – Energy resources and generation of electricity – conservation and management of energy resources – Oil pollution – Impact of oil pollution on marine and costal ecosystems – Management of oil pollution - case study of oil pollution.

UNIT II
Agriculture and Environment: Definition -Composition of soils – soils for plant growth – difference between sandy and clayey soils – macro and micro nutrients for plant growth – different types of agriculture – Impact of agriculture on environment and people – causes for soil erosion – management of soil erosion

UNIT III
Water Management: Water cycle – global water distribution – fresh water supply system – water usage in different ways – water quality and availability - water pollution and its sources – impact of water pollution – managing pollution of fresh water – managing water related diseases.

UNIT IV
Atmospheric Pollution: Definition – atmosphere – structure and composition of atmosphere – natural greenhouse effect – atmospheric pollution and its causes like smog, acid rain – ozone layer depletion – enhanced greenhouse effect – urban heat islands – impact of atmospheric pollution on humans, plants – managing of atmospheric pollution.

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UNIT V

Management of natural hazards: definition – hazard and disaster – Earth quake and volcanoes – Flooding – drought – impact of natural hazards – managing the impacts of natural hazards – opportunities presented by natural hazards.

TEXT BOOKS:

1. KVSG Murali Krishna, "Environmental studies", VGS Publications, Vijayawada, 2016.
2. Jacobson, M.Z. "Atmospheric Pollution: History, Science and Regulation", Cambridge University Press.

REFERENCES:

1. Jacobson, M.Z. "Fundamental of Atmospheric Modeling", Cambridge University Press.
2. Masters, G.M. "Introduction to Environmental Engineering and Science", PHI.
3. Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner. Bharucha, E.
4. The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013
5. India. Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
6. Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
7. Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p. De, A.K
8. Environmental Chemistry, Wiley Eastern Ltd.

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IV Year I sem	**OPEN ELECTIVE IV GEO-SPATIAL TECHNOLOGIES**	L	T	P	C
		3	0	0	3

Course Objectives:

- Understand the various spatial and non-spatial data types, and data base management techniques
- Develop the concepts and professional skills in utility of geo spatial techniques
- Improve the working knowledge of geospatial techniques in field problems

Course Outcomes:

At the end of the course the student will be able to:

1. Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations
2. Apply Geospatial techniques in the decision support systems useful for decision makers and community services.
3. Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc.
4. Able to generate the thematic maps using Geospatial techniques
5. Apply the concept of Geospatial Techniques to the Civil Engineering problems

UNIT I

Introduction – Basic concepts, socioeconomic challenges, fundamentals of geographical information systems (GIS), history of geographical information system, components of geographical information systems.

Projections and Coordinate Systems – Map definitions, representations of point, line, polygon, common coordinate system, geographic coordinate system, map projections, transformations, map analysis.

UNIT –II

Data Acquisition: Data Types, Spatial, Non-Spatial (Attribute) Data, Data Format – Vector and Raster Data, Manual Digitizing, Scanner, Aerial Photographic Data, Remotely Sensed Data, Digital Data, Cartographic Database, Digital Elevation Data.

Data Management: Data Storage and Maintenance, Data Compression, Data Quality and Standards, Precision, Accuracy, Error – Geometric errors and corrections, Radiometric errors and corrections, types of Systematic and Non-systematic errors.

UNIT –III

Data Modeling: Spatial Data Analysis, Data Retrieval Query, Simple Analysis, Recode Overlay, Vector Data Model, Raster Data Model, Digital Elevation Model, Cost and Path Analysis, Knowledge Based System.

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GIS Analysis and Functions: Organizing data for analysis, analysis function, maintenance and analysis of spatial data, buffer analysis, overlay analysis, transformations, conflation, edge matching and editing, maintenance and analysis of spatial and non-spatial data.

UNIT –IV

Applications of GIS: Environmental and Natural Resource Management, Soil and Water Resources, Agriculture, Land Use Planning, Geology and Municipal Applications, Urban Planning and Project Management, GIS for decision making under Uncertainty, standard GIS packages, Introduction to Global Positioning Systems (GPS) and its applications.

UNIT – V

Introduction to Remote Sensing: General background of Remote Sensing Technology, Objectives and Limitations of Remote Sensing, Electro-Magnetic Radiation, Characteristics, Interaction with Atmosphere and Earth Surface, Remote Sensing Platforms and Sensors, Satellite Characteristics, Digital Image Processing, IRS Series and High Resolution Satellites, Remote Sensing Applications to Watershed Modeling, Environmental Modeling, Urban Planning and Management.

TEXT BOOK:

1. Demers, M.N, (2013). 'Fundamentals of Geographic Information Systems' Wiley India Pvt. Ltd,.
2. Burrough, P.A., and Mc Donnell R.A.(1998). Principles of Geographical Information Systems. Oxford University Press, New York.
3. Kang-tsung Chang. (2006). Introduction to Geographical Information Systems. Tata McGraw- Hill Publishing Company Ltd., Third Edition, NewDelhi.
4. George Joseph, (2013). 'Fundamentals of Remote Sensing' Universities Press.

REFERENCES:

1. Sabins F.F. Jr. (1978). Remote Sensing Principles and Interpretations. W.H. Freeman and Company, San Francisco.
2. Tor Bernhardsen. (2002). Geographical Information System. Wiley India (P) Ltd., Third Edition, New Delhi.
3. Hoffman-Wellenhof, B, et al. (1997). GPS Theory and Practice. Fourth Edition, Springer Wein, New York.
4. Lilys and T.M., and Kiefer R.W. (2002). Remote Sensing and Image Interpretation. John Wiley and Sons, Fourth Edition, New York.
5. Choudhury S., Chakrabarti, D., and Choudhury S. (2009). An Introduction to Geographic Information Technology. I.K. International Publishing House (P) Ltd, NewDelhi.

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IV Year I sem	**OPEN ELECTIVE IV SOLID WASTE MANAGEMENT**	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objective of this course is:
1. To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste
2. To acquire the principles of treatment of municipal solid waste
3. To know the impact of solid waste on the health of the living beings
4. To learn the criterion for selection of landfill and its design
5. to plan the methods of processing such as composting the municipal organic waste

Course Learning Outcomes
Upon successful completion of this course, the students will be able to:
a. Design the collection systems of solid waste of a town
b. Design treatment of municipal solid waste and landfill
c. To know the criteria for selection of landfill
d. To characterize the solid waste and design a composting facility

UNIT I
Introduction: Definition of solid waste – waste generation-sources and types of solid waste – sampling and characterization – Determination of composition of Municipal Solid Waste – Onsite storage and handling of solid waste – Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II
Collection and Transport of Solid Waste: Type and methods of waste collection systems, analysis of collection systems-Optimization of collection routes– alternative routes for collection system. Transfer and Transport: Need for transfer operation, transport means and methods, transfer station types and design requirements. Separation and Processing and Transformation of Solid Waste- Waste as a Resource- Disposable Materials, Recycling, Collection, Processing, and Potential for Reuse.

UNIT III
Processing and disposal: unit operations used for separation and processing, Materials Recovery facilities, Source reduction and waste minimization, Metal Separation & Recovery Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT IV
Landfills: Classification, Site selection, design and operation, methods of filling, drainage and leachate collection systems –designated waste landfill remediation, reclamation, environmental closure.

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UNIT V

Hazardous Waste Management: Definition and identification of hazardous wastes-sources and characteristics – hazardous wastes in Municipal Waste – Hazardous wastes regulations – minimization of Hazardous Waste-compatibility, handling and storage of hazardous waste-collection and transport, e-waste - sources, collection, Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste – Solidification, chemical fixation and encapsulation, incineration – reuse after treatment.

TEXT BOOKS:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993

REFERENCES:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993.
2. Charles A. Wentz; ""Hazardous Waste Management", McGraw Hill Publication, 19

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IV Year I sem	**OPEN ELECTIVE IV APPLIED MECHANICS**	L	T	P	C
		3	0	0	3

Course Objectives:

1. To solve the resultant of any force system.
2. To analyze the types of frication for moving bodies and problems related to friction.
3. To determine the centroid of an area and center of gravity of body.
4. To understand the concept of area moment and mass moment about any axes.
5. Understand the work-energy principle

Course Outcomes: After completion of the course the student is able to

1. Determine the resultant of coplanar concurrent and special force systems and analyse the bodies for equilibrium to find the unknown forces.
2. Analyze the bodies on rough horizontal and inclined planes and connected Bodies
3. Determine the centroid of composite areas, centre of gravity of composite bodies
4. Determine the moment of inertia of simple areas and mass moment of inertia of simple bodies.
5. Apply work-energy principle to solve the rigid body problems.
6. Appraise the influences of human factor considerations on engineering design.

UNIT - I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space -Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

UNIT - II

Friction: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions – Types of friction – Dry friction – Ladder friction – Wedge friction – Screw friction – Simple Screw Jack

UNIT - III

Centroid and Center of Gravity: Introduction – Centroids of lines – Centroids of area - Centroids of Composite figures - Theorem of Pappus -Centre of Gravity - Center of gravity of composite bodies.

UNIT - IV

Area moments of Inertia: Introduction – Definition of Moment of Inertia -Polar Moment of Inertia – Radius of gyration - Transfer Theorem for moment of inertia – Moments of inertia by integration - Moments of Inertia of Composite Figures.

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Mass Moment of Inertia: Introduction - Moment of Inertia of Masses – Radius of gyration - Transfer Formula for Mass Moments of Inertia – Mass moments of inertia by integration - Mass moment of inertia of composite bodies – Product of Inertia.

UNIT - V

Kinetics of Rigid Bodies: Types of motion, D"Alemberts principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; kinetic of rigid body rotation.

TEXT BOOKS:

1. Engineering Mechanics by R.K.Bansal, Laxmi Publications (P) Ltd.
2. Engineering mechanics of solids by Popov, Egor P New Delhi : PHI Learning
3. Engineering Mechanics Statics and Dynamics by R.C. Hibbeler, Pearson Education India.

REFERENCES:

1. Engineering Mechanics by S.P. Timoshenko & D.H. Young, J.V.Rao, Sukumar Pati, McGraw Hill Education.
2. Engineering Mechanics by S.S. Bhavikatti and K.G.Rajashekarappa, New Age International (P) Ltd Publishers.
3. Engineering Mechanics: Statics and Dynamics by S.Rajasekaran and G.Sankarasubramaniam, Vikas Publishing house Pvt Ltd.

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IV Year – I Semester	QUANTUM SCIENCE AND TECHNOLOGY	L	T	P	C
		3	0	0	3

Prerequisites: Basic Physics, Linear Algebra, and Introduction to Modern Physics

Course Objectives:

1. To introduce fundamental concepts of quantum mechanics and its mathematical formalism.
2. To explore quantum computing and communication principles and technologies.
3. To understand the physical implementation and limitations of quantum systems.
4. To enable students to relate quantum theory to practical applications in computing, cryptography, and sensing.
5. To familiarize students with the emerging trends in quantum technologies.

Course Outcomes:

After completing this course, students will be able to:
CO1. Explain core principles of quantum mechanics and their technological implications.
CO2. Analyze quantum phenomena like superposition and entanglement.
CO3. Apply mathematical tools to model and solve quantum systems.
CO4. Demonstrate understanding of quantum algorithms and quantum circuits.
CO5. Evaluate potential applications and challenges in quantum communication and sensing.

Unit 1: Fundamentals of Quantum Mechanics: Historical background: Blackbody radiation, photoelectric effect, and Compton scattering; Dual nature of light and matter; De Broglie hypothesis; Schrödinger equation; Free particle, infinite potential well, step potential; Operators and observables: position, momentum, Hamiltonian; Commutation relations and uncertainty principle; Quantum postulates and measurement theory; Eigen values, eigen functions.

Unit 2: Quantum Information Theory: Classical vs. quantum information; Qubit representation using Bloch sphere; Quantum superposition and quantum entanglement; Dirac notation (bra-ket), tensor products, and composite systems; Bell states and EPR paradox; Quantum gates: Pauli-X, Y, Z; Hadamard; Phase; T; CNOT; Quantum circuit models and notation; Measurement in computational basis; Quantum teleportation and no-cloning theorem; Quantum state tomography (introductory)

Unit 3: Quantum Computing: Classical computing review and limitations; Quantum parallelism and interference; Deutsch and Deutsch-Jozsa algorithms; Grover's search algorithm, Oracle and amplitude amplification; Shor's factoring algorithm (overview and significance); Quantum Fourier Transform (QFT); Quantum error correction: Bit-flip, phase-flip, and Shor's 9-qubit code; Introduction to quantum programming: Qiskit, Cirq, IBM

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Quantum Experience (overview)

Unit 4: Quantum Communication: Introduction to quantum cryptography; Quantum key distribution (QKD): BB84 protocol; Entanglement-based QKD: Ekert protocol (E91); Eavesdropping and security of QKD; Quantum teleportation (circuit and protocol); Quantum dense coding; Quantum networks and entanglement swapping; Role of quantum repeaters; Single-photon sources and detectors; Implementation challenges (loss, decoherence, noise)

Unit 5: Quantum Technologies and Applications: Quantum sensors: magnetometry, gravimetry; Quantum metrology: standard time, atomic clocks; Quantum imaging and lithography; Quantum materials: topological insulators, graphene, quantum dots; NV centers in diamonds for sensing; Hardware platforms: Superconducting qubits, Trapped ions, Photonic quantum processors; Quantum supremacy and NISQ era; Global initiatives: IBM, Google, D-Wave, IonQ, India's NQM; Ethical concerns and future prospects

TEXT BOOKS::

1. **"Quantum Computation and Quantum Information"** by Michael A. Nielsen and Isaac L. Chuang
2. **"Quantum Mechanics: Concepts and Applications"** by Nouredine Zettili

Online Learning Resources:

1. https://nptel.ac.in/courses/104104082
2. https://nptel.ac.in/courses/115104096
3. https://nptel.ac.in/courses/122106034

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IV Year I Semester	**SKILL ENHANCEMENT COURSE** **SKILLS ON CIVIL ENGINEERIG SOFTWARE**	**L**	**T**	**P**	**C**
		0	1	2	2

1. Introduction to ETABS
2. 3D analysis of multi-storey buildings
3. Analysis of continuous beams
4. Analysis of portal frames
5. Analysis of trusses

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IV Year I Semester	**AUDIT COURSE CONSTITUTION OF INDIA**	L	T	P	C
		2	0	0	-

Course learning Objectives:

- Understand the concept of Indian constitution directive principle of state policy Analyze the History, features Evaluate Preamble Fundamental Rights and Duties
- Understand the structure of Indian government
- Understand the structure of state government role of Governor and Chief Minister Secretariat Differentiate between structure and functions of state secretariat
- Understand the local Administration district administration Mayer and elected representatives of Municipalities Zilla panchayat block level organization
- Know the role of Election Commission role of Chief Election commissioner and Commissionarate state election commission SC/ST/OBC and women

Course Outcomes

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

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UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Textbooks

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics

REFERENCES:

1. D.C. Gupta, Indian Government and Politics
2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, Indian Government andPolitics Hans
4. J. Raj Indian Government and Politics
5. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
6. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right),
7. Challenges to Civil Rights Guarantees in India, Oxford University Press 2012 resources:
8. nptel.ac.in/courses/109104074/8
9. nptel.ac.in/courses/109104045/
10. nptel.ac.in/courses/101104065/
11. www.hss.iitb.ac.in/en/lecture-details

www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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Suggested SWAYSM / NPTEL MOOCs Courses to pursue

B.Tech *Civil Engineering*

1. Energy Efficiency, Acoustics and Daylighting in Building
2. Applied Seismology for Engineers
3. Structural Dynamics for Civil Engineers
4. Free Surface Flows
5. Industrial Wastewater treatment
6. Retrofitting and Rehabilitation of Civil Infrastructure
7. Soil Structure Interaction
8. Urban Transportation Systems Planning
9. Soil Dynamics
10. Geosynthetics and Reinforced Soil Structures
11. Structural Dynamics
12. Analysis and Design of Bituminous pavements
13. Air pollution and Control
14. Rock Engineering
15. Smart Cities
16. Municipal Solid Waste Management
17. Indoor Air Pollution Control: Sources Effects, Monitoring, Control and Modelling
18. Introduction to Multimodal Urban Transportation Systems
19. Integrated Waste Management for Smart Cities
20. Introduction to Engineering Seismology
21. Pavement Materials (Under Pavement Engineering)
22. Wastewater Treatment and Recycling
23. Subsurface Exploration: Importance and Techniques Involved
24. Municipal Solid Waste Management
25. Sustainable Materials and Green Buildings

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26. Ground Improvement
27. Natural Resource Management
28. Introduction to Machine Learning
29. Explosions and safety
30. Sustainable Energy Technology
31. Disaster Recovery and build back better
32. Building Energy systems and auditing

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		L	T	P	C
IV Year II sem	**INTERNSHIP AND PROJECT**				12

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HONOURS DEGREE COURSES

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GEO TECHNICAL ENGINEERING

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Honor Course	**ADVANCED FOUNDATION ENGINEERING**	**L**	**T**	**P**	**C**
		3		**0**	

Course Outcomes:

CO1	Know the process of the soil exploration and sample collection, preservation and transportation of samples to the laboratory.
CO2	Interpret the results of field tests.
CO3	Determine the bearing capacity of soils for shallow foundations
CO4	Make the choice of foundation based on sub soil conditions.
CO5	Determine the settlement of foundations in different soils.

SYLLABUS:

Unit: 1

Soil Exploration – Importance, Terminology - Geophysical methods. Borings Location, spacing and depth, Methods of Boring including Drilling, Stabilization of Boreholes, Methods of sampling Types of Samples and Samplers - Cleaning of Bore holes, Preservation, Labeling and Shipment of Samples - Design Considerations of Open Drive Samplers.

Unit: 2

Field tests - The Standard Penetration Test – its limitations and Corrections – Cone Penetration Test – Field Vane Shear Test – Borehole Shear Test – Dilatometer Test – Pressure meter test – Planning of exploration – Preparation of Soil Report– Bore log.

Unit: 3

Shallow Foundations – Bearing capacity –Terzaghi's, Meyerhof's, Hansen's and Vesic's Bearing Capacity Theories – IS method of Bearing Capacity - Factors - Bearing Capacity of Stratified Soils - Bearing Capacity Based on Penetration Resistances - Safe Bearing Capacity and Allowable Bearing Pressure

Unit: 4

Types of foundations and the choice of the type of foundations. Design Considerations including Location and Depth, Proportioning of Shallow Foundations - Isolated and Combined Footings and Mats –Design Procedure for Mats. Floating Foundation – Fundamentals of Beams on Elastic Foundations.

Unit: 5

Settlement Analysis – Elastic settlement in granular soils – Meyerhof's, De Beerand Marten' sand Scheuerman's equations - Elastic settlements of surface and subsurface footings in clays - Skempton and Bjerrum's pseudo three dimensional approach to consolidation settlement settlement from insitu tests, Tolerable settlements.

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TEXT BOOKS:

1. 'Basic and applied soil mechanics' by Gopal Ranjan and ASR Rao, New Age Publishers
2. 'Soil Mechanics and Foundation Engineering' by VNS Murthy, CBS Publishers
3. 'Principles of Foundation Engineering' by BM Das, Thomson Brooks/Cole

REFERENCES:

1. Principles of Foundation Engineering by BrajaM. Das.
2. Soil Mechanics in Engineering Practice by Terzagi and Peck
3. Foundation Design by Wayne C.Teng, JohnWiley & Co.,
4. Foundation Analysis and Design by J.E. Bowles Mc Graw Hill Publishing Co.,
5. Analysis and Design of substructures by Swami Saran
6. Design Aids in Soil Mechanics and Foundation Engineering by Shanbaga R.Kaniraj,Tata Mc Graw Hill.
7. Foundation Design and Construction by MJ Tomlinson –Longman Scientific
8. A short course in Foundation Engineering by Simmons and Menzes ELBS

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		L	T	P	C
Honor Course	**PAVEMENT ANALYSIS, DESIGN AND EVALUATION**	3		0	

Course Outcomes:

CO1	Understand the design parameters of pavement design
CO2	Design flexible and rigid pavements for different field conditions
CO3	Compute the stress distribution in different pavement layers
CO4	Evaluate the pavements and design overlay systems

SYLLABUS:

Unit: 1
Pavement Types, Wheel Loads and Design Factors: Definition of Pavement Types, Comparison of Highway pavements, Wheel Loads, Tyre pressure, Contact pressure, Design Factors: Traffic and Loading, Environment, Materials, Failure criteria, Reliability.

Unit: 2
Stresses in Pavements: Layered System Concepts: One Layer System: Boussinesq's Theory. Two Layer Theory: Burmister's Theory. Three Layer System. Stresses in Rigid Pavements. Relative Stiffness of Slabs, Modulus of Sub grade Reaction, Stresses due to Warping, Stresses due to Friction, Stresses due to Load, IRC Recommendations.

Unit: 3
Pavement Design: IRC Method of Flexible Pavement Design, AASHTO Method of Flexible Pavement Design, IRC Method for Rigid Pavements, use of Geo synthetics in pavements.

Unit: 4
Pavement Inventories: Serviceability Concepts, Visual Rating, Pavement Serviceability Index, Roughness Measurements, Measurement of Distress Modes Cracking, Rutting, Rebound Deflection using Load Man Concept, Skid Resistance Measurement.

Unit: 5
Pavement Evaluation: Functional Pavement Performance Evaluation: AASHTO Method, Psycho Physical and Psycho Metric Scaling Techniques, Deduct Value Method. Structural Conditional Evaluation Technique: Pavement Distress Rating Technique. Design of Overlays by Benkelmen Beam Deflection Methods as per IRC – pavements on problematic soils.

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TEXT BOOKS:

1. 'Pavement Analysis and Design' by Yang H. Huang, Pearson Education, Second Edition.
2. 'Principles of Pavement Design' by Yoder.J. & Witczat Mathew, W. John Wiley & Sons Inc
3. 'Pavement Design' by Srinivasa Kumar R, Universities Press, Hyderabad

REFERENCES:

1. Yoder and Witzorack, "Principles of Pavement Design", John Willey and Sons.
2. Yang, H.Huang, "Pavement Analysis and Design", Prentice Hall Publication, Englewood Cliffs, New Jersy.
3. Sargious, M.A. Pavements and Surfacings for Highways and Airports – Applied science Publishers limited
4. Ralps Hass and Hudson, W.R. "Pavement Management System" Mc Graw Hill Book Company.
5. IRC codes of practice.
   IRC:37 Guidelines for the Design of Flexible Pavements
   IRC:59 Guidelines for Plain Jointed Rigid Pavements for Highways

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Honor Course	**EARTH RETAINING STRUCTURES**	**L**	**T**	**P**	**C**
		3		**0**	

Pre Requisites: Soil Mechanics

Course Outcomes:

CO1	Quantify the lateral earth pressures associated with different earth systems
CO2	Evaluate the mechanical properties of geo synthetics used for soil reinforcement
CO3	Identify the merits and demerits of different earth retaining systems.
CO4	Select the most technically appropriate type of retaining wall for the application from a thorough knowledge of available systems
CO5	Design of retaining structures using appropriate design methods, factors of safety, earth Pressure diagrams and field verification methods
CO6	Aware of current guidelines regarding the design of earth retaining structures.
CO7	Design retaining structures considering both external and internal stability aspects

SYLLABUS:

Unit: 1

Earth pressures – Different types and their coefficients - Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure –Computation of Lateral Earth Pressure in Homogeneous and Layered soils – Graphical solutions for Coulomb's Theory in active and passive condition.

Unit: 2

Retaining walls – different types – Type of Failures of Retaining Walls – Stability requirements - Drainage behind Retaining walls – Provision of Joints –Relief Shells.

Unit: 3

Sheet Pile Structures – Types of Sheetpiles – Cantilever sheet piles in sands and clays– Anchored sheet piles– Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

Unit: 4

Soil reinforcement – Reinforced earth – Different components – their functions –Design principles of reinforced earth retaining walls.

Unit:5

Braced cuts and Coffer dams: Lateral Pressure in Braced cuts– Design of Various Components of a Bracedcut–Stability of Braced cuts –Bottom Heavein cuts.– types of cofferdam, suitability, merits and demerits–Design of single – wall coffer dams and their stability aspects –TVA method and Cummins' methods.

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TEXT BOOKS:

1. Principles of Foundation Engineering by Braja M. Das.
2. Foundation analysis and design – Bowles, JE– Mc Graw Hill

REFERENCES:

1. Soil Mechanics in Engineering Practice– Terzaghi, K and Rolph, B. peck 2ndEdn.– JohnWiley & Co
2. Analysis and Design of Foundations and Retaining Structures, Prakash, S– Saritha Prakashan, Mearut.

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Honor Course	APPLICATIONS OF GEO SYNTHETICS	L	T	P	C
		3		0	

Pre Requisites: None

Course Outcomes:

CO1	Use geo synthetic materials in the field of geo technical construction works.
CO2	Assess the properties of different materials of Geo synthetics
CO3	Distinguish and describe various manufacturing methods of geo textiles, geo grids, geo membranes and geo-composites
CO4	Understand concepts and design the geo synthetics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers
CO5	Design reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, Landfill liners, caps and closures, dams and embankments etc
CO6	Distinguish survivability requirements of geo composites and design geo webs, geo cells, Sheet drains, strip drains and moisture barriers etc

SYLLABUS:

Unit 1:
Geosynthetics and Properties and Testing Methods: Introduction to Geosynthetics – Basic description –History – Manufacturing methods – Uses and Applications. Properties and Testing methods of Geo textiles –Geogrids– Geo membranes – Geo composites.

Unit 2:
Geo textiles: Designing for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers.

Unit 3:
Geo grids: Designing for Reinforcement– Stabilization – Designing Gabions – Construction methods – Design of retaining walls.

Unit 4:
Geo membranes: Survivability Requirements – Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners– Caps and Closures – Dams and Embankments.

Unit 5:
Geocomposites: Geocomposites – Overview an added advantage –Geo composites in Separation–Reinforcement – Filtration – Geocomposites as Geowebs and Geocells – Sheet drains – Strip drains and Moisturebarriers.

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TEXT BOOKS:

1. "Designing with Geosynthetics" by Robert M. Koerner Prantice Hall, Eaglewood Cliffs, NJ 07632.2."Construction and Geotechnical Engineering using Synthetic Fabries" by Robert M. Koerner and Josoph P.Welsh.John Willey and Sons, New York.
2. 'Ground Improvement Techniques' by Purus Hotham Raj, Laxmi Publications, New Delhi.
3. 'Ground Improvement Techniques' by Nihar Ranjan Patro,Vikas Publishing House(p) limited ,New Delhi.

REFERENCE:

1. "Engineering with Geosynthetics", by G. Venkatappa Rao and GVS Suryanarayana Raju – Tata McGraw Hill Publishing Company Limited, New Delhi.
2. "Foundation Analysis and Design" by J.E.Bowles Mc Graw Hill Publications.

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	SOIL DYNAMICS & MACHINE FOUNDATIONS	L	T	P	C
		3		0	

Course Outcomes:

CO1	Use theory of vibrations to find the behavior of soil under dynamic loading
CO2	Design machine foundations under different loads and soil conditions
CO3	Understand the liquefaction phenomena
CO4	Conduct various laboratory and filed tests to determine the dynamic soil properties and its Interpretation
CO5	Design vibration isolators under any vibratory machines

SYLLABUS:

Unit: 1

Introduction: Types of motion- SHM - Fundamental definitions - SDOF systems - Free and forced vibration with and without damping- Types of damping - Equivalent stiffness of springs in series and parallel-Principles of vibration measuring devices - Introduction to two and multi degree freedom systems

Unit: 2

Theories of Vibration Analysis- EHS Theory and lumped parameter model-Different modes of vibration - Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory–Sung's solutions - Pauw's Analogy–Heigh's Theory.

Unit: 3

Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes-Stress waves in bounded elastic medium-Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination-damping factor from free and forced vibration tests.

Unit: 4

Machine Foundations: Classification based on the type of dynamic force and structural form, design data, design criteria, foundations for reciprocating, impact and high speed machined like turbo generators-IS code provisions for the design of the same

Unit: 5

Vibration Isolation and Special Topics: Transmissibility, Principles of isolation-Methods of isolation-Vibration isolators-Types and their characterizes -Liquefaction of soils, Dynamic bearing capacity, Earth retaining structures under dynamic loads - Pile foundations

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TEXT BOOKS:

1. Vibrations of Soils and Foundations– Richart Hall and Woods
2. Foundations of Machines- Analysis and Design – Prakash and Puri

REFERENCES:

1. Vibration Analysis and Foundation Dynamics, NSV Kameswara Rao, Wheeler Publishing, New Delhi.
2. Analysis and design of Foundations for Vibrations- PJMoore
3. Fundamentals of Soil Dynamics - BMDas
4. Dynamics of bases and Foundations – Dbarkar

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	**EXPANSIVE SOILS**	**L**	**T**	**P**	**C**
		3		0	

Course Outcomes:

CO1	Understand the behavior of expansive soils
CO2	Assess the foundation practices on expansive soils
CO3	Perform the methods of stabilization expansive soils
CO4	Select additives and the methodology for stabilization
CO5	Apply the gained knowledge for suitable performance

SYLLABUS:

Unit: 1

Clay mineralogy- Nature of soils-clay mineral structures- cation exchange- soil water-soil structure soil water interaction.

Unit: 2

Swelling characteristics: swelling - factors affecting swelling-swell potential - swelling pressure- methods of determination – factors affecting swell potential and swelling pressure – Heave factors affecting heave methods of determination of heave.

Unit: 3

Foundation Practices in Expansive Clays – Sand cushion – Belled Piers – CNS layer technique – Under –reamed pile foundations – Construction techniques – design specifications – Load -carrying capacity in compression and uplift of single and multi– under reamed piles in clays and sands–granular pile Anchors.

Unit: 4

Lime soil columns and Lime slurry pressure injection – Stabilization with admixtures –Pre ponding – Vertical and Horizontal Moisture Barriers.

Unit: 5

Shear strength of expansive soils-Katti's concept of bilinear strength envelope-Stress state variables in partly saturated soils- Fred lund's strength parameters-determination of matrix suction by axis translation technique-field suction measurement

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TEXT BOOKS:

1. F.H.Chen. Foundations on Expansive Soils , Eleveir Scientific Publishing Company, Newyork.
2. J.D.Nelson and D.I. Miller, Expansive soils-Problems and Practice in Foundation and Pavement Engineering by, JohnWiley & Sons,Inc.

REFERENCES:

1. D.G.Fredlund and H.Rahardjo, Soil Mechanics for Unsaturated Soils, WILEY Interscience Publication, JohnWiley &Sons, Inc
2. D.R.Katti,ARKatti, Behaviour of Saturated Expansive Soils and Control methods, Taylor and Francis Gopal Ranjan and ASRao, Basic and Applied Soil Mechanics, New Age International Publishers,
3. HandBook on Under reamed and Bored Compaction Pile Foundations– CBRI, Roorkee.IS:2720(Part XLI)– 1977Measurement of Swelling Pressure of Soils.

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	EARTHERN DAMS	L	T	P	C
		3		0	

Pre Requisites: None

Course Outcomes:

CO1	Understand the basic concepts of earth fill dams and rock fill dams and identify the site Topography and foundations conditions
CO2	Identify basic design requirements and causes of failures of dams, distinguish foundation types and the different fill materials
CO3	Estimate seepage through dam sections, foundations and select core and shell materials
CO4	Understand and design the methods to control seepage through different units of dams
CO5	Able to undertake slope stability analysis of dams
CO6	Distinguish different types of instruments like piezometers, settlement gauges and inclinometers to install for performance studies of dams

SYLLABUS:

Unit: 1

BASIC CONCEPTS AND MISCELLANEOUS TOPICS: Evolution–Types of Dams–Earth fill Dams–Rock fill Dams–Selection of Type of Dam–Site Topography–Foundation Conditions–Basic Design Requirements–Causes of Failure and Deterioration of Dams – Design Investigations – Fill Material – Foundations – Design Studies.

Unit: 2

SEEPAGE THROUGH DAM SECTION AND ITS CONTROL: Estimation of Seepage through Dam Section and foundation– Considerations in selection and design of core and determination of shell material Drains: – Pervious Downstream Shell – Chimney Drains – Rock Toe and Drains – Use of Geo textiles as Filter Material.

Unit: 3

CONTROL OF SEEPAGE THROUGH FOUNDATIONS: General Considerations – different types of cutoff walls –Provision of d/saprons– relief wells SLOPE PROTECTION – Necessity with respect to u/s and d/s slopes – u/s slope protection by Dumped Riprap – Hand placed Riprap – Soil Cement Slope Protection – Downstream Slope Protection by providing berms grassturfing.

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Unit: 4

STABILITY ANALYSIS OF SLOPES OF EARTH DAMS: Slope stability analysis techniques –Methods of Slices, Fellenius' Method, Simplified Bishop method, Taylor's method, Simplified Janbu's Method; Stability of earth dam slopes – u/s slope during sudden drawdown, d/s slope during steady seepage, stability of u/s and d/s slopes during and after construction.

Unit: 5

INSTRUMENTATION: – Purpose -Types of Instruments and Brief Description – Installation – piezometers – Casagrande and Vibration wire Settlement gauges–Inclinometers.

TEXT BOOKS:

1. Christian, K. Earth & Rock fill Dams – Principles of Design and Construction, CRC Press, 1997.
2. Sowers, G.F. – Earth and Rock fill Dam Engineering, Asia Publishing House, 1962.

REFERENCES:

1. Bharat Singh and Sharma, H. D. – Earth and Rock fill Dams, 1999
2. Abramson, L. W., Lee, T. S. and Sharma, S. – Slope Stability and Stabilisation methods – John Wiley & sons. (2002)
3. Sherard, Woodward, Gizienski and Clevenger. Earth and Earth-Rock Dams. John Wiley &. Sons. 1963.
4. US Army Corp of Engineers, Earth and Rock-fill Dams, General Design and construction Considerations, University Press of the Pacific (2004)
5. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	GEO ENVIRONMENTALENGINEERING	L	T	P	C
		3		0	

Course Outcomes:

CO1	Understand various ground contaminations, pollution transport phenomena.
CO2	Collect pollutant data
CO3	Apply principles to get the information about the transport through the unsaturated soil
CO4	Develop various models for contamination transport.

SYLLABUS:

Unit: 1

Introduction- Ground water contamination, pollutant transport and ground water remediation. Sources and Types of ground water contamination–underground storage tanks, Landfills, surface impoundments, waste disposal injection wells, Septic system, Agricultural wastes, Land application, radioactive contamination, other sources of contamination.

Unit: 2

Data Collection methods: Introduction, Geological data acquisition – Drilling methods – Solid flight auger drilling – Hollow stem auger drilling – Wet rotating drilling – Hand auger soil boring – sample collection – Soil core logging– Cone penetration testing –Geophysical methods; Hydrologic data acquisition –monitoring well construction – well material – Screen interval selection – Installation procedure – Survey specification –Protective casing requirements – Well development procedures; Acquisition of soil and Ground water quality data.

Unit: 3

Contaminant Transport Mechanisms: Introduction – Advection process – Diffusion – Dispersion process –Diffusion – Mass transport Equations : Derivation of advection dispersion equation for solute transport; One Dimensional Models – Continuous source in one dimension – Instantaneous source in one dimension –Adsorption effects–Transport in one dimensional with first order decay–Sorption: The concept of sorption, Factors influencing sorption – Contaminant characteristics, Soil characteristics, Fluid media characteristics. Sorption Isotherm: Linear sorption Isotherm – Freundlich Sorption isotherm – Langmuir Sorption Isotherm, Sorption effects on fate and transport of pollutants.

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Unit: 4

Flow and Transport of Pollutants in Unsaturated zone: Capillarity, soil water characteristic curves, Unsaturated Hydraulic conductivity, Governing equation for unsaturated flow, measurement of soil properties.

Unit: 5

Non – Aqueous Phase Liquids (NAPLs): Introduction – Comparison of fate of dissolved mass versus NAPL mass Types of NAPLs– LNAPL– DNAPL; NAPL Transport– general process– NAPL transport at the pore level-Downward Migration of DNAPLs in saturated zone– NAPL movement through Vadose zone– LNAPL behavior at the water table–NAPL Transport at the site level– LNAPL conceptual models–DNAPL conceptual models, NAPL transport.

TEXT BOOKS:

1. Ground water Contamination (Transport and Remediation) By Philip.B.Bedient, Hanadi, S.Rifai & Charles.J. Newell, Prentice Hall PTR, Upper Saddle River, NJ07458.
2. Geo environmental Engineering by R.Krishna Reddy -JohnWiley & Sons, Inc.

REFERENCES:

1. Geo technical Engineering by Gulahati, S.K. and Datta, M.–Tata McGraw Hill Publishing Company
2. Geo technical Engineering Principles and Practices by Coduto –Pearson Education(PHI)
3. Geo environmental engineering by Reddy, L.NandInyang, I.H. – MarcelDrekker,2000.
4. Environmental geo techniques by Sarsby, R. – Thompson Telford, 2000.Geotechnical Practices for Waste Disposal by Daniel,D.E., 1993

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STRUCTURAL ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	THEORY OF ELASTICITY AND PLASTICITY	L	T	P	C
		3		0	

Course Outcomes:

CO1	Comprehend the basic concepts of continuum mechanics of solids like stresses strains compatibility and equations of equilibrium, understand how to utilize the constitutive equations and generalized hooks' law
CO2	Ability to solve 2D problems in rectangular coordinates and application to bending of simple beams.
CO3	Applying polar co ordinates in analyzing stressed and strains in circular section
CO4	Applications of 3D continuum mechanics to solve for stresses and strains, compatibility conditions
CO5	Solving torsion in prismatic and non prismatic sections through energy principles

SYLLABUS:

Unit: 1
Elasticity– Notation for forces and stresses – components of stresses and strains–Hooke's Law Plane Stress– Plane strain–Differential Equations of equilibrium – Boundary conditions – Compatibility Equations Stress function– Boundary Conditions

Unit: 2
Two dimensional problems in rectangular coordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

Unit: 3
Two dimensional problems in polar coordinates General equations in polar coordinates – Stress distribution for problems having symmetrical about an axis -Strain components in polar coordinates– Displacements for symmetrical stress distributions -Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

Unit: 4
Analysis of stress and strain in three dimensions -Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses -Maximum shear stress – Homogeneous Deformation –General Theorems -Differential equations of equilibrium – Conditions of compatibility– Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

Unit: 5
Torsion of Prismatic bars – Bars with elliptical cross section – Other elementary solution– Membrane analogy–Torsion of rectangular bars – Solution of Torsional problems by energy method

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TEXTBOOKS:

1. Theory of Elasticity Stephen Timoshenko & J.N.Goodier, Mc.Graw hill Publishers
2. Advanced Mechanics of Solids L.S. Srinath, Mc Graw Hill Publisher

REFERENCES::

1. Elasticity: Theory, Applications and Numeric Martin H.Sadd, Wiley Publishers
2. Theory of Elasticity-Sadhu Singh 3rd Edition, Khanna Publishers

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	STRUCTURAL DYNAMICS	L	T	P	C
		3		0	

Course Outcomes:

CO1	Understand fundamental objectives, types of loadings and degrees of freedom
CO2	Understand SDOF systems and behaviour of structures under SDOF systems
CO3	Understand MDOF systems and response to various types of loading
CO4	Evaluation of response of structures considering continuous systems
CO5	Understand earth quake forces and design of earthquake resistant structures

SYLLABUS:

Unit: 1
Introduction to Structural Dynamics: Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization – Formulation of equations of motion by different methods Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization – Oscillatory motion - Simple Harmonic motion – Victorian representation of S.H.M.

Unit: 2
Single Degree of Freedom Systems: Free vibrations of single degree of freedom system – un damped and damped vibrations – critical damping- Logarithmic decrement –Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation -Dynamic magnification factor – Phase angle. Formulation and solution of the equation of motion - Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral

Unit: 3
Multi Degree of Freedom Systems: Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion –Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure

Unit: 4
Continuous Systems: Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure – Natural frequencies and mode-shapes of simple beams with different end conditions-Principles of application to continuous beams.

Unit: 5
Introduction to Earthquake Resistant Design: Seismology- Seismic waves and propagation- Measurement scales- Seismic Resistant architecture- Objective of ERD- Codal provisions

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TEXTBOOKS:

1. Structural Dynamics Anil K Chopra, 4 edition, Prentice Hall Publishers
2. Structural Dynamics Theory & Computation–Mario Paz, CBS Publishes and Distributors
3. Dynamics of Structures by Clough & Penzien3e, Computers & Structures Inc.

REFERENCES:

1. Theory of Vibration-William T Thomson, Springer Science
2. Earthquake Resistant Design of Structures- Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India New Delhi

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	BRIDGE ENGINEERING	L	T	P	C
		3		0	

Course Outcomes:

CO1	Design theories Masonry Arch Bridges
CO2	Design of RCC slab and T beams bridges
CO3	Understand the behaviour of plate girder bridge
CO4	Posses the knowledge to design pre stressed concrete bridges
CO5	Analyze the abutments piers and design of pipe culvert

SYLLABUS:

Unit:1

Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal Forces-Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.

Unit: 2

Pigeaud's method design of longitudinal girders-Guyon Messonet method-Hendry Jaegar method-Courbon's theory. (Ref: IRC 21), voided slabs, Super Structure: Slab bridge-Wheel load on slab-effective width method-slabs supported on two edges-cantilever slabs-dispersion length-Design of interior panel of slab-T Beam bridges.

Unit: 3

Box Culverts- Single Cell Box Culvert– Design Loads, Design Moments, Shears and Thrusts. Design of Critical sections.

Unit: 4

Plate girder bridges- Elements of plate girder and their design- web -flange-intermediate stiffener- vertical stiffeners -bearing stiffener - design problem

Unit: 5

Sub structure -Abutments-Stability analysis of abutments-piers-loads on piers – Analysis of piers-Design problem (Ref: IRC 13, IRC 21, IRC 78) -Pipe culvert-Flow pattern in pipe culvers-culvert alignment culvert entrance structure-Hydraulic design and structural design of pipe culverts-reinforcements in pipes. (Ref: IRC: SP 13)

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TEXTBOOK:

1. 'Essentials of Bridge Engineering 'by Johnson Victor D.
2. Design of Concrete Bridges M.G.Aswini, V.N.Vazirani, M.M Ratwani, Khanna
3. 'Design of Bridges' by Krishna Raju. CBS Publishers and Distributors

REFERENCES:

1. 'Design of Concrete Bridges' by Aswini, Vazirani,Ratwani.
2. 'Design of Steel Structures' by B.C.Punmai, Jain & Jain, Lakshmi Publications.
3. Design of Bridge Structures' by T.R. Jagadeesh, M.A. Jayaram, PHI.Publishers
4. Bridge Engineering by S. Ponnuswamy, McGraw hill Publications
5. Concrete Bridge Design and Practice-V.K.Raina, Tata Mc Graw-Hill Publishing Company Limited
6. IRC6-2016Standard Specifications and Code of Practice for Road bridges
7. IRC21-2009StandardSpecificationsandcodeofpractice for Road Bridges Section III

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	EARTHQUAKE RESISTANT DESIGN	L	T	P	C
		3		0	

Course Outcomes:

CO1	To learn the fundamentals of seismology and basic earthquake mechanisms, tectonics types of ground motion, and propagation of ground motion. Understand qualitative and quantitative representations of earthquake magnitude
CO2	Determine the natural frequency of a single degree of freedom dynamic system for given mass, stiffness and damping properties.
CO3	Determine the maximum dynamic response of an elastic vibrating structure to a given forcing function. Distribute the static base shear to the structure based on vertical distribution of mass horizontal distribution of mass, and centres of rigidity.
CO4	Learn the fundamentals of building code based structural design
CO5	Recognize special conditions such as irregular buildings, building separation, P-delta

SYLLABUS:

Unit: 1
Engineering seismology– rebound theory– plate tectonics–seismic waves - earthquake size and various scales– local site effects– Indian seismicity– seismic zones of India– theory of vibrations– near ground and far ground rotation and their effects.

Unit: 2
Seismic design concepts – EQ load on simple building – load path– floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration–pounding effects–mass and stiffness irregularities – torsion in structural system-Provision of seismic code (IS1893&13920)–Building system–frames–shear wall–braced frames–layout design of Moment Resisting Frames(MRF)–ductility of MRF–In fill wall– Non structural elements

Unit: 3
Calculation of EQ load– modelling of building systems and analysis (theory only) Evaluation of lateral forces using seismic coefficient method, Response Spectrum method and Dynamic analysis method. Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing

Unit: 4
Cyclic loading behaviour of RC, elements – modern concepts – Base isolation–Adaptive systems– case studies – Codal provision for load calculation

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Unit: 5

Retrofitting and restoration of buildings subjected to damage due to earthquakes - effects of earthquakes–factors related to building damages due to earthquake – methods of seismic retrofitting -restoration of buildings

TEXTBOOKS:

1. Earthquake Resistant Design of Structures Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India 2007, New Delhi
2. Earthquake Resistant Design of Structures-S.K.Duggal, Oxford Publications

REFERENCES:

1. Introduction to the Theory of Seismology, Great Britain atthe University Printing houses, Cambridge UniversityPress1996
2. Earthquake Resistant Design and Risk Reduction-David Dowrick
3. IS 4326-1998: Earthquake Resistant Design and Construction of Buildings
4. IS 1893(Part1to5)-2002:General Provisions and Building
5. IS 4928–1993:Code of practice for Earthquake Resistant Design and Construction of Buildings
6. IS 13920-1997: Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces
7. IS 13935-1993: Guidelines for Repair and Seismic Strengthening of Building

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Honor Course	MATRIX ANALYSIS OF STRUCTURES	L	T	P	C
		3		0	

Course Outcomes:

CO1	Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and equilibrium Methods
CO2	Understand stiffness Method with applications on pin jointed truss, continuous beams and rigid jointed plane frames
CO3	Perform structural analysis using the stiffness method and apply on solving different complex application problems
CO4	Understand effective finite element analysis techniques to reduce computational efforts
CO5	Solve multiple degree of freedom plane frames including sides way single storey single bay gable frames using flexibility method

SYLLABUS:

Unit: 1

Introduction of matrix methods of analysis – Static and kinematic indeterminacy– Degree of freedom– Structure idealization stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element - Element force displacement equations.

Unit: 2

Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly–structure stiffness matrix equation –analysis of simple pin jointed trusses–continuous beams–rigid jointed plane frames

Unit: 3

Stiffness method for Grid elements – development of stiffness matrix – coordinates transformation. Examples of grid problems – tapered and curved beams

Unit: 4

Additional topics in stiffness methods –discussion of bandwidth–semi band width – static condensation – sub structuring –Loads between joints - Support displacements-inertial and thermal stresses - Beams on elastic foundation by stiffness method.

Unit: 5

Analysis of plane truss- continuous beams with and without settlement - plane frame including side sway single storey, single – bay and gable frame by flexibility method using system approach

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TEXT BOOKS:

1. Matrix analysis of structures, Robert E Sennet – Prentice Hall - Englewood Cliffs -New Jercy
2. Structural Analysis Matrix Approach- Pandit and Gupta, Mc Graw hill Education
3. Advanced structural analysis, P.Dayaratnam – Tata Mc Graw hill publishing company limited.

REFERENCES:

1. Indeterminate Structural analysis, CK Wang, Amazon Publications
2. Analysis of Tall buildings by force –displacement –Method M. Smolira Mc. Graw Hill.
3. Foundation Analysis and design, J.E.Bowls, 5e, Amazon Publications

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	**STABILITY OF STRUCTURES**	**L**	**T**	**P**	**C**
		3		**0**	

Course Outcomes:

CO1	Determine the critical moments and deflection and critical loads for beam columns under different loading and end conditions
CO2	Determine the critical loads in straight column and bulking of frames under different loading and end conditions
CO3	Asses lateral bulking of beams
CO4	Assess the bulking of thin-walled bars of open cross section along with flexure

SYLLABUS:

Unit: 1
Beam columns: Differential equation for beam columns–Beam column with concentrated loads–continuous lateral load– couples–Beam column with built in ends–continuous beams with axial load – Application of Trigonometric series–Determination of allowable stresses

Unit: 2
Elastic buckling of bars: Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway &Non-Sway mode -Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section–Effect of shear force on critical load–Built-up columns– Effect of Initial curvature on bars–Buckling of frames–Sway & Non Sway mode

Unit: 3
In elastic buckling: Buckling of straight bars–Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram–Empirical formulae of design–various end conditions–Design of columns based on buckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation–Ritz method Stiffness method and formulation of Geometric stiffness matrix Applications to simple frames

Unit: 4
Torsional Buckling: Pure torsion of thin-walled bars of open cross section– Non uniform torsion of thin-walled bars of open cross section - Torsional buckling–Buckling of Torsion and Flexure

Unit: 5
Lateral Buckling of simply supported Beams: Beams of rectangular Cross section subjected for pure bending, Buckling of I Section subjected to pure bending

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TEXT BOOKS:

1. Theory of Stability of Structures by Alexander ChaJes
2. Theory of Elastic Stability by S.P.Timoshenko & J.M.Gere – Mc Graw Hill Publications

REFERENCES:

1. Fundamentals of Structural Stability by George J Simitses & Dewey H. Hodges, Elsevier Publications
2. Elastic Stability of Structural Elements, N.G.R.Ayyangar Macmillan Publications

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	ADVANCED REINFORCED CONCRETE STRUCTURES	L	T	P	C
		3		0	

Course Outcomes:

CO1	Estimate the deflection of Concrete beams and slabs
CO2	Estimate crack width and its affects
CO3	Design flats labs, bunkers, silos and chimneys
CO4	Understand the thermal effect on concrete members

SYLLABUS:

Unit: 1
Limit Analysis of R C Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, loading pattern, Bending Moment Envelop, Application for Fixed Beams and Continuous Beams. In elastic Analysis of Slabs, Moment Redistribution in Columns, Limit analysis with Torsinal Hinges.

Unit: 2
Yield line analysis for slabs: Yield line criterion – Virtual work and equilibrium methods of analysis – For square circular, Rectangular, Triangular and Hexagonal with simple and continuous end conditions.

Unit: 3
Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, arrangement of Reinforcements.
Flat slabs: Direct design method – Distribution of moments in column strips and middle strip- moment and shear transfer from slabs to columns – Shear in Flat Slabs-Check for one way and two-way shears- Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip sketch showing reinforcement details.

Unit: 4
Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456. Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels, Design of Nibs.

Unit: 5
Design of Slender Columns – Slenderness limits, Methods of Design of Slender Columns, Additional Moment Method and Procedure for Design of Slender Columns. Eccentrically Loaded columns- development of interaction Diagrams

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TEXT BOOKS:

1. Advanced Reinforced Concrete Design by P.C.Varghese Prentice Hall India Limited
2. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press.
3. Reinforced Concrete Design, by S. Unnikrishnan Pillai & Devdas Menon Tata Mc. Graw-Hill Publishing Company Ltd. New Delhi 2010.

REFERANCES:

1. Design Reinforced Concrete Foundations P.C.Varghese Prentice Hall of INDIA Private Ltd.
2. Limit State Theory and Design of Reinforced Concrete S. R. Karve and V.L Shah. Standard Publishers
3. Reinforced concrete structural elements – behaviour, Analysis and design by P. Purushottam, Tata McGraw-Hill, 1994
4. Design of concrete structures – Arthus H. Nilson,David Darwin, and Chorles W. Dolar, Tata Mc. Graw-Hill, 3rd Edition, 2005.
5. Reinforced Concrete design by Kennath Leet,Tata Mc.Graw – Hill International, editions, 2nd edition, 1991
6. IS 456 - 2000 Plain and Reinforced concrete book of Practice.
7. SP 16 - Design Aids for Reinforced Concrete to IS 456
8. SP 34 - Hand Book as Concrete Reinforcement and retaining

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	THEORY OF PLATES AND SHELLS	L	T	P	C
		3		0	

Course Outcomes:

CO1	Have knowledge about various plate theories due to bending. Gain the knowledge of Navier's solution, Levy's solution and solve for the rectangular and square plates
CO2	Analyze circular plates with various boundary conditions
CO3	Gain the knowledge on singly ruled and doubly ruled and focus on membrane and bending theory
CO4	Ability to solve governing equation's pertaining to cylindrical shells and design principles
CO5	Understand the behaviour of the behaviour & geometry and membrane analysis of special shaped shells

SYLLABUS:

Unit: 1
Derivation of governing differential equation for plate– in plane bending and transverse bending effects-rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier's and Levy's type of solutions for various boundary condition.

Unit: 2
Circular plates: Symmetrically loaded, circular plates under various loading conditions, annular plates

Unit: 3
Introduction to Shells – Single and double curvature –Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of Membrane theory and bending theory

Unit: 4
Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

Unit: 5
Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms – Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

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TEXT BOOKS:

1. Theory of Plates and Shells 2e – S.Timoshenko and S.Woinowsky Krieger, McGraw Hill book company, INC, New York.
2. Reinforced Concrete Shells and Folded Plates by P.C.Varghese, Prentice Hall India Publications
3. Analysis of Thin Concrete Shells by K. Chandrasekhar, New Age International (P) Ltd.

REFERANCE:

1. Theory and Analysis of Elastic Plates and Shells by J.N. Reddy, CRS Press
2. A Text Book of Shell Analysis –Bairagi, K,Khanna Publisher, New Delhi.
3. Design and Construction of Concrete Shell Roofs–Ramaswamy, G.S,Mc Graw Hill, New York

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ENVIRONMENTAL AND WATER RESOURCES ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	COMPUTATIONAL HYDRAULICS	L	T	P	C
		3		0	

Course Outcomes:

CO1	Solve uniform and non-uniform open channel flow problems.
CO2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
CO3	Select suitable pumps and turbines.

SYLLABUS:

UNIT: 1

UNIFORM FLOW IN OPEN CHANNELS: Types of channels – Types of flows –Velocity distribution –Energy and momentum correction factors – Chezy's and Manning's formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth

UNIT: 2

NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow – Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT: 3

HYDRAULIC SIMILITUDE: Dimensional analysis - Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT: 4

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency- angular momentum principle

CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head- minimum starting speed-losses and efficiencies-specific speed, multistage pumps- pumps in parallel and series - performance of pumps-characteristic curves- NPSH- efficiencies-classification of turbines. Pelton wheel - Franci'sturbine – Kaplan turbine -Cavitation.

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UNIT: 5

HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and working, working proportions, velocity diagrams, work done and efficiency, hydraulic design, draft tube–theory and efficiency. Governing of turbines-surgetanks- unit and specific quantities, selection of turbines, performance characteristics-geometric similarity- cavitation.

TEXT BOOKS:

1. Open Channel flow, K.Subramanya, Tata Mc Graw Hill Publishers
2. Flow through Open channels by K.G.RangaRaja, Tata Mc Graw Hill Publishers
3. Hydraulics and Fluid Mechanics including Hydraulic machinery By P.N. Modi, S.MSeth, Standard book house.

REFERENCES:

1. Open channel hydraulics by Ven Te Chow. Mc Graw Hill Companies
2. Fluid Mechanics and hydraulic machine, Rajput, S Chand Publications.
3. Fluid Mechanics by V.L.Streeter, Mc Graw Hill
4. Companies Fluid Mechanics by K.L. Kumar, S. Chand publications.

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Honor Course	**URBAN HYDROLOGY**	**L**	**T**	**P**	**C**
		3		**0**	

Course Outcomes:

CO1	Develop intensity duration frequency curves for urban drainage systems
CO2	Develop design storms to size the various components of drainage systems.
CO3	Apply best management practices to manage urban flooding.
CO4	Prepare master drainage plan for an urbanized area.

SYLLABUS:

UNIT: 1

Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – trends in urbanization – Effect of urbanization on hydrology

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration-Frequency (IDF) curves, design storms for urban drainage systems.

UNIT: 2

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.

UNIT: 3

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping and source control.

UNIT: 4

Analysis and Management: Storm water drainage structures, design of storm water network-Best Management Practices – detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT: 5

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, and use of models in planning

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TEXT BOOKS:

1. Geiger W.F, JMarsalek, W.J.RawlsandF. C.Zuidema,(1987 – 2 volumes), UNESCO,
2. Urban Hydrology Wanielista M P and Eaglin (1997), Wiley and Sons.
3. Akan A.O and R.L. Houghtalen (2006), Wiley International, Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling,

REFERENCES:

1. Storm water Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.
2. Urban water cycle processes and interactions, Marsaleket.al.(2006), Publication No. 78, UNESCO, Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C andJ A Tejada-Guibert (2001), IWA Publishing.
4. Manual on Drainage in Urbanized area Hall MJ(1984), Elsevier Applied Science Publisher.
5. Hydrology – Quantity and Quality Analysis

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	GROUND WATER MODELING AND MANAGEMENT	L	T	P	C
		3		0	

Course Outcomes:

CO1	Basic concepts of Role of ground water in hydrological cycle and aquifer properties
CO2	Understanding the governing equations of Ground water flows
CO3	Knowledge about the imparts exposure towards well design and practical problems of ground water aquifers
CO4	Analyze the Ground water conservation and Ground water quality
CO5	Explain about Ground water flow modelling

SYLLABUS:

Unit: 1

Introduction: Role of groundwater in hydrological cycle, groundwater bearing formations, classification of aquifers, flow and storage characteristics of aquifers, Darcy's law, anisotropy and heterogeneity.

Unit: 2

Governing Equations for Groundwater Flow : Dupuit - Forchheimer assumptions, general differential equations governing groundwater flows, analytical solutions.

Unit: 3

Wells and Well Hydraulics: Types of wells, construction of wells, steady and unsteady state solutions for confined, unconfined and leaky aquifers, effect of boundaries, image well theory, interference of wells, well losses, pumping and recovery test analysis.

Unit: 4

Groundwater Conservation: Regional groundwater budget; resource assessment; estimation of recharge, Indian practice for artificial recharge,
Groundwater Quality: Contamination of groundwater, sources, remedial and preventive measures, seawater intrusion in coastal aquifers.

Unit: 5

Groundwater Flow Modeling: Role of groundwater flow models, Hele-Shaw and analog models, introduction to numerical modeling – boundary conditions, Planning of Groundwater Development: constraints, optimal groundwater development.

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TEXT BOOKS:

1. Groundwater Hydrology by Todd and Mays
2. Groundwater Hydrology by H M Raghunath

REFERENCES:

1. Introduction to Groundwater by Schwartz and Hubao Zhang
2. Hand book of Groundwater by Jcques Delluer
3. Groundwater Assessment, Development and Management by K R Karant

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	**AIR POLLUTION AND CONTROL**	**L**	**T**	**P**	**C**
		3		**0**	

Course Outcomes:

CO1	To evaluate the fundamentals of air pollution control
CO2	To design the operation of various air pollution control devices

SYLLABUS:

Unit: 1

Introduction: Definition-Sources and classification of Air Pollutants –Photochemical smog-Effects of air pollution on health of Human & Animals, vegetation & materials, air quality standards, Global effects of air pollution.

Unit: 2

Meteorology and Dispersion of air pollutants: Temperature lapse rates and Stability, Wind velocity and turbulence, Wind Rose, plume behavior, Measurement of meteorological variables. Dispersion of Air pollutants: Gaussian Dispersion model - Equations for the estimation of pollutant concentrations of emissions - Plume Rise–Effective stack height and mixing depths.

Unit: 3

Sampling, Analysis and Particulate Pollution Control Methods: Ambient air quality monitoring - High volume sampler- stack monitoring train and stack monitoring - Principles and design aspects of different types of particulate pollution control equipment– Settling chambers, Cyclone separators, Scrubbers, Filters and Electrostatic precipitators.

Unit: 4

Gaseous pollution control methods and automobile pollution: Gaseous pollutants' sampling and analysis- Types of gaseous pollution control methods – absorption, adsorption and combustion processes. Automobile pollution, sources of pollution, composition of auto exhausts, Control methods.

Unit: 5

Noise Pollution: Definitions – Significance - sources, measurement - effects and control measures, legislations

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TEXTBOOKS:

1. Air Pollution by M.N.Rao, Tata Mc Graw Hill Publication.
2. "Air pollution and control by KVSG Murali Krishna, Laxmi Publications, NewDelhi, 2016.
3. Air Pollution by H.C.Perkins.

REFERENCES:

1. Environmental Engineering by Peavy and Rowe, Mc Graw Hill Publication.
2. Air Pollution Control Engineering by N.D.Nevers,Mc Graw Hill Publication.
3. Air Pollution control engineering by Noelde Nevers, Mc Graw Hill Publication and New York.
4. Fundamentals of Air Pollution by Richard W.Boubeletal, Academic Press, NewYork.
5. Air Pollution: Physical and Chemical Fundamentals by John H.Seinfeld, McGraw Hill book Co. 1988.

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Honor Course	INDUSTRIAL WASTE WATER MANAGEMENT	L	T	P	C
		3		0	

Course Outcomes:

CO1	Know the quality and quantity of water for various industries and Advanced water treatment methods
CO2	Learn the common methods of treatment of wastewaters and Biological treatment methods
CO3	Study of methods to reduce impacts of disposal of wasters into environment and CETPs.
CO4	Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
CO5	Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods

SYLLABUS:

Unit: 1

Industrial water Quantity and Quality requirements: Boiler, Cooling, Domestic/Canteen and Process waters for Textiles, Food processing, Dairy, Aqua industry, Sugar mills, Brewery and distillery Industries, Fertilizer industry, Power plants. Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Color and Odor. Use of Municipal waste water in Industries.

Unit: 2

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization- Toxicity of industrial effluents- Common methods of Treatment of wastewaters - Unit operations and processes- Volume and Strength reduction –Neutralization – Equalization and proportioning-recycling, reuse and resources recovery. Miscellaneous Treatment: Biological treatment of sewage- Primary, secondary and Tertiary treatment of sewage.

Unit: 3

Industrial wastewater disposal management: Discharges into Sewers, Streams- Oxygen sag curve, Lakes-eutrophication and oceans and associated problems, Land treatment – sewage sickness, Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastewaters- Effluent Disposal Method.

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Unit: 4

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants. Case studies.

Unit: 5

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Aqua industry, Pharmaceutical Plants. Case studies.

TEXT BOOKS:

1. Industrial Wastewater Treatment by KVSG Murali Krishna, Paramount Publishers, Visakhapatnam,2019
2. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH,NewDelhi.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHILearning,Delhi

REFERENCES:

1. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R solekar, Mc-Graw Hill, New Delhi;3rdEdition
2. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc-Graw Hill, Third Edition
3. Wastewater Engineering by Metcalf and EddyInc, Tata McGraw-Hill., NewDelhi
4. Wastewater Treatment- Concepts and Design Approach by G.L. Karia &R.A. Christian, Prentice Hall of India.
5. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

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Honor Course	**WATER AND AIR QUALITY MODELLING**	**L**	**T**	**P**	**C**
		3		**0**	

Course Outcomes:

CO1	At the end of the course, the student will be able to:
CO2	Explain the characteristics and importance of a model building
CO3	Discuss the basics of modeling stratified lakes and reservoirs
CO4	Explain the modelling concepts of seawater intrusion
CO5	Assess the concentration of pollutant at different receptor locations using plume dispersion modelling

SYLLABUS:

Unit: 1

MODELING CONCEPTS: Casual and statistical models-Characteristics- Steps in model development - Importance of model building.- conservation of mass and mass balance – calibration and verification of models; Transport phenomena – Advection, diffusion, dispersion, simple transport models; chemical reaction kinetics – Law of mass action, Rate constants, reaction order, types of reactions, equilibrium principles.

Unit: 2

SURFACE WATER QUALITY MODELING: Water quality models – Historical development – Mass balance equation – Streeter - Phelps Equation – Modification to Streeter – Phelps Equation – Waste load allocations – Dissolved oxygen in Rivers and estuaries; Lake Water Quality Models; Models for Nitrogen, Bacteria, Phosphate and toxicants.

Unit: 3

GROUNDWATER QUALITY MODELING: Mass transport of solutes, degradation of organic compounds, application of concepts to predict groundwater contaminant movement, seawater intrusion – basic concepts and modelling.

Unit: 4

AIR QUALITY MODELS: Types of modeling technique, modeling for non-reactive pollutants, single source, short term impact, multiple sources and area sources, Fixed box models- diffusion models – Gaussian plume derivation- modifications of Gaussian plume equation- long term average-multiple cell model- receptor oriented and source-oriented air pollution models, model performance, accuracy and utilization.

Unit: 5

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WATER QUALITY INDEX: Categories of water quality index. Determination of water quality index (WQI): Industrial and municipal effluent index, ambient water quality index, combined water quality index and Delphi method.

AIR QUALITY INDEX: Categories of air quality index. Determination of air quality index (AQI): National AQI, Extreme value indices, Regional indices.

TEXT BOOKS:

1. Steven C. Chapra, "Surface Water Quality Modeling", Tata McGraw-Hill Companies, Inc., New Delhi, 1997.
2. R.W.Boubel, D.L. Fox, D.B. Turner & A.C. Stern, "Fundamentals of Air Pollution", Academic Press, New York, 1994.

REFERENCES:

1. Reckhow & Chapra, "Engineering Approaches for Lake Management", Volumes 1 & 2, Butterworths Publ., 1983.
2. E.V. Thomson, "Principles of Surface Water Quality Modeling and Control", Happer and Row Publishers New York, 1987.
3. J.L. Schnoor, "Environmental Modeling Fate and Transport of Pollutants in Water, Air and Soil", John Wiley & Sons Inc., New York, 1996.

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Honor Course	CLIMATE CHANGE IMPACT ON ENVIRONMENT	L	T	P	C
		3		0	

SYLLABUS:

Unit: 1

Climate System; Climate, weather and Climate Change; Overview of Earth's Atmosphere; Vertical Structure of Atmosphere; Radiation and Temperature; Laws of Radiation; Heat-Balance of Earth Atmosphere System; Random Temperature Variation; Modelling Vertical Variation in Air Temperature; Temporal Variation of Air temperature; Temperature Change in Soil; Thermal Time and Temperature Extremes.

Unit: 2

Hydrologic Cycle: Introduction; Global water balance; Cycling of water on land, a simple water balance model;

Unit: 3

Climate Variables affecting Precipitation: Precipitation and Weather, Humidity, Vapor Pressure, Forms of Precipitation, Types of Precipitation; Cloud; Atmospheric Stability; Monsoon; Wind Pattern in India; Global Wind Circulation; Evaporation and Transpiration, Processes of Vadose Zone, Surface Runoff, Streamflow.

Unit: 4

Climate Variability: Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

Unit: 5

Climate Change: Introduction; Causes of Climate Change; Modeling of Climate Change, Global Climate Models, General Circulation Models, Downscaling; IPCC Scenarios

TEXT BOOKS:

1. Climate and Global Environmental Change by L.D. Danny Harvey, Prentice Hall publication
2. Climate Change- An Indian Perspective by S.K.Das , Foundation books
3. Global Warming- A very short introduction by Mark Maslin, Oxford publication

REFERENCES:

1. Heal, G. M., Interpreting Sustainability, in Sustainability: Dynamics and Uncertainty, Kluwer Academic Publ., 1998
2. Jepma, C.J., and Munasinghe, M., Climate Change Policy – Facts, Issues and Analysis, Cambridge University Press, 1998
3. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007

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DEPARTMENT OF CIVIL ENGINEERING

Honor Course	ENVIRONMENTAL SYSTEM ENGINEERING	L	T	P	C
		3		0	

SYLLABUS:

UNIT I

Systems Engineering – Analysis - Design – synthesis - applications to environmental engineering Systems.

UNIT II

Role of optimization models - Deterministic models/Linear programming, Dynamic programming, Separable and Nonlinear programming models.

UNIT III

Formulation of objective functions and constraints for environmental engineering planning and design. Simulation models

UNIT IV

Probabilistic models - Classical sets and fuzzy sets, Logic and reasoning, Fuzzy set operations and fuzzy relations, Membership Functions, fuzzy numbers and fuzzy arithmetic - Modern tools - Expert systems - Artificial Neural Networks (ANN): types of ANN and learning algorithms, tasks performed by ANN - Genetic Algorithm - concepts of genetic algorithm, components of genetic algorithm

UNIT V

Environmental Applications & Case studies: Optimization of water distribution network, sewerage systems, solid waste collection systems and routes. Expert systems in water and wastewater treatment

TEXT BOOKS:

1. Rich L.G., Environmental Systems Engineering, McGraw Hill, 1973.
2. Thomas R.V., Systems Analysis & water Quality control, McGraw Hill, 1978.

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MINORS COURSE

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	**SURVEYING**	**L**	**T**	**P**	**C**
		3		**0**	

SURVEYING & GEOMATICS

Course Objectives

After studying this course, the student will be able to:

1. Understand the fundamental principles and methods of surveying, levelling, contouring, and the use of surveying instruments for measurement of distance, direction, and elevation.
2. Learn the principles and procedures for conducting theodolite surveys, triangulation, trigonometric levelling, and setting out of horizontal and vertical curves.
3. Gain knowledge of modern surveying techniques including Electronic Distance Measurement (EDM), Total Station, Global Positioning System (GPS), and Geographic Information Systems (GIS).
4. Understand the principles of photogrammetric surveying, aerial photography, stereoscopy, and digital photogrammetry.
5. Study the concepts of remote sensing, satellite imagery, digital image processing, and their applications in civil engineering projects.

Course Outcomes (COs)

1. Apply the principles of surveying, levelling, contouring, and plane table surveying for measurement and mapping purposes.
2. Analyze and perform theodolite surveying, triangulation, trigonometric levelling, and curve setting for civil engineering applications.
3. Utilize modern survey instruments and technologies such as EDM, Total Station, GPS, and GIS in engineering surveys and spatial data analysis.
4. Explain the principles of photogrammetry, aerial photography, stereoscopic viewing, and digital photogrammetric techniques.
5. Interpret remote sensing data and apply digital image processing and GIS techniques for solving civil engineering and environmental problems.

SYLLABUS:

Unit: 1

Introduction to Surveying: Definition, Classification, Principles, Survey stations and Survey lines; Introduction to measurement of distance, direction and elevation; Ranging and it methods, Meridians and Bearings, Methods of levelling, Booking and reducing levels, Reciprocal levelling, distance of visible horizon, Profile levelling and cross sectioning, Errors in levelling; Introduction to methods of plane table surveying; Contouring: Characteristics, methods, uses, computation of areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Methods of horizontal and vertical control, Triangulation: Figures or systems, Signals, Satellite station, Baseline and its importance, corrections, Trigonometric levelling: Accessible and inaccessible objects.

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Unit: 2
Curves: Elements of simple circular curves, Theory and methods of setting out simple circular curves, Transition curves- types, characteristics and equations of various transition curves; Introduction to vertical curves.

Unit: 3
Modern Field Survey Systems: Principle and types of Electronic Distance Measurement systems and instruments, Total Station- its advantages and applications; Global Positioning Systems Segments, working principle, errors and biases. Geographic Information System: Concepts and data types, data models, data acquisition. GIS applications in civil engineering.

Unit: 4
Photogrammetric Survey: basic principles, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, stereoscope and stereoscopic views, parallax equations. Introduction to digital photogrammetry.

Unit: 5
Remote Sensing: Concepts and physical basis of Remote Sensing, Electromagnetic spectrum, atmospheric effects, image characteristics. Remote sensing systems, spectral signatures and characteristics spectral reflectance curves. Salient features of some of Remote Sensing satellites missions. Digital image processing: Introduction, image rectification and restoration, image enhancement, image transformation, image classification. Applications of remote sensing to civil engineering.

TEXT BOOKS:

1. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
2. Punmia BC et al: Surveying Vol. I, II, Laxmi Publication
3. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

REFERENCES:

1. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
2. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
3. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
4. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House.
5. Chandra AM and Ghosh SK: Remote Sensing and Geographical Information System, Alpha Science 9. Ghosh SK: Digital Image Processing, Alpha Science
6. Lillesand T M et al: Remote Sensing & Image Interpretation, John Wiley & Sons
7. Bhatta B: Remote Sensing and GIS, Oxford University Press, 2008

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	**MECHANICS OF SOLIDS**	**L**	**T**	**P**	**C**
		3		**0**	

SOLID MECHANICS

Course Objectives

After studying this course, the student will be able to:

1. Understand the fundamental concepts of stress, strain, elastic properties, compound stresses, strain energy, and theories of failure in engineering materials.
2. Analyze shear force and bending moment in beams subjected to different loading and support conditions.
3. Understand bending, torsion, and shear stress behavior in structural members and design simple beam and shaft sections.
4. Determine slopes and deflections of beams using standard analytical methods and study the stability behavior of columns and struts.
5. Analyze the behavior of springs and pressure vessels subjected to internal and external loads and evaluate stresses in thin and thick cylinders and spheres.

Course Outcomes (COs)

1. Apply the concepts of stress, strain, elastic constants, compound stresses, strain energy, and failure theories to engineering problems.
2. Construct and analyze shear force and bending moment diagrams for beams under various loading and support conditions.
3. Evaluate bending stresses, shear stresses, and torsional stresses in beams and shafts and design simple structural members.
4. Determine slopes and deflections in beams and analyze the buckling and stability behavior of columns and struts.
5. Analyze the performance of springs, thin and thick cylinders, and pressure vessels under different loading conditions.

SYLLABUS:

Unit: 1

Simple stress and strains: Concept of stress and strain, types of stresses and strains, Hook's law, stress and strain diagram for ductile and brittle metal. Lateral strain, Poisson ratio, volumetric strain, elastic moduli and relation between them. Bar of varying cross section, composite bar and temperature stress. Strain energy for gradual, sudden and impact loading. Compound stress and strains: Normal stress and strain, shear stress and strain, stresses on inclines sections, principal stress and strain, maximum shear stress, Mohr's stress circle,

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three-dimensional state of stress & strain, equilibrium equations, generalized Hook's law-3D, Theories of failure and factor of safety.

Unit: 2

Shear force and bending moment diagrams Shear force (SF) and Bending moment (BM) diagrams for simply supported, cantilevers, overhanging and fixed beams. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads.

Unit: 3

Flexural Stresses-Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections. Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Shear Stresses- Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

Unit: 4

Deflection of Beams: Slope and deflection- Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams. Short Columns and Struts: Buckling and stability, slenderness ratio, combined bending and direct stress, middle third and middle quarter rules.

Unit: 5

Helical and Leaf Springs Deflection of springs by energy method, helical springs under axial load and under axial twist (respectively for circular and square cross sections) axial load and twisting moment acting simultaneously both for open and closed coiled springs. Thin cylinders, Thick cylinders & Spheres: Introduction, difference between thin walled and thick-walled pressure vessels, thin-walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain. Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders.

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TEXT BOOKS:

1. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.
2. Engineering mechanics of solids by Popov, Egor P New Delhi : PHI Learning
3. Mechanics of Materials by Hibbeler, Pearson. Strength of Materials by R. K. Bansal, Lakshmi Publications, 1^{6th} Edition, 2022.

REFERENCES:

1. Mechanics of material by Gere, Cengage Learning
2. Strength of Materials by Ryder, Macmillan.
3. Strength of Materials by Timoshenko and Youngs, East West Press.
4. Introduction to Solid Mechanics by Shames, Pearson
5. Kazmi, S. M. A., "Solid Mechanics" TMH, Delhi, India Date: 5th & 6th March 2022

K Rajan

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	**SOIL MECHANICS**	**L**	**T**	**P**	**C**
		3		**0**	

GEOTECHNICAL ENGINEERING – I

Course Objectives

After studying this course, the student will be able to:

1. Understand the origin, formation, classification, and index properties of soils along with their engineering behavior.
2. Learn the principles of permeability, seepage, and effective stress in soils and analyze groundwater flow through soil masses.
3. Analyze stress distribution in soils caused by external loads using different theoretical approaches and practical methods.
4. Understand the concepts of soil compaction and consolidation, including factors affecting them and methods for determining consolidation characteristics.
5. Study the shear strength behavior of soils and apply various theories and laboratory methods for determining soil strength under different drainage conditions.

Course Outcomes (COs)

1. Explain soil formation, soil structure, index properties, and classify soils using standard soil classification systems.
2. Analyze permeability, seepage characteristics, effective stresses, and flow behavior of water through soils using Darcy's law and flow net concepts.
3. Determine stress distribution in soil masses due to applied loads using Boussinesq's, Westergaard's, Newmark's, and approximate stress distribution methods.
4. Evaluate the compaction and consolidation characteristics of soils, including settlement behavior and rate of consolidation.
5. Analyze the shear strength behavior of soils using Mohr-Coulomb theory and determine soil strength parameters under different drainage conditions.

SYLLABUS:

Unit: 1

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass-volume relationship –Relative density

Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

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Unit: 2

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability – Permeability of layered systems.

Geostatic Stresses: Total, neutral and effective stresses –quick sand condition Seepage: 2-D flow and Laplace's equation-Seepage through soils–Flow nets: Characteristics and Uses.

Unit: 3

Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

Unit: 4

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control. Consolidation: Compressibility of soils –e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

Unit: 5

Shear Strength of Soils: Basic mechanism of shear strength -Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

TEXT BOOKS:

1. Gopal Ranjan and A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age International Publishers.
2. V.N.S.Murthy, "Soil Mechanics and Foundation Engineering", CBS publishers
3. Soil mechanics & foundation engineering by Arora

REFERENCES:

1. D.W.Taylor, "Fundamentals of Soil Mechanics", Wiley.
2. Holtz and Kovacs, "An introduction to Geotechnical Engineering" Prentice Hall
3. Donald P. Coduto, Man-chu Ronald Young and William A. Kitch.

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Minor Course - II/IV	**FLUID MECHANICS**	**L**	**T**	**P**	**C**
		3		**0**	

Course Objectives

After studying this course, the student will be able to:

1. Understand the fundamental properties of fluids and principles of fluid statics including pressure measurement and hydrostatic forces on submerged surfaces.
2. Learn the concepts of fluid kinematics and fluid dynamics such as types of fluid flow, continuity equation, Bernoulli's equation, momentum equation, and flow net analysis.
3. Analyze laminar and turbulent flows through pipes and closed conduits, including friction losses, pipe flow equations, and pipe network analysis.
4. Understand the principles and applications of flow measurement devices such as Venturimeters, Orifice meters, Pitot tubes, notches, and weirs.
5. Gain knowledge of boundary layer theory, drag and lift forces, flow separation, and flow around submerged bodies in fluid mechanics applications.

Course Outcomes (COs)

1. Explain the physical properties of fluids, pressure measurement techniques, and hydrostatic forces acting on submerged surfaces.
2. Apply the principles of fluid kinematics and dynamics to analyze various fluid flow problems using continuity, Bernoulli's, and momentum equations.
3. Evaluate laminar and turbulent pipe flows, friction losses, and flow behavior in closed conduit systems using standard hydraulic equations and methods.
4. Analyze and calculate discharge through various flow measuring devices such as Venturimeters, Orifice meters, notches, and weirs.
5. Understand boundary layer development, drag and lift phenomena, flow separation, and their engineering applications in fluid flow problems.

SYLLABUS:

Unit: 1

Introduction: Dimensions and units – Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures-measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers. Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

Unit: 2

Fluid Kinematics: Description of fluid flow, Streamline, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and ir rotational flows – Equation of continuity for one, two, three dimensional

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flows – stream and velocity potential functions, flow net analysis. Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a streamline - Momentum equation and its application – forces on pipe bend.

Unit: 3

Laminar Flow and Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen - Poiseuille Formula, Flow between parallel plates, Flow through long tubes, hydro-dynamically smooth and rough flows. Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-William's formula, Hard-Cross Method,

Unit: 4

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and stepped notches, Broad crested weirs and Ogee weirs.

Unit: 5

Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

TEXTBOOKS:

1. Modi P.N and Seth S.M. (2018), "Fluid mechanics", Standard book house, New Delhi
2. A text of Fluid mechanics and hydraulic machines, R.K. Bansal – Laxmi Publications (P) ltd., New Delhi
3. K. Subramanian, Fluid mechanics and hydraulic machines Mc Graw hill

REFERENCES:

1. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education. Principle of fluid mechanics and fluid machines III edition, university press

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	**BUILDING MATERIALS AND CONSTRUCTION**	**L**	**T**	**P**	**C**
		3		**0**	

Course Objectives

After studying this course, the student will be able to:

1. Understand the properties, classification, manufacturing processes, and uses of various building materials such as stones, bricks, tiles, lime, cement, timber, aggregates, glass, gypsum, aluminum, and bituminous materials.
2. Gain knowledge of different types of masonry, bonds, walls, timber structures, and alternative construction materials used in building works.
3. Learn the composition, manufacture, properties, testing procedures, and applications of lime, cement, concrete, and other construction materials.
4. Understand the construction and functions of various building components such as lintels, arches, staircases, floors, roofs, formwork, and scaffolding.
5. Develop knowledge of finishing works including plastering, painting, damp proofing, waterproofing, and surface treatments used in buildings.
6. Understand the classification, properties, testing, and practical significance of aggregates used in concrete and construction works.

Course Outcomes (COs)

At the end of the course, the student will be able to:

1. Explain the properties, classification, manufacturing methods, and applications of stones, bricks, tiles, and other basic building materials.
2. Describe different types of masonry, bonds, timber structures, seasoning methods, defects in timber, and alternative materials used in construction.
3. Analyze the composition, manufacture, properties, and testing methods of lime, cement, concrete, and related construction materials.
4. Identify and explain various building components including lintels, arches, staircases, floors, roofs, formwork, and scaffolding systems.
5. Apply knowledge of finishing techniques, damp proofing, waterproofing, painting methods, and aggregate properties in building construction practices.

SYLLABUS:

Unit: 1

Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminum, Gypsum, Glass and Bituminous materials

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Unit: 2

Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminum.

Unit: 3

Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete. Building Components: Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre-fabricated roofs.

Unit: 4

Finishings and Aggregates: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings. Aggregates - Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

TEXT BOOKS:

1. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
2. Building Construction, B.C. Punmia, Laxmi Publications (p)ltd.
3. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
4. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.

REFERENCES:

1. Building Materials, P. C. Verghese, PHI learning (P)ltd.
2. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
3. Building construction, P. C. Verghese, PHI Learning (P)Ltd.
4. Building Materials, Construction and Planning, S. Mahaboob Basha, Anuradha Publications, Chennai.

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Minor Course - II/IV	**BUILDING PLANNING AND DRAWING**	**L**	**T**	**P**	**C**
		3		**0**	

Course Objectives:

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various signs and bonds.
4. Giving training exercises on different building units.
5. Imparting the skills and methods of planning of various buildings.

Course Outcomes:

1. Upon successful completion of this course the students will be able to:
2. Plan various buildings as per the building by-laws.
3. Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
4. Draw signs and bonds.
5. Draw different building units
6. Learn the skills of drawing building elements and plan the buildings as per requirements.

SYLLABUS:

Unit: 1

Concepts to be studied Introduction to CAD software: Basic commands of CAD to draw, modify 2D drawings

Unit: 2

Building Byelaws: Introduction – Terminology – Objectives of building byelaws – Principles under laying building bye laws – Types of Buildings.

Unit: 3

Regulations: Introduction – Development Control Rules of buildings – General Building Requirements as per NBC – Open space, Lighting and ventilation requirements – Floor area ratio & Floor space index.

Unit: 4

Conventions, signs and symbols: Conventions as per IS 962-1989, signs and symbols for earthwork, brickwork, stonework, concrete, woodwork and glass used in civil engineering. Construction, Graphical symbols for door and window, Abbreviations, symbols for sanitary and electrical installations.

Unit: 5

Types of lines and scales: Types of lines- visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and

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numerals for Titles, sub titles, notes and dimensions. Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing. Sizes of various standard papers/sheets.

NOTE: Drawing classes must be conducted every week and the students should prepare the following plates.

Plate 1 – Basic CAD Commands
Plate 2 – Simple Residential Building Plan
Plate 3 – Building Bye-laws & Setbacks
Plate 4 – FAR / FSI Calculation
Plate 5 – Conventional Symbols
Plate 6 – Door, Window & Installation Symbols
Plate 7 – Types of Lines & Lettering
Plate 8 – Scales and Sheet Layout

TEXT BOOKS:

1. Planning and Design of buildings by Y.S. Sane
2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
3. Building planning and drawing by M. Chakravarthi.
4. A and B Series of JNTU Engg, Ananthapur.

REFERENCES:

1. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai.

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	**ESTIMATION AND COSTING**	**L**	**T**	**P**	**C**
		3		**0**	

Course Learning Objectives:
The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

Course Outcomes:
Upon the successful completion of this course:

a. The student should be able to determine the quantities of different components of buildings.
b. The student should be in a position of find the cost of various building components
c. The student should be capable of finalizing the value of structures.

SYLLABUS:

Unit: 1
Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings- concepts of e-procurement and reverse auctions. Standard specifications for different items of building construction.

Unit: 2
General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

Unit: 3
Rate Analysis – Working out data for various items of work over head and contingent charges. Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

Unit: 4
Detailed Estimation of Buildings using individual wall method for single, double and four roomed buildings.

Unit: 5
Detailed Estimation of Buildings using centre line method for single, double and four roomed buildings. Standard software's like building estimator etc.

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TEXT BOOKS:

1. 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimates by B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Eng Works – B.I.S.)
3. 'Estimation, Costing and Specifications' by M. Chakraborthi; Laxmi publications. National Building Code
4. New 'Estimating and Costing' by G.S. Birdie.

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	SUSTAINABLE MATERIALS AND GREEN BUILDINGS	L	T	P	C
		3		0	

Course Outcomes:

a. To imbibe basics of green design and sustainable development concept.
b. To understand different features & and approaches in GREEN Buildings
c. To Study about the renewable energy sources & efficiencies in Green buildings
d. To know about the guidelines for the different design philosophies in green buildings
e. To understand the about energy conversations involved in Green buildings

SYLLABUS:

Unit: 1

Green Buildings: History of Green Building Movement; Environmental Impact and Resource Consumption; Introduction to concept of green buildings; Benefits of Green Building and its Productivity.

Unit: 2

Indoor Built Environment: Problem of Existing Buildings and Built Environment; Energy use in buildings; Greenhouse Gas Emissions and Indoor Air pollution; Building Water Use; Land use and consumption; Construction Materials; Construction, Operation and Demolition Waste.

Unit: 3

Green Building Design: Passive Design Strategies: Optimum Design, Performing Insulation Solution, Ventilation; Active Strategies: Equipment, Renewable Energy; Retrofitting; Net Zero Building Design; Embodied Energy Estimation; Life Cycle Assessment Analysis.

Unit: 4

Green Building Assessment: Green Building Organizations, Green Building Rating Tools, Green building certification procedure Learning

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TEXT BOOKS:

1. Green Building Technology Guide: Volume 1 - Residential, Fred Andreas, Academic Press Inc., 2020, First Edition.
2. The Idea Of Green Building, A. K. Jain, Khanna Publishers, 2014, First Edition.
3. Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination, Karthik Karuppu, Notion Press, 2019, First Edition.

REFERENCES:

1. Sustainable Construction: Green Building Design and Delivery, Charles Kibert, John Wiley & Sons, 2005.
2. Energetics Perspective on the Environmental and Human Impact of Buildings, Teodora Melania Soimosan and Ligia Mihaela Moga, Business Science Reference, 2020.
3. Alternative Energy Systems in Building Design, Peter Gevorkian, McGraw-Hill Education, 2009, First Edition.

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DEPARTMENT OF CIVIL ENGINEERING

Minor Course - II/IV	CONSTRUCTON PLANNING AND MANAGEMENT	L	T	P	C
		3		0	

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. To introduce the importance of safety in construction projects

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Appreciate the importance of construction planning.
b. Understand the functioning of various earth moving equipment.
c. Know the methods of production of aggregate products and concreting.
d. Apply the gained knowledge to project management and construction techniques.
e. Know the different construction methods like earthwork, piling etc.

SYLLABUS:

Uint: 1

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method

Unit: 2

Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

Unit: 3

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets

Unit: 4

Concreting equipment — concrete mixers – Batching plants, mobile using plants like "Ajax" etc. mixing and placing of concrete – consolidating and finishing.

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Unit: 5

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling)

TEXT BOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Sarasvati, Oxford University press

REFERENCES:

1. 'Construction Project Management - An Integrated Approach' by Peter Fewings , Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage learning

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Date: 28.04.2026

Sir/Madam,

Sub: EEE-BoS meeting to finalize the detailed course content of I & II semesters of IV year of SRK23- Invitation-Reg.

It is proposed to convene the EEE - Board of Studies meeting at 2:00PM on 29/04/2026 (Wednesday) in Electrical and Electronics Engineering Department to discuss the following agenda.

Agenda:-

1. To finalize the detailed course content of I & II semesters of IV year of SRK23 and open electives offered to other departments in IV year I semester of SRK23.
2. Any other matter with the permission of chair.

The BoS meeting is proposed to be in digital mode and the link for the meeting will be shared a day before. You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely

P. Bhavana
28/04/2026

(Dr. P. Bhavana)
CHAIRMAN
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For circulating among all BoS members

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Department of Electrical and Electronics Engineering

MINUTES of BoS MEETING

BoS/EEE/04 | **Date: 29.04.2026**
Department: EEE | **Academic Year: 2025-26**
Venue: IQAC Room | **Time: 2:00PM**

Members Present

S.No.	Name	Designation	Category
1	Dr. P. Bhavana	Asst. Professor & HoD	Chairman
Two Subject Experts Outside Parent University			
2	Dr. B. Loveswara Rao	Professor, (KL Deemed to be University, Vaddeswaram.)	Member
3	Dr. K. Chandra Sekhar	Professor & HoD EEE RVR & JC College of Engineering	Member
One Subject Expert Nominated by Vice Chancellor			
4	Dr. S. Siva Nagaraju	Professor, University College of Engineering, JNTUK.	Member
One Representative from Industry			
5	Mr. V. Samson Deva Kumar	Project Manager, SCR WWO, Vijayawada	Member
Alumnus Nominated by Principal			
6	Mr. P. Varun Kumar	Project Engineer, Wipro Ltd., Bengaluru	Member
Faculty of the Department			
7	All Faculty	SRK Institute of Technology, EEE Dept.	Members

Dr. P. Bhavana, chaired the meeting online at https://us02web.zoom.us/j/83235019581?pwd=WgKdCRVwy6DEYi0bbe0nrOhzW68DHx.1 and welcomed all members to BoS meeting. She gave an overview of the department and the academic activities undertaken. After a short introduction, the listed topics were discussed and the following resolutions were passed.

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S.No.	Name	Designation	Category	Signature
1	Mr. K. Narendra Babu	Asst. Professor	Member	
2	Mr. G. Sri Harsha	Asst. Professor	Member	
3	Ms. V. Siva Kumari	Asst. Professor	Member	
4	Ms. M. Supriya	Asst. Professor	Member	
5	Ms. S. Sandhya	Asst. Professor	Members	
6	Ms. V. Susmitha	Asst. Professor	Members	
7	Mr. K. Vidhya Sagar	Asst. Professor	Members	

AGENDA:

BoS/EEE/04/01	To finalize the detailed course content of I & II semesters of IV year of SRK23
BoS/EEE/04/02	To finalize the open elective courses in IV year I semester offered by EEE department for other branches (except EEE branch)
BoS/EEE/04/03	Any other matter with the permission of chair.

POINTS DISCUSSED IN THE MEETING:

1. IV B.Tech course structure and I & II semesters syllabus including open elective courses in IV year I semester offered by EEE department for other branches (except EEE branch)
2. Credit distribution as per APSCHE and Titles of courses
3. Arrange I & II Semester subjects to balance the workload of the teachers
4. Departmental Course Syllabus for Semesters I & II

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IV Year I Semester

5. Need for updating the text books according to syllabus in "Power System Operation and Control" subject.
6. The syllabus of Electrical Distribution System was examined and suggested to combine the topics in Unit III.
7. The committee reviewed the Course structure and suggested changing of Power System Simulation Lab Experiments 7, 8 and 10.
8. Need for updating new edition textbooks for all the courses.

IV Year II Semester

9. The Board discussed the importance of internships for improving students' industry exposure and practical knowledge. It was proposed that students should complete internships in reputed industries/organizations.
10. The Board discussed guidelines for major projects. Emphasis was given to industry-oriented, innovative, and research-based projects.
11. Suggestions from Subject Experts and other BoS members

RESOLUTIONS:

The following changes were made by the BoS committee:

1. IV B.Tech course structure and I & II semesters syllabus including open electives III and IV in IV year I semester offered by EEE department for other branches (except EEE branch) was approved.
2. Credit distribution as per APSCHE and Titles of courses are accepted.
3. I & II Semester subjects to balance the workload of the teachers approved without changes
4. Syllabus of Courses by the Department for I & II Semesters

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IV year I semester:

5. The text books were updated according to syllabus in "Power System Operation and Control" course.
6. It was resolved to revise Unit III of the syllabus for the subject "Electrical Distribution System" by combining related topics to improve the continuity, clarity, and effective coverage of the course content.
7. Power System Simulation Lab Experiments 7, 8 and 10 are modified as per the prescribed syllabus with the suggestion of the BOS members.
8. New edition textbooks were updated for each course as per the suggestion of BOS members.

IV year II semester:

9. It was resolved to make internship training mandatory for students as per university regulations. Students shall submit internship completion certificates and reports for evaluation.
10. It was resolved that students should undertake projects relevant to current technological developments. Project reviews and evaluations shall be conducted periodically by the departmental committee.
11. Recommendations provided by subject matter experts and other BoS members

After extensive deliberations, the BoS committee accepted IV B.Tech course structure and I & II semesters syllabus including III and IV Open Elective courses in IV year I semester offered by EEE department for other branches (except EEE branch).

The external BoS members have conveyed their satisfaction with the curriculum and have expressed their contentment with the course syllabus that was developed for each course by the internal BoS members.

P. Bhaskar

Chairman BoS

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hod eee <srkeeehod@gmail.com>

MINUTES OF MEETING AND IV B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I AND II SEMESTER INCLUDING OPEN ELECTIVES

HOD Electrical & Electronics <hodeee@rvrjc.ac.in> Mon, Jun 15, 2026 at 9:29 AM
To: hod eee <srkeeehod@gmail.com>

Dear BOS Chairman
That the proposed syllabus as been approved and you can proceed further

With Best Regards
[Quoted text hidden]

P. Bhaskar

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MINUTES OF MEETING AND IV B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I AND II SEMESTER INCLUDING OPEN ELECTIVES

sivanagaraju s.s.n <sirigiri70@gmail.com> Thu, Jun 4, 2026 at 12:45 PM
To: hod eee <srkeeehod@gmail.com>

Dear madam
The attached minutes of meeting are approved from my side for further processong.

with regards

Dr. S. Sivanagaraju
Professor of EEE,
JNTU Kakinada,
Kakinada, Andhra Pradesh, India.
Pin: 533003
Ph: +918500961061
[Quoted text hidden]

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MINUTES OF MEETING AND IV B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I AND II SEMESTER INCLUDING OPEN ELECTIVES

loveswra rao Burthi <loveswararao@kluniversity.in> Sat, Jun 6, 2026 at 1:31 PM
To: hod eee <srkeeehod@gmail.com>

Madam,

After discussion in the BOS Meeting which was held on 29.04.2026, as a BOS member I approved of the following points:

1. IV B.Tech course structure and I & II semesters syllabus including open electives III and IV in IV year I semester offered by EEE department for other branches (except EEE branch) was approved.

2. Credit distribution as per APSCHE and Titles of courses are accepted.

3. I & II Semester subjects to balance the workload of the teachers approved without changes

4. Syllabus of Courses by the Department for I & II Semesters

Please proceed with further processing.

With Thanks and Regards

Yours

Dr B Loveswara Rao, M.Tech., Ph.D., SMIEEE
Professor
PH NO: 9866290922
EEE Dept
K L Deemed to be University

https://www.scopus.com/authid/detail.uri?authorId=57209464044

https://publons.com/researcher/3478468/loveswara-rao-burthi/

Burthi Loveswara Rao - Google Scholar

Burthi LOVESWARA RAO | Professor | PhD | Department of EEE (researchgate.net)

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From: hod eee <srkeeehod@gmail.com>
Sent: Thursday, June 4, 2026 10:15 AM
To: sivanagaraju s.s.n <sirigiri70@gmail.com>; loveswra rao Burthi <loveswararao@kluniversity.in>; hod eee <srkeeehod@gmail.com>; Varun <patnala.varun997@gmail.com>; Samson Devakumar <vemusamson@gmail.com>; bhavana8099@gmail.com <bhavana8099@gmail.com>; narendrababukeee@gmail.com <narendrababukeee@gmail.com>
Subject: MINUTES OF MEETING AND IV B.TECH SRK23 COURSE STRUCTURE & SYLLABUS FOR I AND II SEMESTER INCLUDING OPEN ELECTIVES

[Quoted text hidden]

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(SRK23 - IV Year COURSE STRUCTURE & SYLLABUS)

B.Tech. IV Year-I Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Power System Operation and Control	3	0	0	3
2	Management Course- II	Energy Management & Auditing	2	0	0	2
3	Professional Elective-IV	1. EHVAC & HVDC Transmission Systems 2. Programmable Logic Controllers 3. Electrical Distribution System	3	0	0	3
4	Professional Elective-V	1. Electric Vehicles 2. Switched Mode Power Conversion 3. Design of PV systems	3	0	0	3
5	Open Elective - III		3	0	0	3
6	Open Elective-IV		3	0	0	3
7	Skill Enhancement Course	Power Systems Simulation Lab	0	0	4	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**16**	**1**	**02**	**21**

B.Tech. IV Year-II Semester

S.No.	Category	Title	L	T	P	C
1.	PR	Internship and Project	-	-	24	12

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OPEN ELECTIVES

S.No.	Category	Title	L	T	P	C
1	Open Elective – I (III-I)	1. Renewable Energy Sources 2. Concepts of Energy Auditing & Management	3	0	0	3
2	Open Elective-II (III-II)	1. Fundamentals of Electric Vehicles 2. Electrical Wiring Estimation and Costing	3	0	0	3
3	Open Elective-III (IV-I)	1. Battery Management Systems and Charging Stations 2. Concepts of Smart Grid Technologies	3	0	0	3
4	Open Elective-IV (IV-I)	1. Concepts of Power Quality 2. Quantum Science and Technology	3	0	0	3

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IV Year –I Semester	POWER SYSTEM OPERATION AND CONTROL (Professional Core)	L	T	P	C
		3	0	0	3

Pre-requisite: Power Systems, Power Systems Analysis.

Course Objectives:

- To understand optimal dispatch of generation with and without losses.
- To understand the optimal scheduling of hydro thermal systems.
- To understand the optimal unit commitment problem.
- To understand the load frequency control for single area system with and without controllers
- To understand the load frequency control for two area system with and without controllers
- To understand the reactive power control and compensation of transmission lines.

Course Outcomes:

After the completion of the course the student should be able to

CO1: Compute optimal load scheduling of Generators.

CO2: Formulate hydrothermal scheduling and unit commitment problem.

CO3: Analyse effect of Load Frequency Control for single area systems

CO4: Analyse effect of Load Frequency Control for two area systems.

CO5: Describe the effect of reactive power control for transmission lines

UNIT - I

Economic Operation of Power Systems

Optimal operation of Generators in Thermal power stations - – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

UNIT - II

Hydrothermal Scheduling

Mathematical Formulation – Short term Solution Technique

Unit Commitment

Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

UNIT – III

Load Frequency Control-I

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Modelling of steam turbine – Generator – Mathematical modelling of speed governing system – Transfer function – Necessity of keeping frequency constant, Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response

UNIT - IV

Load Frequency Control-II

Block diagram development of load frequency control of two area system: uncontrolled case and controlled case – Tie-line bias control – Load frequency control and economic dispatch control.

UNIT - V

Compensation in Power Systems

Overview of Reactive Power control – Reactive power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Compensated transmission lines. Introduction of FACTS devices – Need of FACTS controllers – Types of FACTS devices.

Text Books:

1. Power System Operation and Control by S. Siva Naga Raju, G. Sreenivasan, Pearson Publications.
2. Power system engineering D. P. kothari and I.J Nagrath, Mc. Graw Hill Education Pvt. Limited.
3. Power Generation - Operation and Control by Allen J Wood - Bruce F Wollen Berg 3rd Edition - Wiley Publication 2014.

Reference Books:

1. Power System stability & control - Prabha Kundur - TMH - 1994.
2. Power System Analysis by Hadi Saadat – – Tata McGraw–Hill 3rd edition - 2010.
3. Power System Analysis and Stability by S.S.Vadhera - Khanna Publications - 4th edition - 2005.

Online Learning Resources:

1. https://nptel.ac.in/courses/108104191
2. https://nptel.ac.in/courses/108104052

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IV Year –I Semester	ENERGY MANAGEMENT & AUDITING	L	T	P	C
		2	0	0	2

Pre-requisite: Power Systems, Electrical Measurements and Instrumentation, Utilization of Electrical Energy, Analytical Skills.

Course Objectives:

- To understand basic concepts of Energy Audit & various Energy conservation schemes.
- To design energy an energy management program.
- To understand concept of Energy Efficient Motors and lighting control efficiencies.
- To understand the concept of Demand side management and significance of Energy instruments
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:
After the completion of the course the student should be able to:
CO1: Understand the principles of energy audit along with various Energy related terminologies.
CO2: Asses the role of Energy Manager and Energy Management program.
CO3: Design an energy efficient motors and good lighting system.
CO4: To understand the significance of Demand side management and identify the energy instruments for various real time applications.
CO5: Evaluate the computational techniques about economic aspects.

Unit–I
Basic Principles of Energy Audit
Energy audit- definitions - concept - types of audit - energy index - cost index - pie charts - Sankey diagrams and load profiles - Energy conservation schemes- Energy audit of industries- energy saving potential - energy audit of process industry - thermal power station - building energy audit - Conservation of Energy Building Codes (ECBC-2017).

Unit–II:
Energy Management
Principles of energy management - organizing energy management program - initiating - planning - controlling - promoting - monitoring - reporting. Energy manager - qualities and functions - language - Questionnaire – check list for top management.

Unit–III:
Energy Efficient Motors and Lighting

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Energy efficient motors - factors affecting efficiency - loss distribution - constructional details - characteristics – variable speed - RMS - voltage variation-voltage unbalance-over motoring-motor energy audit, lighting system design and practice - lighting control - lighting energy audit.

Unit–IV

Demand Side Management and Energy Instruments

Introduction to DSM - concept of DSM - benefits of DSM - Different techniques of DSM – time of day pricing - multi-utility power exchange model - time of day models for planning. Load management - load priority technique - peak clipping - peak shifting - valley filling - strategic conservation– Energy Instruments- data loggers - thermocouples - pyrometers - lux meters - tongue testers.

Unit–V

Economic Aspects and Their Computation

Economics Analysis depreciation Methods - time value of money - rate of return - present worth method - replacement analysis - life cycle costing analysis – Energy efficient motors. Calculation of simple payback method - net present value method – Applications of life cycle costing analysis - return on investment.

Text Books:

1. Energy management by W.R.Murphy & G. Mckay Butter worth - Heinemann publications - 1982.
2. Energy management hand book by W.C Turner - John wiley and sons - 1982.

Reference Books:

1. Energy efficient electric motors by John. C. Andreas - Marcel Dekker Inc Ltd-2nd edition – 1995.
2. Energy management by Paul o' Callaghan - Mc-graw Hill Book company-1st edition – 1998.
3. Energy management and good lighting practice : fuel efficiency- booklet12-EEO

Online Learning Resources:

1. https://nptel.ac.in/courses/112105221
2. https://nptel.ac.in/courses/109106161

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IV Year –I Semester	EHVAC & HVDC TRANSMISSION SYSTEMS	L	T	P	C
		3	0	0	3

Pre-requisite: Power Systems, Power Electronics.

Course Objectives

- Role of EHVAC transmission, Electrostatics and voltage gradient distribution.
- The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
- To explain fundamental principles of HVDC transmission system, including their advantages, limitations and modern trends in DC transmission.
- To interpret the operation and control of power converters used in HVDC systems.
- To educate students on the generation and impact of harmonics in HVDC systems, methods for their calculation, and design of effective AC filters such as single-tuned and high-pass

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Acquaint with HV transmission system with regard to power handling capacity, losses, conductor resistance and electrostatic field associate with HV. Further knowledge is gained in area of bundle conductor system to improve electrical and mechanical performance.

CO2: Develop ability for determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines

CO3: Understand the basic concepts, economic considerations, and terminal equipment of HVDC transmission systems, including different types of HVDC and MTDC links

CO4: Analyze and compare the configurations and characteristics of HVDC converters such as 6-pulse and 12-pulse Graetz circuits, and explain the principles and methods of DC link control

CO5: Evaluate the origin and effects of harmonics in HVDC systems, calculate harmonic components, and design appropriate AC filters including single-tuned and high-pass filters.

Unit – I:

Introduction of EHV AC transmission

Necessity of EHV AC transmission – Advantages and problems– Power handling capacity and line losses– Mechanical considerations in line performance –Electrostatics – Field of sphere gap – Field of line charges and properties – Charge – potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius– Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

Unit – II:

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Corona effects

Power loss and audible noise (AN) – Corona loss formulae – Charge voltage diagram – Generation – Characteristics – Limits and measurements of AN – Relation between 1–phase and 3–phase AN levels – Examples – Radio interference (RI) – Corona pulses and their generation – Properties and limits – Frequency spectrum – Modes of propagation – Excitation function – Measurement of RI, RIV and excitation functions – Examples.

UNIT – III:

Basic Concepts of DC Transmission

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC transmission – Application of DC Transmission System – Planning & Modern trends in DC transmission – Types of MTDC systems.

UNIT – IV:

Analysis of HVDC Converters and System Control

Choice of Converter configuration – Analysis of Graetz circuit – Characteristics of 6 Pulse & 12 Pulse converters — Principal of DC Link Control – Converters Control Characteristics – Firing angle control –Constant Current and extinction angle control –Starting and stopping of DC link – Power Control.

UNIT–V:

Harmonics in HVDC System

Generation of Harmonics – Characteristics harmonics – Calculation of AC Harmonics – Non–Characteristics harmonics – Adverse effects of harmonics – Calculation of voltage & current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters –Design of High pass filters.

Text Books:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
3. EHVAC and HVDC Transmission Engineering and Practice – Sunil S.Rao.

Reference Books:

1. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
3. HVDC Transmission – J.Arrillaga.

Online Learning Resources:

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1. https://nptel.ac.in/courses/108104013
2. https://nptel.ac.in/courses/108108099

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IV Year –I Semester	PROGRAMMABLE LOGIC CONTROLLERS	L	T	P	C
		3	0	0	3

Pre-requisite: Boolean algebra and Basic of Microprocessor.

Course Objectives:

- To understand the various components of PLC systems and Input/output devices.
- To know the programming instructions and ladder diagram construction in the PLC.
- To understand the use and applications of timer and counter functions.
- To familiar the data handling function and their applications.
- To understand and implementation of analog operations and PID modules.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Illustrate I/O modules of PLC systems and Input/output devices.

CO2: Demonstrate various the programming instructions and ladder diagram construction in the PLC

CO3: Examine various types of PLC functions and counters and their applications.

CO4: Assess different data handling functions and its applications.

CO5: Describe the analog operations and PID modules.

UNIT – I

PLC Basics:

PLC Advantages and disadvantages – Overall PLC system – Central Processing Unit - I/O modules Power supplies- programming Equipment - programming formats - construction of PLC ladder diagrams – Input On/Off Switching Devices – Input Analog Devices - Output On/Off Switching Devices – Output Analog Devices.

UNIT – II

PLC Programming:

PLC Input instructions - outputs - operational procedures - programming examples using contacts and coils - Drill press operation, Digital logic gates - Boolean algebra PLC programming - conversion examples- Ladder diagrams and sequence listings - ladder diagram construction and flowchart for spray process system.

UNIT – III

Basic and Intermediate PLC Functions:

General Characteristics of Registers - module addressing - holding registers - Input Registers - Output Registers. PLC Timer functions & Industrial applications - counters - counter function industrial applications - Arithmetic functions - Number comparison functions - number conversion functions.

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UNIT –IV

Data Handling functions:

SKIP - Master control Relay - Jump - Move - FIFO - FAL - ONS - CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register - sequence functions and applications - controlling of two-axis & three axis Robots with PLC - Matrix functions.

UNIT – V

Analog PLC operation:

Analog modules & systems - Analog signal processing - Multi bit Data Processing - Analog output Application Examples - PID principles - position indicator with PID control - PID Modules - PID tuning - PID functions.

Text books:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss - Fifth Edition - PHI
2. Programmable Logic Controllers- Programming Method and Applications –JR. Hackworth &F.D Hackworth Jr. –Pearson – 2004.
3. PLCS & SCADA – Prof. Rajesh Mehra, Er. Vikrant Vij.ltd.

Reference Books:

1. Introduction to Programmable Logic Controllers- Gary A. Dunning - 3rd edition - Cengage Learning - 2005.
2. Programmable Logic Controllers –W.Bolton - 5th Edition - Elsevier publisher - 2009.

Online Learning Resources:

1. https://nptel.ac.in/courses/108105062
2. https://nptel.ac.in/courses/108105063

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IV Year –I Semester	ELECTRICAL DISTRIBUTION SYSTEM	L	T	P	C
		3	0	0	3

Pre-requisite: Basic concepts of Electric circuits and power systems.

Course Objectives

- To learn different factors of distribution system.
- To learn and design aspects of the substations and distribution systems.
- To learn the concepts of voltage drop and power loss.
- To learn the distribution system protection and its coordination.
- To learn the effect of compensation for power factor improvement.
- To learn the effect of voltage control on distribution system.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Discriminate various factors of distribution system - load modelling and characteristic of loads.

CO2: Know the concept of design considerations of substation and feeders.

CO3: Determine the voltage drop and power loss for different types of distribution loads.

CO4: Analyse the protection and its coordination for distribution systems.

CO5: Analyse the effect of compensation for p.f improvement and voltage improvement.

UNIT - I

General Concepts

Introduction to distribution systems - Distribution system losses – Coincidence factor – Contribution factor – loss factor – Relationship between the load factor and loss factor – Numerical Problems – Load modeling and characteristics – Classification and characteristics of loads (Residential - Commercial - Agricultural and Industrial).

UNIT - II

Substations

Selection for location of substations - Rating of distribution substation – Service area with 'n' primary feeders – Benefits and methods of optimal location of substations.

Distribution Feeders

Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT - III

System Analysis

Voltage drop and power loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads, Three phase balanced primary lines and Non three phase balanced primary lines.

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UNIT - IV

Protection

Objectives of distribution system protection –Time current characteristics – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionaliser and circuit breakers - Earth leakage circuit breakers – Protection schemes of parallel & Ring-main feeders.

Coordination of protective devices

General coordination procedure –Various types of co-ordinated operation of protective devices - Residual Current Circuit Breaker

UNIT - V

Compensation for Power Factor Improvement

Capacitive compensation for power factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

Voltage Control

Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation.

Text Book:

1. "Electric Power Distribution system - Engineering" – by Turan Gonen - McGraw–hill - 2nd edition - 2008.
2. "Electrical Power Distribution Systems" by V. Kamaraju - Right Publishers.
3. "Electrical Distribution Systems"-by Abdelhay A. Dallam, Om P.Malik,2011.

Reference Books:

1. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo - CRC press - 2nd edition.
2. Electric Power Distribution – by A.S. Pabla - Tata McGraw–hill Publishing Company - 4th edition - 1997.

Online Learning Resources:

1. https://nptel.ac.in/courses/108107112
2. https://www.mooc-list.com/tags/electrical-distribution

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IV Year –I Semester	ELECTRIC VEHICLES	L	T	P	C
		3	0	0	3

Pre-requisite: Basics of Electrical Machines and Electronics

Course Objectives:

- To familiarize the students with the need and advantages of electric and hybrid electric vehicles
- To know various architectures of hybrid electric vehicles
- To understand the power management of plug in electric vehicles
- To study and understand different power converters used in electrical vehicles
- To familiarize with different batteries and other storage systems

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Know the concept of electric vehicles and hybrid electric vehicles.
CO2: Familiar with different configuration of hybrid electric vehicles
CO3: Choose an effective motor for EV and HEV application
CO4: Understand the power converters used in hybrid electric vehicles.
CO5: Know different batteries and other energy storage systems.

UNIT-I

Introduction

Fundamentals of vehicle -components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; History of hybrid vehicles -advantages and applications of Electric and Hybrid Electric Vehicles.

UNIT-II

Hybridization of Automobile

Architectures of HEVs - series and parallel HEVs - complex HEVs, Plug-in hybrid vehicle (PHEV) -constituents of PHEV -comparison of HEV and PHEV; Extended range hybrid electric vehicles (EREVs) -blended PHEVs -Fuel Cell vehicles and its constituents.

UNIT-III

Special Machines for EV and HEVs

Characteristics of traction drive - requirement of electric motors for EV/HEVs, Induction Motor drives - their control and applications in EV/HEVs, Permanent magnet Synchronous motor: configuration - control and applications in EV/HEVs. Brushless DC Motors: Advantages control of application in EV/HEVs. Switch reluctance motors: Merits limitations - converter configuration-control of SRM for EV/HEVs.

UNIT-IV

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Power Electronics in HEVs

Boost and Buck-Boost converters – Multi Quadrant DC-DC converters-DC-AC Inverter for EV and HEV applications-Three Phase DC-AC inverters-Voltage control of DC-AC inverters using PWM-EV and PHEV battery chargers.

UNIT-V

Energy Sources for HEVs

Energy Storage - Battery based energy storage and simplified models of battery - fuel cells – their characteristics and simplified models-super capacitor based energy storage-its analysis and simplified models –flywheels and their modeling for energy storage in EV/HEV - Hybridization of various energy storage devices.

Text Books

1. Ali Emadi –Advanced Electric Drive Vehicles-CRC Press-2014.
2. Iqbal Husse in-Electric and Hybrid Vehicle: Design Fundamentals-CRC Press- 2021,3rd Edition.

Reference Books:

1. Mehrdad Ehsani –YimiGao -Sebastian E. Gay -Ali Emadi -Modern Electric - HybridElectricandFuelCellVehicles:Fundamentals-Theory andDesign-CRC Press -2004.
2. James Larminie -John Lowry -Electric Vehicle Technology Explained -Wiley - 2003.
3. H.Partab: Modern Electric Traction-DhanpatRai&Co -2007.
4. Pistooa G. -"Power Sources-Models -Sustanability -Infarstructure and the market" - Elsevier 2008
5. Mi Chris -Masrur A. -and Gao D.W. -"Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives" 1995.

Online Learning Resources:

1. https://nptel.ac.in/courses/108106182
2. https://nptel.ac.in/courses/108102121

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IV Year –I Semester	SWITCHED MODE POWER CONVERSION	L	T	P	C
		3	0	0	3

Pre-requisite: Power electronics, Control Systems.

Course Objectives:

- To illustrate CCM and DCM modes of operation of non-isolated switched mode converters.
- To illustrate the working of isolated switched mode converters.
- To analyze ZVS and ZCS operation of buck, boost converters.
- To learn about the control schemes & design aspects of transformers, inductors and capacitors
- To model the converters and design controller for closed loop operation of switched mode converters.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Design and analyse the operation of non-isolated switch mode converters
CO2: Analyze the operation of isolated switch mode converters.
CO3: Illustrate the operation of resonant converters.
CO4: Analyse the control schemes of converters and design transformer and inductor.
CO5: Model the converters and design controller for closed loop operation.

UNIT–I
Non-Isolated Switch Mode Converters

Control of DC-DC converters: Buck converters - Boost converters - Buck-Boost converter - CUK Converter - continuous and discontinuous operation - Converter realization with non- ideal components.

UNIT–II
Isolated Switched Mode Converters

Forwarded converter – fly back converter - push-pull converter - half-bridge converter - full bridge converter

UNIT–III
Resonant Converters

Basic resonant circuit concepts - series resonant circuits - parallel resonant circuits-zero current switching quasi –resonant buck converter-zero current switching quasi-resonant boost converter - zero voltage switching quasi-resonant buck converter - zero voltage switching quasi-resonant boost converter.

UNIT–IV
Control Schemes of Converters and Magnetic Design

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Voltage mode control –Current mode control –Current control mode instability.
Magnetic Design: Transformer design-inductor and capacitor design.

UNIT–V

Modelling of Converters and Controller Design Based on Linearization:

Formulation of large signal models for buck and boost converters using state space analysis-derivation of averaged large signal model using circuit averaging method-small signal model derivation- average switch modelling technique to obtain small signal models of buck and boost converters- Transfer function of converters-Controller design based on linearization.

Text Books:

1. Fundamentals of Power Electronics-Erickson-RobertW.-Maksimovic- Dragan -Springer - 2011.
2. Powers witching converters-Simon Ang-Alejandro Oliva-CRC Press- 2010
3. Power Electronics: Essentials & Applications - L. Umanand, S.P.Bhat, John Wiley& Sons Australia, 1992

Reference Books:

1. Switching Power Supply Design-AbrahamI. Pressman-McGraw-Hill Ryerson - Limited - 1991.
2. Power Electronics: converters Applications & Design – Mohan - Undeland -Robbins-Wiley publications.
3. Design of Magnetic Components for Switched Mode Power Converters-Z Umanand - S.P. Bhat -John Wiley & Sons Australia -1992.
4. Elements of Power Electronics – Philip T. Krein - Oxford University press -2014.

Online Learning Resources:

1. https://nptel.ac.in/courses/108108036
2. https://nptel.ac.in/courses/108105180

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IV Year –I Semester	DESIGN OF PV SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisites: Basic knowledge of electrical circuits, power systems, and renewable energy fundamentals.

Course Objectives:
The objectives of this course are to:

- Provide a comprehensive understanding of solar energy fundamentals and solar radiation parameters relevant to PV system design.
- Introduce the working principles, types, and characteristics of photovoltaic (PV) cells and modules.
- Familiarize students with various components of a PV system including inverters, batteries, and controllers.
- Enable students to perform load analysis, sizing, and design of standalone and grid-connected PV systems.
- Impart knowledge on the installation, maintenance, performance evaluation, and safety practices of PV systems in accordance with national and international standards.

Course Outcomes:
On successful completion of this course, students will be able to:
CO1: Analyze solar radiation data and evaluate site conditions for PV applications.
CO2: Explain the operation and characteristics of various types of PV cells and modules.
CO3: Identify and select appropriate components for different PV system configurations.
CO4: Design and size standalone, hybrid, and grid-tied PV systems using an analytical and Simulation tools
CO5: Apply standards and practices for the installation, testing, maintenance, and economic Evaluation of PV systems

UNIT1:
Solar Energy Basics:
Solar radiation – Extraterrestrial and terrestrial, Solar geometry – Declination, altitude angle, hour angle, air mass Radiation measurement and estimation, Effect of tilt angle on radiation, over view of solar energy conversion technologies, Introduction to PV effect and materials used

UNIT2:
Solar Photo voltaic Cell Technologies
Typesofsolarcells:Crystallinesilicon,thin-film,multi-junction,emergingtechnologies,Cell structure and working principle, I-V characteristics of solar cells – Effect of irradiance and temperature, Efficiency, fill factor, and performance parameters, Maximum Power

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Point Tracking (MPPT) – Algorithms and techniques

UNIT3:
PV Module and System Components
PV module characteristics and rating, Module interconnections – Series and parallel configurations, Balance of System (BoS): Batteries, charge controllers, inverters, protection devices PV system configurations: Standalone, grid-connected, hybrid Energy storage options – Battery types and characteristics

UNIT4:
PV System Design
Load estimation and energy requirement analysis-Sizing of PV array, battery bank, and inverter-Shadow analysis and tilt optimization -Wiring, cabling, earthing, and protection design-Simulation tools (e.g., PV syst, HOMER, SAM) – Basic introduction

UNIT5:
Installation, Operation & Maintenance
Installation guidelines and standards (e.g., MNRE, IEC codes)-Testing, Commissioning, and troubleshooting of PV systems Maintenance strategies and fault diagnostics-Performance evaluation and economic analysis (Payback period, LCOE)-Environmental and safety considerations

Text Books
1. Chetan Singh Solanki, 'Solar Photo voltaics: Fundamentals, Technologies and Applications', PHI Learning, 3rd Edition (or latest).
2. James P. Dunlop, 'Photovoltaic Systems', American Technical Publishers.

Reference Books
1. Mohanlal Kolhe, Pradip Bansal, T.K.Mallick, 'Design and Installation of Photovoltaic Systems', Springer.
2. John A. Duffie and William A. Beckman, 'Solar Engineering of Thermal Processes', Wiley.
3. B. H. Khan, 'Renewable Energy Systems', Mc Graw Hill Education.
4. S.P. Sukhatme and J.K. Nayak, 'Solar Energy: Principles of Thermal Collection and Storage', Tata McGraw Hill.

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IV Year –I Semester	BATTERY MANAGEMENT SYSTEMS AND CHARGING STATIONS	L	T	P	C
		3	0	0	3

Pre-requisite: Electric Circuits and Power Electronics
Course objectives:

- To understand the fundamentals of batteries, configurations, and charging processes
- To learn the functional requirements and architecture of a Battery Management System (BMS)
- To explore methods for estimating battery state of charge and health, along with balancing techniques
- Study modelling approaches for simulating batteries and electric vehicle performance. To Analyze design considerations for practical implementation of BMS in multi-battery systems
- To understand the charging infrastructure and its various types

Course Outcomes:
After the completion of the course the student should be able to:
CO1: Describe the construction and operation of different batteries for EV applications
CO2: Describe charging algorithms of different batteries and balancing methods of battery packs
CO3: Describe the different kinds of infrastructure needed in the charging stations
CO4: Describe the requirements of battery management and their maintenance. Obtain the modelling of batteries and develop their simulation models.
CO5: Develop various charging types and their usage for different applications

Unit-I:
Introduction
Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electro chemical and lithium-ion cells, Rechargeable cells, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging

Unit-II:
Battery Management System Requirement
Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

Unit-III:
Battery State of Charge and State of Health Estimation, Cell Balancing

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Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model- based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium-ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing.

Unit-IV:
Modelling and Simulation
Equivalent- circuit models (ECMs), Physics-based models (PBMs), Empirical modelling approach, Physics-based modelling approach, simulating an electric vehicle, Vehicle range calculations, simulating constant power and voltage, simulating battery packs. Battery-Management-System Requirements

Unit-V:
Charging Infrastructure
Domestic Charging Infrastructure, Public charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone

Text Books:

1. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 2015.
2. Davide Andrea," Battery Management Systems for Large Lithium-ion Battery Packs" Artech House, 2010.

Reference Books:

1. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems - Design by Modelling" Philips Research Book Series 2002.
2. Pop, Valer, et al. Battery management systems: Accurate state-of-charge indicationforbattery-poweredapplications.Vol.9.SpringerScience&Business Media, 2008.
3. Fast-Charging Infrastructure for Electric and Hybrid Electric Vehicles: Methods for Large-Scale Penetration into Electric Distribution Networks Book by C. Sharmeela, P. Sanjeevi kumar, and Palanisamy Sivaraman.

Online Learning Resources:

1. https://nptel.ac.in/courses/108106170
2. http://www.digimat.in/nptel/courses/video/108106170/L65.html

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IV Year –I Semester	CONCEPTS OF SMART GRID TECHNOLOGIES	L	T	P	C
		3	0	0	3

Pre-requisite: Power Systems, Renewable Energy Technologies

Course Objectives:

- To understand the basic concepts of smart grid
- To understand various smart grid technologies and its usage in smart applications.
- To realize substation automation with intelligent sensors and have an idea on battery energy storage systems
- To have basic knowledge on micro grids and DG's
- To have an idea on communication technologies used in smart grid.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Know the concepts of smart grids and analyse the smart grid policies and developments in smart grids

CO2: Develop concepts of smart grid technologies in hybrid electrical vehicles etc.

CO3: Know the concepts of smart substations-feeder automation-Battery Energy storage systems etc

CO4: Analyse micro grids and distributed generation systems.

CO5: Analyse the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.

UNIT–I

Introduction to Smart Grid

Evolution of Electric Grid -Concept of Smart Grid -Definitions -Need of Smart Grid - Functions of Smart Grid -Opportunities & Barriers of Smart Grid -Difference between conventional & smart grid – Concept of Resilient & Self-Healing Grid – Present development & International policies on Smart Grid.

UNIT–II

Smart Grid Technologies: Part 1

Introduction to Smart Meters -Real Time Pricing -Smart Appliances -Automatic Meter Reading(AMR) -Outage Management System(OMS) -Plug in Hybrid Electric Vehicles(PHEV)-Vehicle to Grid-Smart Sensors-Home & Building Automation-Phase Shifting Transformers -Net Metering.

UNIT–III

Smart Grid Technologies: Part 2

Smart Substations - Substation Automation - Feeder Automation, Geographic Information System (GIS) - Intelligent Electronic Devices (IED) & their application for monitoring &protection. Smart storage like Battery Energy Storage Systems (BESS) - Super Conducting

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Magnetic Energy Storage Systems (SMES)-Pumped Hydro-Compressed Air Energy Storage (CAES)

UNIT–IV

Micro grids and Distributed Energy Resources

Concept of micro grid – need & applications of micro grid – formation of micro grid-Issues of inter connection – protection & control of micro grid –Integration of renewable energy sources - Demand Response.

UNIT-V

Information and Communication Technology for Smart Grid

Advanced Metering Infrastructure (AMI)-Home Area Network (HAN)-Neighborhood Area Network (NAN) -Wide Area Network (WAN).

Text Books:

1. Smart Grid Technology and Applications By Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama · 2012.
2. The Smart Grid: Enabling Energy Efficiency and Demand Response - by Clark W.Gellings - Fairmont Press -2009.
3. Microgrids and Active Distribution Networks by S.Chowdhury-S.P.Chowdhury - P.Crossley-Institution of Engineering and Technology-30 Jun 2009.
4. Grids byJean-Claude Sabonnadière -NouredineHadjsaïd - Wileypublishers – 2013.

Reference Books:

1. Substation Automation (Power Electronics and Power Systems) by Mladen Kezunovic- Mark.
2. The Advanced Smart Grid: Edge Power Driving Sustainability: by Andres Carvallo - John Cooper -Artech House Publishers July 2011.

Online Learning Resources:

1. https://nptel.ac.in/courses/108107113
2. https://online-learning.tudelft.nl/courses/smart-grids-the-basics/

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IV Year –I Semester	CONCEPTS OF POWER QUALITY	L	T	P	C
		3	0	0	3

Pre-requisite: Concepts of Power Systems

Course Objectives:

- To learn different types of power quality phenomena.
- To identify sources for voltage sag, voltages well, interruptions, transients, long duration over voltages and harmonics in a power system.
- To describe power quality terms and know the power quality standards.
- To learn the principle of voltage regulation and power factor improvement methods
- Toexplaintherelationshipbetweendistributedgenerationandpowerquality.
- Tounderstandthepowerqualitymonitoringconceptsandtheusageofmeasuring instruments.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Differentiate between different types of power quality problems.

CO2: Explain the sources of voltage sag-voltage swell-interruptions- transients-long duration over voltages and harmonics in a power system.

CO3: Explain the principle of voltage regulation and improvement methods.

CO4: Analyse voltage distortion and current distortion and their indices.

CO5: Know the concepts of distributed generation technologies and power quality monitoring.

UNIT–I

Introduction-Terms& Definitions

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations – Voltage Sags – Voltage Swell.

UNIT-II

Transient Over Voltages

Sources of Transient Over voltages - Principles of Over voltage protection- Devices for Over voltage protection–Utility Capacitor Switching Transients –Utility System Lightning Protection –Managing Ferro resonance – Switching Transient Problems with Loads.

UNIT-III

Long-Duration Voltage variations

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Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage Regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker.

UNIT-IV

Harmonic distortion and solutions

Voltage distortion vs. Current distortion –Harmonic indices: THD -TDD and True Power Factor– Sources of harmonics – Effect of harmonic distortion – Impact on capacitors - transformers -motors and meters–Concept of Point of common coupling–Passive and active filtering–Numerical problems.

UNIT-V

Distributed Generation and Monitoring

Resurgence of distributed generation–DG technologies–Interface to the utility system–Power quality issues and operating conflicts – DG on low voltage distribution networks

Monitoring: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data

Text books:

1. Electrical Power Systems Quality-Dugan RC-Mc Granaghan M F-Santoso S – and Beaty H W -Second Edition -McGraw–Hill -2012 -3rd edition.
2. Power System Harmonics-ArrillagaJ and Watson NR-Second Edition-John Wiley & Sons -2003.
3. Distributed generation in the power system Math H.J Bollen. Fainon Hassan 2011.

Reference Books:

1. Understanding Power Quality Problems: Voltage Sags and Interruptions -Bollen M HJ - First Edition -IEEE Press; 2000.
2. Electric Power Quality control Techniques-W. E. Kazibwe and M. H. Sendaula – Van Nostrad Reinhold -New York.
3. Harmonics and Power Systems –Franciso C. DELARosa–CRC Press (Taylor & Francis)

Online Learning Resources:

1. https://nptel.ac.in/courses/108106025
2. https://nptel.ac.in/courses/108107157

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IV Year –I Semester	QUANTUM SCIENCE AND TECHNOLOGY	L	T	P	C
		3	0	0	3

Pre requisites: Basic Physics, Linear Algebra, and Introduction to Modern Physics

Course Objectives:

- To introduce fundamental concepts of quantum mechanics and its mathematical formalism
- To explore quantum computing and communication principles and technologies
- To understand the physical implementation and limitations of quantum systems
- Toenablestudentstorelatequantumtheorytopracticalapplicationsincomputing, cryptography, and sensing
- To familiarize students with the emerging trends in quantum technologies

Course Outcomes:

After completing this course, students will be able to:

CO1: Explain core principles of quantum mechanics and their technological implications

CO2: Analyze quantum phenomena like superposition and entanglement.

CO3: Apply mathematical tools to model and solve quantum systems.

CO4: Demonstrate understanding of quantum algorithms and quantum circuits.

CO5: Evaluate potential applications and challenges in quantum communication and sensing

Unit1:

Fundamentals of Quantum Mechanics: Historical background: Blackbody radiation, photoelectric effect, and Compton scattering; Dual nature of light and matter; De Broglie hypothesis; Schrödinger equation; Free particle, infinite potential well, step potential; Operators and observables: position, momentum, Hamiltonian; Commutation relations and uncertainty principle; Quantum postulates and measurement theory; Eigen values, Eigen functions.

Unit 2:

Quantum Information Theory: Classical vs. quantum information; Qubit representation using Bloch sphere; Quantum superposition and quantum entanglement; Dirac notation (bra-ket), tensor products, and composite systems; Bell states and EPR paradox; Quantum gates: Pauli-X, Y, Z; Hadamard; Phase; T; CNOT; Quantum circuit models and notation; Measurement in computational basis; Quantum teleportation and no-cloning theorem; Quantum state tomography (introductory)

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Unit 3:

Quantum Computing: Classical computing review and limitations; Quantum parallelism and interference; Deutsch and Deutsch-Jozsa algorithms; Grover's search algorithm, Oracle and amplitude amplification; Shor's factoring algorithm (overview and significance); Quantum Fourier Transform (QFT); Quantum error correction: Bit-flip, phase- flip,andShor's9 – qubit code; Introduction to quantum programming: Qiskit, Cirq, IBM Quantum Experience (overview)

Unit 4:

Quantum Communication: Introduction to quantum cryptography; Quantum key distribution (QKD): BB84 protocol; Entanglement-based QKD: Ekert protocol (E91); Eavesdropping and security of QKD; Quantum teleportation (circuit and protocol); Quantum dense coding; Quantum networks and entanglement swapping; Role of quantum repeaters; Single-photon sources and detectors; Implementation challenges (loss, decoherence, noise)

Unit 5:

Quantum Technologies and Applications: Quantum sensors: magnetometry, gravimetry; Quantum metrology: standard time, atomic clocks; Quantum imaging and lithography; Quantum materials: topological insulators, graphene, quantum dots; NV centers in diamonds for sensing; Hardware platforms: Super conducting qubits, Trapped ions, Photonic quantum processors; Quantum supremacy and NISQ era; Global initiatives: IBM, Google, D- Wave, IonQ, India's NQM; Ethical concerns and future prospects

Text Books:

1. "Quantum Computation and Quantum Information "by Michael A. Nielsen and Isaac L. Chuang
2. "Quantum Mechanics: Concepts and Applications "by Nouredine Zettili

Online Learning Resources:

1. https://nptel.ac.in/courses/104104082
2. https://nptel.ac.in/courses/115104096
3. https://nptel.ac.in/courses/122106034

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IV Year –I Semester	POWER SYSTEM SIMULATION LAB	L	T	P	C
		0	0	4	2

Pre-requisite: Power System Analysis, Operation and Control.

Course Objectives:

1. Understand the formation of Y-Bus and Z-Bus matrices for power system network modeling.
2. Apply various load flow analysis methods including Gauss-Seidel, Newton-Raphson, and Fast Decoupled techniques.
3. Analyze symmetrical and unsymmetrical faults using Z-Bus and sequence components.
4. Perform Economic Load Dispatch with and without considering transmission losses.
5. Study transient stability and load frequency control for single and multi-area power systems.

Course Outcomes:

After the completion of the course the student should be able to:

CO1. Distinguish between different load flow methods.
CO2. Building and analyzing Y-bus &Z-bus algorithms
CO3. Practice and analyze the symmetrical &unsymmetrical faults.
CO4. Recognize the importance of Load flow control and Economic load dispatch.
CO5. Recognize the importance of Economic load dispatch and transient stability analysis.

List of Experiments

Any10ofthefollowingexperimentsaretobeconducted

1. Formation of Y-Bus by Direct-Inspection Method.
2. Load Flow Solution Using Gauss Siedel Method
3. Load Flow Solution Using Newton Raphson Method
4. Load Flow Solution Using Decoupled Method
5. Load Flow Solution Using Fast Decoupled Method
6. Formation of Z-Bus by Z-bus building algorithm
7. Ferranti effect on long transmission lines.
8. Symmetrical components of set of unbalanced currents
9. Economic Load Dispatch with &without transmission losses
10. Transient Stability Analysis of Single Machine connected to an Infinite Bus (SMIB) by using Equal area criteria.
11. Load Frequency Control of Single Area Control &Two Area Control system with and without controllers.

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IV Year –I Semester	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	-

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IV Year –I Semester	EVALUATION OF INDUSTRY INTERNSHIP	L	T	P	C
		-	-	-	2

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B.Tech. IV Year-II Semester

S.No.	Category	Title	L	T	P	C
1.	Internship & Project Work	Full semester Internship and Project Work	-	-	24	12

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Department of Mechanical Engineering

BOS members (SRK 23)

S.No	Name	Designation	Category
1.	Dr. A. Stanly Kumar	Associate Professor & HoD	Chairman
(2 Subject experts outside Parent University)			
2.	Dr. T.Babu Rao	Assistant Professor, NIT Andhra Pradesh	Member
3.	Dr.M.Rama Krishna	Professor,VIGNAN Foundation for Science, Technology & Research	Member
(1 Subject experts nominated by Vice-Chancellor)			
4.	Dr.N.Mohan Rao	Professor,JNTUK	University Nominee
(1 Reprehensive from Industry)			
5.	Mr. T.Raghava Prasad	Managing Partner, Krishna Engineering works, Vijayawada	Member
(Alumnus Nominated by Principal)			
6.	Mr.A.Jayakanth	Staff Assistant Krishna District Co-operative bank, Nagayalanka	Member
(Faculty of the Department)			
7.	All Faculty	SRK Institute of Technology Mechanical Department	Member

Chairman
Board of Studies

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ANDHRA PRADESH - 521108.

K. Ramalle 12/06/2026
Principal

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Approved by AICTE, New Delhi | Certified by ISO 9001:2015
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Date : 04-06-2026

Sir/Madam,

Sub : Mechanical Engineering Board of studies meeting-Reg.

It is proposed to convene the Mechanical Engineering – Board of studies meeting at 11 AM on 10-06-2026(Wednesday) in Mechanical Engineering Department to discuss the following agenda.

Agenda:

1.To finalize the detailed courses contents of IVth Year I st and IInd semester of SRK23 Regulation.

2. Any other matter with the permission of chair.

In view of the prevailing situation the BOS meeting is proposed to be held in digital mode.

The link for SRK INSTITUTE OF TECHNOLOGY's DEPT OF MECH - BOS Zoom Meeting Time: Jun 10, 2026 11:00 AM Mumbai, Kolkata, New Delhi Join Zoom Meeting

" https://us02web.zoom.us/j/85693669305?pwd=tqkJFdKOJeandVqjT6h79gs2czUeCb.1 "

Meeting ID: 856 9366 9305 Passcode: 739625

You are requested to kindly make convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking You,

Yours sincerely,

(Dr.A.Stanly Kumar)

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For circulation among all BOS members

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MINUTES of BoS MEETING

BoS/ME/04
Department: ME
Venue: TPO Board Room
Members Present

Date: 10.06.2026
Academic Year: 2026-27
Time: 11:00AM

S.No	Name	Designation	Category
1.	Dr. A. Stanly Kumar	Associate Professor & HoD	Chairman
(2 Subject experts outside Parent University)			
2.	Dr. T.Babu Rao	Assistant Professor, NIT Andhra Pradesh	Member
3.	Dr.M.Rama Krishna	Professor,VIGNAN Foundation for Science, Technology & Research	Member
(1 Subject experts nominated by Vice-Chancellor)			
4.	Dr.N.Mohan Rao	Professor,JNTUK	University Nominee
(1 Reprehensive from Industry)			
5.	Mr. T.Raghava Prasad	Managing Partner, Krishna Engineering works, Vijayawada	Member
(Alumnus Nominated by Principal)			
6.	Mr.A.Jayakanth	Staff Assistant Krishna District Co-operative bank, Nagayalanka	Member
(Faculty of the Department)			
7.	All Faculty	SRK Institute of Technology Mechanical Department	Member

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Dr. A. Stanly Kumar, chaired the meeting online at **https://us02web.zoom.us/j/85693669305?pwd=tqkJFdKOJeandVqjT6h79gs2czUeCb.1**" Meeting ID: 856 9366 9305 Pass code: 739625

and welcomed all members to BoS meeting. He gave an overview of the department and the academic activities undertaken. After a short introduction, the listed topics were discussed and the following resolutions were passed.

S.No.	Name	Designation	Category	Signature
1	Dr. D.Rognatha Rao	Asst. Professor	Member	
2	Mr. V.Bala Chinalingam	Asst. Professor	Member	
3	Ms. Y.Durga Bhavani	Asst. Professor	Member	
4	Mr. U.Tanoj	Asst. Professor	Member	
5	Mr. K.Ramu	Asst. Professor	Members	
6	Mr. U.Saikrishna	Asst. Professor	Members	
7	Mr. G.Vinay Kumar	Asst. Professor	Members	
8.	Ms.M.Asha	Asst. Professor	Members	
9	Ms.M.Sirisha	Asst. Professor	Members	

AGENDA:

BoS/ME/04/01	To finalize the detailed course content of I & II semesters of IV year of SRK23
BoS/ME/04/02	To finalize the Massive Open Online Courses in IV year I,II semester offered by Swayam/NPTEL.
BoS/ME/04/03	Any other matter with the permission of chair.

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POINTS DISCUSSED IN THE MEETING:

1. Departmental Course Syllabus for Semesters I & II
2. CAD/CAM Lab Syllabus
3. Operations Research Syllabus
4. Massive Open Online Courses in IV year I,II semester offered by Swayam/NPTEL Subjects for Semesters I & II

IV Year I Semester

5. The Board discussed about CAD/CAM Lab syllabus and suggested to incorporate CAD modeling Experiment through any 3D modeling package..
6. The syllabus of Operations Research to be modified by incorporating a Management concept.

IV Year II Semester

7. The Board discussed the importance of internships for improving students' industry exposure and practical knowledge. It was proposed that students should complete internships in reputed industries/organizations.
8. The Board discussed guidelines for major projects. Emphasis was given to industry-oriented, innovative, and research-based projects.
9. Suggestions from Subject Experts and other BoS members

RESOLUTIONS:

The following changes were made by the BoS committee:

1. IV B.Tech I semesters CAD/CAM Lab syllabus modified by incorporating 3D modeling experiment was approved.
2. IV B.Tech I semesters Operations Research syllabus modified by incorporating management concept in one unit was approved.
3. A student has to pursue and complete one course through MOOC's (Swayam)/

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NPTEL as per SRK 23 Regulation guidelines.

4. The Board suggested that While allocating SWAYAM/NPTEL MOOC's courses, the Internal BoS Comprising HoD/Coordinator and student members select the Title of the Subject from the NPTEL Calendar and should ensure due diligence to avoid any duplication of regular curriculum courses.
5. I & II Semester subjects to balance the workload of the teachers approved without changes
6. Syllabus of Courses by the Department for I & II Semesters was approved.

IV year II semester:

7. It was resolved to make internship training mandatory for students as per university regulations. Students shall submit internship completion certificates and reports for evaluation.
8. It was resolved that students should undertake projects relevant to current technological developments. Project reviews and evaluations shall be conducted periodically by the departmental committee.
9. Recommendations provided by subject matter experts and other BoS members.

After extensive deliberations, the BoS committee accepted IV B.Tech course structure and I & II semesters syllabus offered by ME department.

The external BoS members have conveyed their satisfaction with the curriculum and have expressed their contentment with the course syllabus that was developed for each course by the internal BoS members.

Chairman BoS

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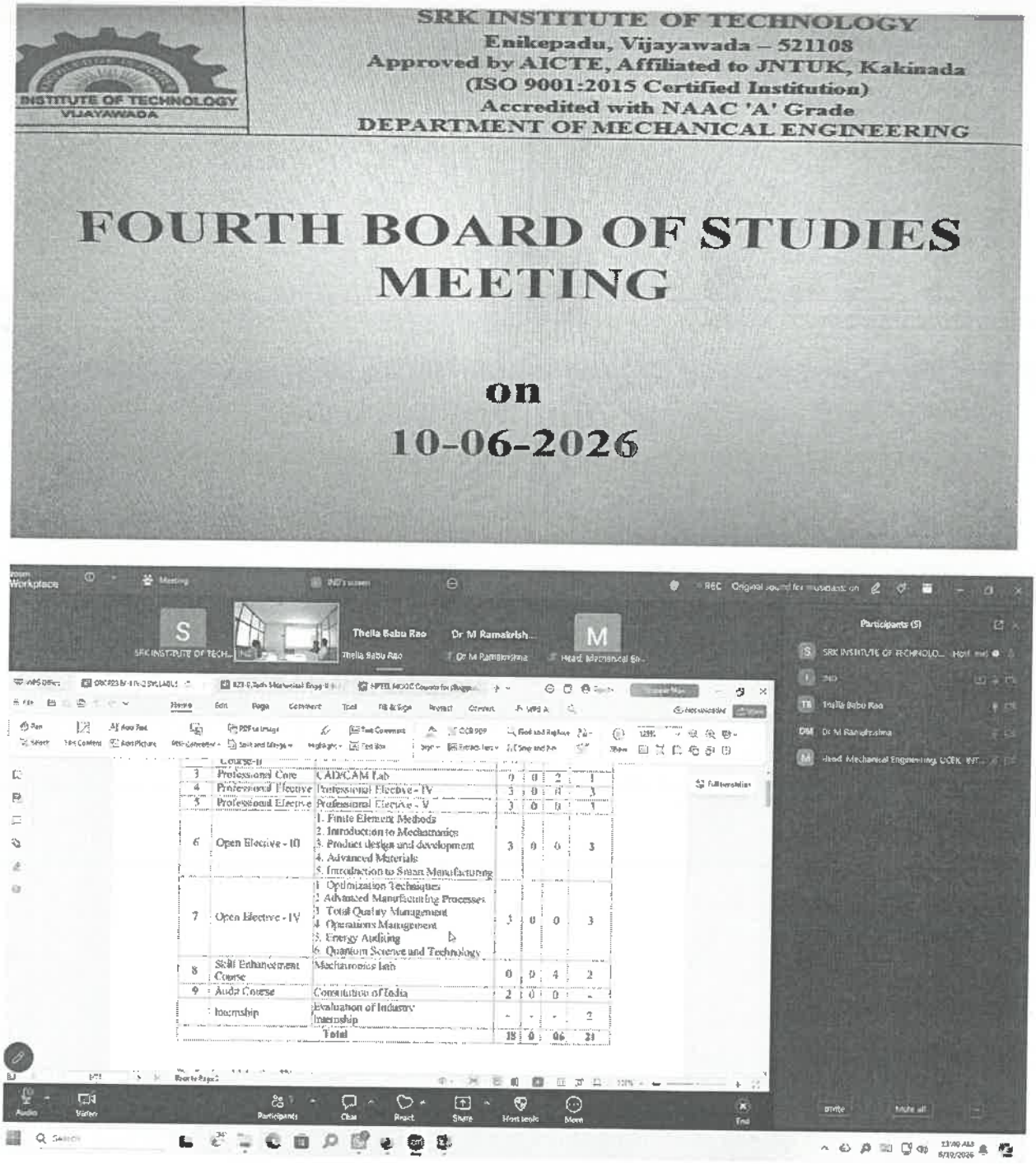

Fig 1: Mechanical Online BoS Meeting

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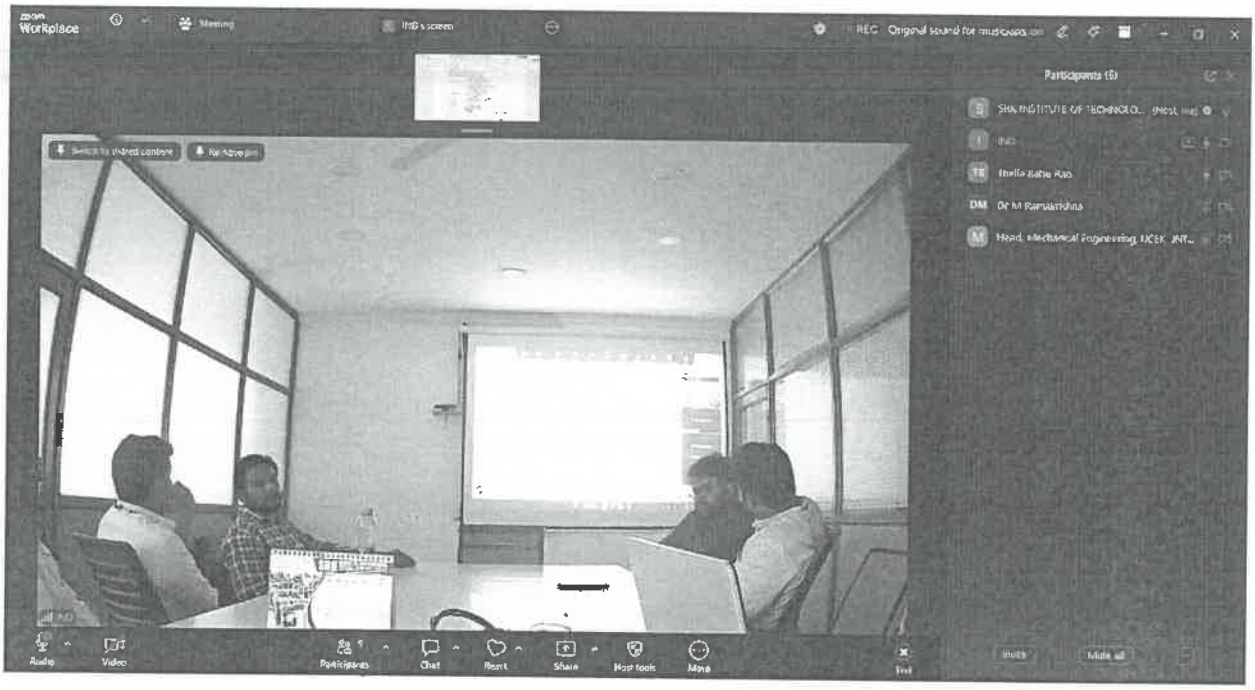

Fig 2: Mechanical Online BoS Meeting

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Fig 3: Mechanical Online BoS Meeting

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Gmail

Mechanical Dept <hodme.srk@gmail.com>

Minutes of meeting and Approval of complete syllabus IV Year I&II Semester of 2026-27 Academic Year

3 messages

Mechanical Dept <hodme.srk@gmail.com> Thu, Jun 25, 2026 at 10:09 AM
To: "Dr M.Ramakrishna" <drmramakrishnaa@gmail.com>

Respected Professor,
I hope this message finds you well. With reference to the SRK 23 IV BoS Meeting held on 10-06-2026, based on the suggestions proposed, we have made the necessary changes.Here I am attaching the proposed course structure and syllabus along with BoS Minutes of the Meeting.
I kindly request that you review the attached syllabus at your earliest convenience and provide any suggestions you may have.
Your prompt attention to this matter would be greatly appreciated, as it will help ensure a smooth start to the upcoming semester.
Thank you for your time and consideration.
Yours Sincerely,
Dr.A.Stanly Kumar ME M.Tech PhD(Robotics)

--
Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Email: hodme.srk@gmail.com

2 attachments

SRK 23 MECH IV BOS Minutes_Final.pdf
1277K

SRK R23 ME IV-1 IV-2 SYLLABUS_Final.pdf
1994K

Dr.M.RAMAKRISHNA <drmramakrishnaa@gmail.com> Thu, Jun 25, 2026 at 10:11 AM
To: Mechanical Dept <hodme.srk@gmail.com>

Dear
I approved the MoM
[Quoted text hidden]

Mechanical Dept <hodme.srk@gmail.com> Thu, Jun 25, 2026 at 10:12 AM
To: "Dr.M.RAMAKRISHNA" <drmramakrishnaa@gmail.com>

Thank you sir

Head of the Department
Department of Mechanical Engineering
SRK Institute of Technology, Eluru road,
Enikepadu, Vijayawada
Andhra Pradesh-521108
Email: hodme.srk@gmail.com
[Quoted text hidden]

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Gmail

Mechanical Dept <hodme.srk@gmail.com>

IV BOS Meeting Minutes and a Final Syllabus

mohan rao <nmohan72@gmail.com> Tue, Jun 16, 2026 at 8:19 PM
To: Mechanical Dept <hodme.srk@gmail.com>
Cc: "Dr. Thella Babu Rao" <thellababurao@nitandhra.ac.in>, nmohan72@jntucek.ac.in, "Dr M.Ramakrishna" <drmramakrishnaa@gmail.com>

Approved.
[Quoted text hidden]

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MechanicalDept<hodme.srk@gmail.com>

Approval for SRK23 Mechanical Engineering IV thYr Syllabus -Reg

Dr. Thella Babu Rao <thellababurao@nitandhra.ac.in>
To: Mechanical Dept <hodme.srk@gmail.com>

Fri, Jun 12, 2026 at 5:28 PM

Dear Dr.StanlyKumar,

Thank you for sharing the minutes of the BoS meeting held on 10th June 2026, along with the finalizedsyllabus.

I hereby approve the submitted syllabus for the IV Year. Kindly proceed with the necessary formalities and record the approval as required.

Regards,
BabuRao

[Quoted text hidden]

–
Warmregards,
Dr.ThellaBabuRao Assistant
Professor
DepartmentofMechanicalEngineering
National Institute of Technology Andhra Pradesh
Tadepalligudem – 534102, Andhra Pradesh, India
Email: thellababurao@nitandhra.ac.in
Mobile:+919642288866
https://nitandhra.ac.in/dept/mech/16915https://scholar.google.com/citations?user=0B_BJuMAAAAJ&hl=en&oi=ao

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

B.Tech.– IV Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	CAD/CAM	2	0	0	2
2	Management Course-II	Operations Research	2	0	0	2
3	Professional Core	CAD/CAM Lab	0	0	2	1
4	Professional Elective	Professional Elective - IV	3	0	0	3
5	Professional Elective	Professional Elective - V	3	0	0	3
6	Open Elective - III	1. Finite Element Methods 2. Introduction to Mechatronics 3. Product design and development 4. Advanced Materials 5. Introduction to Smart Manufacturing	3	0	0	3
7	Open Elective - IV	1. Optimization Techniques 2. Advanced Manufacturing Processes 3. Total Quality Management 4. Operations Management 5. Energy Auditing 6. Quantum Science and Technology	3	0	0	3
8	Skill Enhancement Course	Mechatronics Lab	0	0	4	2
9	Audit Course	Constitution of India	2	0	0	-
	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**18**	**0**	**06**	**21**

Professional Elective-IV

1. Mechatronics
2. Computational Fluid Dynamics
3. Functional Materials and Applications
4. Drives and Actuators for Robotics

Professional Elective-V

1. Hydrogen and Fuel Cell Technology
2. Smart Manufacturing
3. Autonomous Systems
4. Embedded Systems and Programming

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

B.Tech.–IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	PR	Internship and Project	-	-	24	12

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

IV Year I Semester	CAD/CAM	L	T	P	C
		2	0	0	2

Course Objectives: The student will acquire the knowledge

- Introduce fundamentals of CAD/CAM and computer graphics used in product design.
- Explain wire frame and surface modeling techniques with their applications.
- Provide understanding of solid modeling and basics of CNC part programming.
- Introduce group technology concepts and flexible manufacturing systems.
- Explain computer-integrated manufacturing systems and process planning strategies.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION**: Fundamentals of CAD, CAM, Automation, design process, Applicationofcomputersfordesign,BenefitsofCAD,ProductDesignandCAD-Comparison, benefits of using CAD in product design and product development cycle. **COMPUTER GRAPHICS:** Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections.
UNIT– 2	**WIRE FRAME MODELING**: Definition, advantages, dis-advantages, wire frame entities- analytic entities and synthetic entities. **SURFACE MODELING**: Definition, advantages, disadvantages, surface entities-analytic entities and synthetic entities. **SOLID MODELING:** Definition, constructive solid geometry, advantages, modelling entities. Curve representation: Implicit and explicit forms of straight line, circle, ellipse, cubic spline and Bezier curve, differences between Bezier curve and, cubic spline curve and Introduction to Data exchange formats.
UNIT– 3	**PART PROGRAMMING:** NC, NC modes, NC elements, CNC machine tools and their applications, Parts and power transmission in CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming- APT language, simple problems in manual part programming and Computer Aided Part Programming. Direct Numerical Control, Adaptive Control.
UNIT– 4	**GROUP TECHNOLOGY:** Part family, coding and classification, Optiz and MICLASS classification system, benefits of group technology - production flow analysis, types and advantages. **FMS:** Introduction, types of FMS, Equipment, Tool management systems, Layouts, FMS Control.

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UNIT– 5 **COMPUTER INTEGRATED MANUFACTURING SYSTEMS:** Types of manufacturing systems, machine tools and related equipment, material handling systems, material requirement planning, MRP, Enterprise resource planning, computercontrolsystems,humanlaborinmanufacturingsystems,CIMSbenefits, computer aided quality control, Computer aided processes planning – variant processplanningandgenerativeprocessplanning-Implementationconsiderations.

TEXT BOOKS:

1. Automation,Productionsystems&ComputerintegratedManufacturing/M.P. Groover /Pearson Education
2. Mastering CAD/CAM/ Ibrahim Zeid /McGraw-Hill

REFERENCES

1. CAD/CAM Principles and Applications /PN Rao/ McGraw-Hill
2. Principles of Compute r Aided Design and Manufacturing / Farid Amirouche / Pearson
3. Computer Numerical Control Concepts and programming/WarrenS Seames/ Thomson learning, Inc
4. Product manufacturing and cost estimation using CAD/CAE/Kuang Hua Chang/Elsevier Publishers

Course Outcomes: At the end of the course, student will be able to

CO1 Describe the role of CAD in design and apply geometric transformations in graphics.

CO2 Distinguish between modeling types and model basic wireframe and surface Geometries.

CO3 Create solid models and generate simple CNC part programs using manual and APT methods.

CO4 Classify parts using coding systems and explain FMS layouts and control systems.

CO5 DescribecomponentsofCIMSanddifferentiatevariantandgenerativeprocess planning.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

.	EK	PA	DD	ICP	ETU	E&W	ETH	IND &TW	COM M	PM&F	LLL	D&M	TS
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	3	3	3	2	3	3	1	3	2	2	3	3	0
CO2	3	3	3	2	3	3	1	3	2	2	3	3	0
CO3	3	3	3	1	3	3	1	3	2	2	3	3	0
CO4	3	3	3	1	3	3	1	3	2	2	3	3	0
CO5	3	3	3	1	3	3	1	3	2	2	3	3	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	OPERATIONSRESEARCH	L	T	P	C
		2	0	0	2

Course Objectives: The student will acquire the knowledge

- Introduce the fundamentals of operations research and linear programming techniques.
- Teach optimization in transportation, assignment, and sequencing problems.
- Explain models for replacement strategies and decision-making using gametheory.
- Provide knowledge on queuing models and inventory control techniques.
- Introduce dynamic programming principles and simulation modeling.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION** - definition– characteristics and phases – types of operation research models – applications. **LINEAR PROGRAMMING:** Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two–phase method, big-M method – duality principle.
UNIT– 2	**TRANSPORTATION PROBLEM:** Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem- travelling salesman problem. **SEQUENCING**–Introduction–flow–shop sequencing–n jobs through two machines – n jobs through three machines – job shop sequencing – two jobs through 'm' machines.
UNIT– 3	**REPLACEMENT:** Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement. **THEORY OF GAMES:** Introduction–mini.max(max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.
UNIT– 4	**QUEUEING THEORY:** Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel. **INVENTORY CONTROL :** Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable, Instantaneous demand and continuous demand and no set up cost.ABC & VED Analysis.

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UNIT– 5

QUALITY MANAGEMENT : Quality engineering, Taguchi Principles, SQC– X bar, p and c charts, problems,
Juran's principles Introduction to quality acceptance sampling.
Deming's Philosophy, Introduction to Total quality management, Quality Function Deployment, Introduction to six sigma and ISO 9000 2015 standards.

Text Books:

1. Operations Research-An Introduction / Hamdy A Taha / Pearson publishers
2. OperationsResearch–Theory&publications/S.D.Sharma-Kedarnath/McMillan publishers India Ltd

References:

1. Operations Research / R. Panner selvam / PHI Publications.
2. Operations Research/Wagner/PHI Publications.
3. Operation Research/J.K.Sharma / MacMilan Publ.
4. Operations Research/Pai /Oxford Publications
5. Operations Research/S Kalavathy /Vikas Publishers
6. Operations Research/DS Cheema / University cience Press
7. OperationsResearch/ Ravindran,Philips,Solberg/Wileypublishers

Course Outcomes : At the end of the course,s tudent will be able to

CO1 Formulate and solve linear programming problems using graphical and simplex methods.

CO2 Solve transportation, assignment, and sequencing problems for efficient operations.

CO3 Analyze replacement scenarios and determine optimal strategies using game theory.

CO4 Apply queuing theory and inventory models to optimize service and stock management.

CO5 Solve multi stage decision problems and apply simulation to real-life systems.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	1	3	0	1	1	1	1	2	1	1	1	0	0
CO2	1	3	0	1	1	1	1	2	1	1	1	0	0
CO3	1	3	0	1	1	1	1	2	1	1	1	0	0
CO4	1	3	0	1	1	1	1	2	1	1	1	0	0
CO5	1	3	0	1	1	1	1	2	1	1	1	0	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	CAD/CAM LAB	L	T	P	C
		0	0	2	1

Course Objectives: The student will acquire the knowledge

- Introduce students to simulation-based analysis of structural, thermal, and vibrational behavior using FEA tools.
- Provide practical knowledge of CNC part programming for lathe and milling operations.
- Familiarize students with CAM software for automatic tool path planning andG-code generation.
- Introduce the concepts and work flow of rapidprototypingusing3D printing machines.
- Enable students to simulate and visualize the 3 D printing process through online virtual labs.

Note: Student shall perform at least three experiments from a section

CONTENTS

1. Experiment to Design 3D Part modeling using any 3D software and upload to Ansys .
2. Experiments to determine stresses, deflection, natural frequencies, harmonic analysis, HT analysis and buckling analysis.

   a) Determination of deflection and stresses in 2D and 3D trusses and beams.
   b) Determination of principal and Von-mises stresses in plane stress, plane strain and axi symmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   d) Estimation of natural frequencies and mode shapes, harmonic response of 2D beam.
   e) Steady state heat transfer analysis of plane and axi symmetric components.
   f) Buckling analysis

3. Study of CNC part programming fundamentals and write part programmes for simple components on CNC lathe and Mill and Study of RP machine.

   A. CNC part programming for turned components
      (i) Plain turning and facing
      (ii) Step Turning Operation
      (iii) Taper turning

   B. CNC programming for milled components
      (i) Circular interpolation
      (ii) End milling
      (iii) Pocket milling

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Course Outcomes: At the endof the course, student will be able to

CO1 Perform structural, thermal, and buckling analyses using FEA and interpret stress, deflection, and frequency results.

CO2 Develop and execute CNC part programs for basic lathe and milling operations.

CO3 Generate optimized CNC tool paths and G-codes using CAM packages for given part geometries.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO 2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	3	3	3	3	3	2	1	2	2	1	3	3	1
CO2	3	3	3	3	3	2	1	2	2	1	3	3	1
CO3	3	3	3	3	3	2	1	2	2	1	3	3	1

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IVYear I Semester	MECHATRONICS (Professional Elective-IV)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquirethe knowledge

- Introduce the fundamentals, components, and sensor technologies in mechatronic systems.
- Familiarize students with solid-state devices and analog signal conditioning techniques.
- Provide understanding of fluid-based and mechanical actuation systems in automation.
- Introduce digital control systems, microcontrollers, and PLC sinmechatronic applications.
- Teach interfacing techniques, data acquisition, and digital signal processing in mechatronic systems.

UNIT **CONTENTS**

UNIT– 1 **MECHATRONICS SYSTEMS:** Elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT– 2 **SOLIDSTATEELECTRONICDEVICES:** PN junction diode, BJT, FET, DIAC,TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering

UNIT– 3 **HYDRAULICAND PNEUMATIC ACTUATINGSY STEMS:** Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuatingsystemsandelectricalactuatingsystems–basicprinciplesandelements.

UNIT– 4 **DIGITAL ELECTRONICS AND SYSTEMS:** Digital logic control, microprocessors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT– 5 **SYSTEM AND INTERFACING AND DATA ACQUISITION:** Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing–data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives. Design of mechatronics systems &future trends.

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TextBooks:

1. MECHATRONICS Integrated Mechanical Electronics Systems / KP Ramachandran, GK Vijaya Raghavan & MS Bala sundaram / WILEY India Edition

References:

1. Mechatronics / Smaili A,Mrad F/ Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book / Newton C Braga / Thomson Publications, Chennai.
3. Mechatronics – N.Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics System Design / Devdasshetty / Richard/Thomson.
5. Mechatronics / M.D.Singh / J.G.Joshi / PHI.
6. Mechatronics–Electronic Control Systems in Mechanical and Electrical Engg.4th Edition / W. Bolton/ Pearson,2012
7. Mechatronics–Principles and Application / Godfrey C.Onwubolu /Elsevier, Indianprint

Course Outcomes: At the end of the course, student will be able to

CO1 Explain the structure of mechatronic systems and identify various sensors used for Measurement and control.

CO2 Describe the working of electronic devices and apply analog signal conditioning using Operational amplifiers.

CO3 Analyze hydraulic, pneumatic, and electro mechanical actuation systems and their components.

CO4 Develop basic control logic using microprocessors, micro controllers, and PLCs.

CO5 Implement data acquisition, signal processing, and motor drive interfacing in a mechatronic setup.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	2	2	1	3	3	2	1	2	2	2	2	2	0
CO2	2	2	1	3	3	2	1	2	2	2	2	2	0
CO3	2	2	1	3	3	2	1	2	2	2	2	2	0
CO4	2	2	1	3	3	2	1	2	2	2	2	2	0
CO5	2	2	1	3	3	2	1	2	2	2	2	2	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	COMPUTATIONALFLUID DYNAMICS (Professional Elective-IV)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce PDE classification, fundamental fluid flow equations, and basic numerical solution techniques.
- Explain dimensionless momentum and energy equations and finite difference applications in heat transfer.
- Introduce discretization methods, consistency, and stability in finite difference fluid flow modelling.
- Provide understanding of wave equation stability and finite volume method in CFD.
- Introduce FEM formulation and its application to 1D and 2D fluid flow and heat transfer problems.

UNIT	CONTENTS
UNIT– 1	**CONSERVATION PRINCIPLES:** Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations (Derivation), conservation of energy principle, special forms of the Navier-stokes equations. **APPLIED NUMERICAL METHODS:** Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix in version, direct methods for banded matrices, TDMA–Algorithms.
UNIT– 2	**CONDUCTION AND CONVENTION:** Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function -vorticity formulation. Finite difference applications in heat conduction and convention –heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.
UNIT– 3	**EXPLICIT AND IMPLICIT METHODS**: Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modelling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.
UNIT– 4	**INTRODUCTION TO FIRST ORDER WAVE EQUATION:** Stability of hyperbolic and elliptic equations, fundamentals of fluid flow modelling, conservative property, the upwind scheme. **FINITE VOLUME METHOD:** Approximation of surface integrals, volume integrals, interpolation and differentiation practices, up wind interpolation,linear interpolation and quadratic interpolation.

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UNIT– 5 **FINITE ELEMENT METHOD:** Introduction–Weighted Residual and Variational Formulations–Rayleigh-Ritz Method–Interpolation–One dimensionalandTwodimensionalregions–ErrorControl–ApplicationsofFEM toOnedimensionalProblems(SteadyandTransient)–Twodimensionalproblems

Text Books:

1. Numerical heat transfer and fluid flow / Suhas V.Patankar / Butter-worth Publishers
2. Computational fluid dynamics-Basics with applications/John.D.Anderson / McGraw Hill.

References:

1. Computational Fluid Flow and Heat Transfer / Niyogi / Pearson Publications
2. Introduction to CFD: Finite Volume Method – H.Versteegand W. Malala sekahara
3. Fundamentals of Computational Fluid Dynamics/Tapan K.Sengupta / Universities Press.
4. Computationalfluiddynamics:Anintroduction,3rdedition/John.FWendt/Springer publishers

Course Outcomes: At the end of the course, student will be ableto

CO1 Derive governing equations of fluid flow and apply numerical methods like TDMA for solving linear systems.

CO2 Analyze steady / transient heat conduction and convective problems using finite difference techniques.

CO3 Apply finite difference methods and assess consistency and stability of numerical schemes.

CO4 Analyze stability and implement interpolation schemes using finite volume methods For fluid flow problems.

CO5 Solve fluid flow and heat transfer problem susing FEM with appropriate Interpolation and error control techniques.

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PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	3	1	2	2	1	0	0	1	1	2	2	3
CO2	3	3	1	2	2	2	0	0	1	1	2	2	3
CO3	3	3	2	2	3	2	0	0	1	1	3	2	3
CO4	3	3	2	3	3	2	0	1	1	2	3	2	3
CO5	3	3	3	3	3	3	1	1	2	2	3	3	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	FUNCTIONAL MATERIALS AND APPLICATIONS (Professional Elective - IV)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES: The student will acquire the knowledge

- Introduce crystal structures, defects, and deformation mechanisms in materials.
- Explain electrical and magnetic behavior of materials using classical and quantum theories.
- Provide understanding of semiconductor physics and charge transport mechanisms.
- Explore optical behavior of materials and principles behind optoelectronic devices.
- Introducequantumphenomenainnanomaterialsandtheirapplicationinelectronics and photonics.

UNIT	CONTENTS
UNIT– 1	**CRYSTALLOGRAPHY**: Crystal structures: BCC, FCC and HCP–directions and planes – linear and planar densities–crystal imperfections-edge and screw dislocations – grain and twin boundaries - Burgers vector and elastic strain energy-Slipsystems,plasticdeformationofmaterials-Polymorphism–phase changes.
UNIT– 2	**ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS:** Classical free electron theory – Expression for electrical conductivity–Thermal conductivity, expression - Quantum free electron theory: Tunneling – degenerate states–Fermi-Dirac statistics–Density of energy states–Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – para magnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.
UNIT– 3	**SEMICONDUCTORS AND TRANSPORT PHYSICS**: Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors:Drift,mobilityanddiffusion–Halleffectanddevices–Ohmic contacts – Schottky diode
UNIT– 4	**OPTICAL PROPERTIES OF MATERIALS**: Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode–laser diode-optical processes inorganic semiconductor devices–excitonic state – Electro-optics and non linearoptics:

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Modulatorsandswitchingdevices– plasmonics.

UNIT– 5 **NANO ELECTRONIC MATERIALS:** Quantum confinement – Quantum structures–quantumwells,wiresanddots–Zener-Blochoscillations–Resonant tunneling – quantum interference effects - mesoscopic structures - Single electron phenomena – Single electron Transistor. Semiconductor photonic structures – 1D, 2D and 3D photonic crystal. Active and passive optoelectronic devices – photo processes – spintronics – carbon nanotubes: Properties and applications.

TEXT BOOKS:

1. V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015.
2. S.O.Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.
3. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley (India), 2007.
4. Jasprit Singh,SemiconductorOptoelectronics:PhysicsandTechnology,Mc-GrawHill India (2019)
5. G.W.Hanson. Fundamentals of Nano electronics. Pearson Education (Indian Edition), 2009.

REFERENCES:

1. R.Balasubramaniam, Callister's Materials Science and Engineering.Wiley(Indian Edition), 2014.
2. Wendelin Wright and Donald Askeland, Essentials of Materials Science and Engineering, CL Engineering, 2013.

Course Outcomes: At the end of the course, student will be able to

CO1 Explain crystal geometries, imperfections, and their influence on material Deformation and phase changes.

CO2 Analyze electrical conductivity, energy bands, and magnetic properties of different materials.

CO3 Calculate carrier concentration, mobility, and analyze transport phenomenain Intrinsic and extrinsic semiconductors.

CO4 Explain optical transitions, recombination processes, and working of optoelectronic And non linear optical devices.

CO5 Describe quantum confinement, nanostructures, and emerging nano electronic and spintronic devices.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	1	1	2	1	3	3	3	3	2	3	2	2
CO2	3	1	1	2	1	3	3	3	3	2	3	2	2
CO3	3	1	1	2	1	3	3	3	3	2	3	2	2
CO4	3	1	1	2	1	3	3	3	3	2	3	2	2
CO5	3	1	1	2	1	3	3	3	3	2	3	2	2

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	DRIVES AND ACTUATORS FOR ROBOTICS (Professional Elective - IV)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES: The student will acquire the knowledge

- Introduce switching devices and their characteristics for motor control applications.
- Understand the dynamic behavior and performance characteristics of electric drives.
- Provide knowledge of DC motors ,their characteristics, and drive configurations.
- Explain various control methods used in three-phase induction motor drives.
- Introduce stepper, servo, and BLDC motors and their applications in automation.

UNIT	CONTENTS
UNIT– 1	**RELAY AND POWER SEMI-CONDUCTOR DEVICES**: Study of Switching Devices – Relay and Types, Switching characteristics -BJT, SCR, TRIAC ,GTO, MOSFET, IGBT and IGCT-: SCR, MOSFET and IGBT-Triggering and commutation circuit-Introduction to Driver and snubber circuits
UNIT– 2	**DRIVE CHARACTERISTICS**: Electric drive–Equations governing motor loaddynamics–steadystatestability–multiquadrantDynamics:acceleration, deceleration, torque, and Direction starting & stopping – Selection of motor
UNIT– 3	**DC MOTORS AND DRIVES**: DC Servomotor - Types of PMDC & BLDC motors-principle of operation- emf and torque equations –characteristics and control– Drives-Hbridge-Single and Three Phases –4quadrantoperation – Applications
UNIT– 4	**ACMOTORS AND DRIVES**: Introduction–Induction motor drives–Speed control of 3- phase induction motor–Stator voltage control – Stator frequency control – Stator voltage and frequency control – Stator current control – Static rotor resistance control – Slip power recovery control.
UNIT– 5	**STEPPER AND SERVO MOTOR**: Stepper Motor: Classifications-Construction and Principle of Operation – Modes of Excitation Drive System- Logic Sequencer-Applications. Servo Mechanism–DC Servomotor-AC Servomotor – Applications.

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TEXT BOOKS:

1. Bimbhra B.S.,"Power Electronics",5th Edition, Kanna Publishers, New Delhi,2012.
2. MehtaV.K.&Rohit Mehta,"Principles of Electrical Machines",2ndEdition, S.Chand& Co. Ltd., New Delhi, 2016.

REFERENCES

1. GobalK. Dubey,"Fundamentals of Electrical Drives",2nd Edition,Narosal Publishing House, New Delhi, 2001.
2. Theraja B.L.&Theraja A.K.,"AText Book of Electrical Technology",2ndEdition, S.Chand & Co. Ltd., New Delhi, 2012.
3. Singh M.D. & Kanchandhani K.B., "Power Electronics", Mc Graw Hill, New Delhi, 2007

COURSE OUT COMES: At the end of the course, the student able to

CO1 Explain the working, triggering, andprotectionofrelays,SCRs,MOSFETs,IGBTs, andassociated circuits.
CO2 Analyze motor – load dynamics and select suitable motors based on drive requirements.
CO3 Explain DC motor operation and implement single/three-phase drives with H-bridge control.
CO4 Apply different speed control techniques to three-phase induction motors using AC drives .
CO5 Describe construction, operation, and control methods of stepper, servo, and BLDC motors.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	2	3	1	1	3	1	2	3	2	3	3	0
CO2	3	2	1	1	1	3	1	2	3	2	3	1	0
CO3	3	2	1	1	1	3	1	2	3	2	3	1	0
CO4	3	2	1	1	1	3	1	2	3	2	3	1	0
CO5	3	2	1	1	1	3	1	2	3	2	3	1	0

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Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IVYear I Semester	HYDROGEN AND FUEL CELL TECHNOLOGY (Professional Elective - V)	L	T	P	C
		3	0	0	3

Course Objectives:

- To introduce the fundamental concepts of hydrogen as an energy carrier and its role in a sustainable energy system.
- To provide comprehensive knowledge on various hydrogen production technologies.
- To impart understanding of hydrogen storage technologies and associated challenges.
- To explore various applications of hydrogen in energy conversion devices and engines.
- To explain the principles, types, and performance characteristics of fuel cells.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION OF HYDROGEN ENERGY SYSTEMS:** Properties of hydrogen as fuel, Hydrogen pathways introduction-current uses, general introduction to infrastructure requirement for hydrogen production, storage, dispensing, utilization, safety and hydrogen production plants.
UNIT– 2	**HYDROGEN PRODUCTION PROCESSES**: Thermal-Steam reformation, thermo chemical water splitting, gasification - pyrolysis, nuclear thermal catalytic and partial oxidation methods, Electrochemical-Electrolysis, photo electro chemical, Biological-Anaerobic digestion, fermentation micro-organism, PM based electrolyser.
UNIT– 3	**HYDROGEN STORAGE:** Physical and chemical properties, general storage methods, compressed storage-composite cylinders, glass microsphere storage, zeolites, metal hydride storage, chemical hydride storage and cryogenic storage, carbon based materials for hydrogen storage.
UNIT– 4	**HYDROGEN UTILIZATION:** Overview of hydrogen utilization, IC Engines, gas turbines, hydrogen burners, power plant, domestic cooking gas, marine applications, hydrogen dual fuel engines.
UNIT– 5	**FUELCELLS:** History–principle-working-thermodynamics and kinetics of fuel cell process –performance evaluation of fuel cell – comparison on battery Vs fuel cell, Types of fuel cells–AFC,PAFC,SOFC,MCFC,DMFC, PEMFC,microbial fuel cells, relative merits and demerits and application of fuel cells.

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Text Books:

1. Sorenson B, Hydrogen and Fuel Cells: Emerging Technologies and Applications, Bent Sorenson, Academic Press (2005).
2. Hordeski MF, Hydrogen and Fuel Cells: Advances in Transportation and Power, The Fairmont Press, Inc. (2009)
3. Busby RL, Hydrogen and Fuel Cells: A Comprehensive Guide, Penn Well Books (2005).

Course Outcomes (COs):

CO1: Understand the properties of hydrogen as a fuel and describe the infrastructure requirements for its production, storage, and utilization.
CO2: Analyze various hydrogen production methods including thermal, electrochemical, and biological processes.
CO3: Evaluate different hydrogen storage technologies such as compressed, cryogenic, and solid-state systems with their respective merits and challenges.
CO4: Examine the applications of hydrogen in IC engines, power generation, domestic usage, and hybrid fuel systems.
CO5: Understand the working principles, types, performance, and applications of various fuel cells and distinguish them from conventional batteries.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO 2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	2	0	2	2	1	0	0	1	1	2	2	2
CO2	3	3	0	2	2	2	0	0	1	1	2	1	3
CO3	3	3	0	3	2	2	0	0	1	1	3	1	3
CO4	3	3	2	3	3	2	0	1	1	2	3	2	3
CO5	3	3	2	3	3	3	1	1	2	2	3	3	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	SMART MANUFACTURING (ProfessionalElective-V)	L	T	P	C
		3	0	0	3

Course Objectives to:

- Introduce the key concepts, characteristics, and challenges of smart and circular manufacturing.
- Explain the role and architecture of smart machines and sensors in industrial environments.
- Provide an understanding of CPS design and the 5C architecture in smart factories.
- Introduce digital twin technology and the use of AI and ML in smart manufacturing.
- Explore IoT communication protocols and connectivity infrastructure for industrial automation.

CONTENTS

UNIT– 1 **CONCEPTS OF SMART MANUFACTURING:** Definition and key characteristics of smart manufacturing, Corporate adaptation processes, manufacturing challenges, challenges vs technologies, Overview of circular manufacturing, Stages in smart manufacturing. Minimizing Six big losses in manufacturing with Industry 4.0, Industry 5.0, and their benefits

UNIT– 2 **SMART MACHINES AND SMART SENSORS:** Concept and Functions of a Smart, Machine Salient features and Critical Subsystems of a Smart Machine, Smartsensors;smartsensorsecosystem,need,benefitsandapplicationsofsensors in industry, Sensing for Manufacturing Process in IIoT, Block Diagram of a IoT Sensing Device, Sensors in IIoT Applications, Smart Machine Interfaces

UNIT– 3 **ARCHITECTUREOFCYBER-PHYSICAL SYSTEM(CPS):** Functions of CPS, 5C Architecture; Smart Connection Level, Data-to- Information Level, Cyber Level, Cognition Level, Configuration Level. Design of PHM based CPS systems. Comparison of today's factory and Industry 4.0 factory by the implementation of 5C CPS architecture

UNIT– 4 **DIGITAL TWIN:** Introduction, applications of digital twins, impact zones of digital twins in manufacturing (factories/plants and OEMs),advantages of digital twins, basic steps of digital twin technology, Multi verse and AR and VR.

MACHINE LEARNING (ML) AND ARTIFICIAL INTELLIGENCE (AI) INMANUFACTURING: Introduction, benefits and applications of ML in industries, common approaches of ML; supervised and unsupervised, semi-Supervised and rein forced ML, Application of AI and ML for predictive maintenance.

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UNIT– 5 **IOT CONNECTIVITY FOR INDUSTRY 4.0:** Industrial communication requirement and its infrastructure, an overview of different types of networks, mesh network in industrial IoT, IoT protocols and the internet, TCP/IP (transmission control protocol/internet protocol) model, IoT connectivity standards: common protocols, application layer protocols, internet / network layer protocols, physical layer IoT protocols.

Text Books:

1. Industry 4.0 The Industrial Internet of Things by A lasdair Gilchrist, A press
2. Industrial Internet of Things, Cyber Manufacturing System by Sabina Jeschke, Christian Brecher, Houbing Song Danda B. Rawat, Springer

Course Outcomes: At the end of the course, student will be able to

CO1 Explain the evolution, stages, and benefits of smart manufacturing, Industry4.0and Industry5.0.

CO2 Identify and describe smart sensors, sub systems, and interfaces used in IoT-based manufacturing.

CO3 Analyze CPS functions and compare traditional manufacturing with Industry4.0CPS-based systems.

CO4 Explain digital twin implementation and apply AI / ML concepts for predictive Maintenance in manufacturing.

CO5 Understand and differentiate IoT network layers and protocols used in Industry 4.0 applications.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO 2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	1	2	1	3	3	1	3	3	3	3	1	1
CO2	3	1	1	1	3	3	1	3	3	3	3	1	1
CO3	3	1	1	1	3	3	1	3	3	3	3	1	1
CO4	3	1	1	1	3	3	1	3	3	3	3	1	1
CO5	3	1	1	1	3	3	1	3	3	3	3	1	1

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	AUTONOMOUS SYSTEMS (Professional Elective-V)	L	T	P	C
		3	0	0	3

Course Objectives to :

- Introduce the concepts of intelligent agents and multi-agent systems in the context of autonomous systems.
- Provide an understanding of the architectural design and autonomy levels in unmanned systems like AGVs, AUVs, and drones.
- Equip students with knowledge of modelling and control techniques for different types of unmanned ground, aerial, and underwater vehicles.
- Familiarize students with various sensors, actuators, and computing platforms used in autonomous systems.
- Develop a foundational understanding of aerial robot flight concepts, control strategies, motion planning, and communication protocols.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION TO AGENT SYSTEMS:** Introduction to Agents, Agent Architectures, and Multi-agent Systems and Society of Agents, Distributed Problem Solving and Planning, Case Study: Collaborative Robotics, Robo cup
UNIT– 2	**ARCHITECTURE OF AUTONOMOUS SYSTEMS:** Degree of Autonomy, Reactive Systems, Real-time Systems, Architecture of AGV's , AUV , Drones, Tele-Operation, AR, VR applications
UNIT– 3	**CLASSIFICATION,MODELLING,AND CONTROL ASPECTS OF UNMANNED VEHICLES:** Different types of unmanned vehicles: ground (wheeled and legged), aerial (fixed, flapping, and rotary wings), underwater vehicles , Modelling of unmanned vehicles considering basic forces,kinematics,anddynamics,Discussionondifferenttypesofcontrol for aerial, underwater (fins and propulsion control), ground (biped and quadruped motion control for legged robots)
UNIT– 4	**SENSORS AND ACTUATORS:** Types of sensors used in unmanned vehicles (proximity, IMU, magnetometers, thermal imaging, vision, LiDAR, GPS, RTK, etc.) and their characteristics, Sensor data aggregation, processing, and sensor fusion, Introduction to popular computing platforms for data processing, Types of actuators: motors, servos, harmonic drive, linear actuators
UNIT– 5	**FLIGHT CONCEPTS:** Basic Aerial Robot Flight Concepts, Micro-aerial

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vehicle, Frame Rotations and Representations, Aerial robots equations of motion,State-SpaceForm,Time,Motion,andTrajectories,Linearization, 2-D and 3-D control of Aerial robots, PID Control, LQR control, Motion planning, Collision-free Navigation, Sensingand Estimation, Vision-based Guidance for aerial robots, Introduction to Communication and Networking Protocols.

Textbooks:

1. Roland Siegwart, Illah Reza Nour bakhsh, Davide Scaramuzza (2018),
2. Introduction to autonomous mobile robots, MIT press.2 .Gerhard Weissed.(2013), Multi agent System, Second Edition, MIT Press
3. C.Venkatesan,(2014),FundamentalsofHelicopterDynamics,1stEdition,CRCPress Anderson,(2015),IntroductiontoFlight,8thEdition,McGraw-Hill Education

COURSEOUTCOMES:Attheendofthecourse,thestudentwillbeableto:

CO1: Understand the structure and functioning of intelligent agents and multi-agent systems for collaborative autonomous tasks.

CO2: Analyze and differentiate the architectural features and levels of autonomy in ground, aerial, and underwater autonomous systems.

CO3: Model and apply control techniques to different types of unmanned vehicles considering dynamics and motion constraints.

CO4: Identify and evaluate suitable sensors and actuators used in autonomous systems, and implement basic sensor fusion techniques.

CO5: Apply control algorithms and motion planning strategies for aerial robots including trajectory tracking, guidance, and navigation.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	1	3	1	2	2	3	3	1	0
CO2	3	1	1	1	1	3	1	2	2	3	3	1	0
CO3	3	1	1	1	1	3	1	2	2	3	3	1	0
CO4	3	1	1	1	1	3	1	2	2	3	3	1	0
CO5	3	1	1	1	1	3	1	2	2	3	3	1	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

IV Year I Semester	EMBEDDED SYSTEMS AND PROGRAMMING (Professional Elective-IV)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES: The students will acquire the knowledge:

- Introduce microcontrollers, their architecture, instruction sets, and memory organization.
- Develop programming skills in assembly and embedded C with communication interfaces.
- Teach interfacing of micro controllers with external peripherals and actuators.
- Introduce ARM architecture, instruction sets, and its basic programming.
- Explainsystem-on-chiparchitectureandembeddedprogrammingusingPythononSBCs.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION TO MICRO CONTROLLER**: Fundamentals Functions of ALU - Microprocessor - Microcontrollers – CISC and RISC – Types Microcontroller - 8051 Family - Architecture - Features and Specifications - Memory Organization - Instruction Sets – Addressing Modes.
UNIT– 2	**PROGRAMMING AND COMMUNICATION**: Fundamentals of Assembly Language Programming – Instruction to Assembler – Compiler and IDE - C Programming for 8051 Microcontroller – Basic Arithmetic and Logical Programming - Timer and Counter - Interrupts – Interfacing and Programming of Serial Communication, I2C, SPI and CAN of 8051 Microcontroller – Bluetooth and WI-FI interfacing of 8051 Microcontroller.
UNIT– 3	**PERIPHERAL INTERFACING:** I/O Programming – Interfacing of Memory, Key Board and Displays–Alpha numeric and Graphic, RTC, interfacing of ADC and DAC, Sensors - Relays - Solenoid Valve and Heater - Stepper Motors, DC Motors - PWM Programming – Closed Loop Control Programming of Servomotor – Traffic Light
UNIT– 4	**ARM PROCESSOR:** Introduction ARM 7 Processor - Internal Architecture – Modes of Operations –Register Set – Instruction Sets –ARM Thumb -Thumb State Registers – Pipelining – basic programming of ARM 7 - Applications.
UNIT– 5	**SINGLE BOARD COMPUTERS AND PROGRAMMING**: System on Chip - Broadcom BCM2711 SoC – SBC architecture - Models and Languages – Embedded Design – Real Time Embedded Operating Systems - Real Time Programming Languages – Python for Embedded Systems- GPIO Programming – Interfacing

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TEXTBOOKS:

1. FrankVahidandTonyGivagis, "EmbeddedSystemDesign",2011, Wiley.
2. KennethJ.Aylala,"The8051Microcontroller, the Architecture and Programming Applications", 2003.

REFERENCES:

1. Muhammad Ali Mazidi and Janice Gillispic Mazdi,"The8051Microcontroller and Embedded Systems", Pearson Education, 2006.
2. Simon Monk, Programming the Raspberry Pi, Second Edition: Getting Started with Python McGraw Hill TAB; 2nd edition,2015
3. JamesW.Stewart,"The 8051Microcontroller Hardware, Soft ware and Interfacing", Regents Prentice Hall, 2003.
4. JohnB.Peatman," Design with Microcontrollers",McGraw Hill International,USA, 2005.

Course Outcomes : At the endof the course, student will be able to

CO1 Explain 8051architecture,instruction formats, addressing modes, and memory organization.

CO2 Write programs in assembly / C for 8051andinterface serial / I2C /SPI /CAN, Bluetooth,And Wi- Fi modules.

CO3 Interface8051withmemory, displays, motors, sensors, and write closed-loop control programs.

CO4 DescribeARM7 architecture and write basic programs using ARM instruction sets.

CO5 ApplyGPIOprogrammingandinterfaceperipheralsusingPythononsingle-board computers.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO 2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 10	PO1 11	PSO1	PSO2
CO1	1	1	0	2	0	3	1	2	2	3	3	2	0
CO2	1	1	0	2	0	3	1	2	2	3	3	2	0
CO3	1	1	0	2	0	3	1	2	2	3	3	2	0
CO4	1	1	0	2	0	3	1	2	2	3	3	2	0
CO5	1	1	0	2	0	3	1	2	2	3	3	2	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	FINITE ELEMENT METHODS (Open Elective–III)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce fundamentals of FEM including stress-strain relations and variational methods.
- Teach weighted residual methods and energy principles for solving1D problems.
- Introduce bar element formulation and discretization techniques in FEM.
- Teach2D finite element modeling using CST and rectangular elements.
- Introduce higher order and iso-parametric elements with natural coordinates and numerical integration.

UNIT CONTENTS

UNIT– 1 **VARIATIONAL METHODS:** Introduction to finite element method, stress and equilibrium, strain –displacement relations, stress–strain relations, plane stress and plane strain conditions, variational methods.

UNIT– 2 **WEIGHTED RESIDUAL METHODS :** solving differential equations using weighted residual methods, concept of potential energy, one dimensional problems.

UNIT– 3 **1 D- ELEMENTS :** Bar element formulation, Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, bandwidth, node numbering, mesh generation, interpolation functions, local andglobal oordinates,convergencerequirements,treatmentofboundaryconditions.

UNIT– 4 **2D-ELEMENTS:** Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions. Finite element modeling of four noded rectangular element.

UNIT– 5 **HIGHER ORDER AND ISO-PARAMETRIC ELEMENTS:** One dimensional, quadratic and cubic elements in natural coordinates, two dimensional four node iso-parametric elements and numerical integration.

Text Books:

1. The Finite Element Methods in Engineering/ SSRao / Pergamon.

References:

1. Finite Element Method with applications in Engineering / YMDesai, Eldho &Shah / Pearson publishers
2. An introduction to Finite Element Method / JN Reddy / Mc Graw Hill
3. TheFiniteElementMethodforEngineers–KennethH.Huebner,DonaldL.Dewhirst, Douglas E. Smith and Ted G. Byrom /John Wiley& sons (ASIA)Pte Ltd.

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4. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education
5. Finite Element Methods / Chen
6. Finite Element Analysis: for students & Practicing Engineers / G.Lakshmi Narasaiah / BSP Books Pvt. Ltd.

Course Outcomes : At the end of the course, student will be able to

CO1 Explain stress-strain relations and apply variational methods in FEM formulations.
CO2 Applyweightedresidualmethodsandpotentialenergyprinciplesto1DFEMproblems.
CO3 Formulate bar element stiffness matrix and perform mesh generation with appropriate boundary conditions.
CO4 Model 2D stress problem susing CSTand four-node rectangular elements with boundary conditions.
CO5 Apply quadratic, cubic, and iso-parametric elements using numerical integration in FEM.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

PSO 1 :Analyze, design and develop mechanical components to solve engineer problems in design and manufacturing domains.
PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	3	3	3	3	3	1	3	3	3	3	3	3
CO2	3	3	3	3	3	3	1	3	3	3	3	3	3
CO3	3	3	3	3	3	3	1	3	3	3	3	3	3
CO4	3	3	3	3	3	3	1	3	3	3	3	3	3
CO5	3	3	3	3	3	3	1	3	3	3	3	3	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	INTRODUCTION TO MECHATRONICS (Open Elective-III)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce mechatronics systems, their components, and various sensors used for measurement.
- Explain solid-state devices and analog signal conditioning using op-amps.
- Explore fluid power and mechanical actuation systems with their control mechanisms.
- Teach digital electronics, micro controllers, and PLC-based control systems.
- Introduce data acquisition, digital signal processing, and mechatronic system design.

UNIT	CONTENTS
UNI– 1	**MECHATRONICS SYSTEMS**: Elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.
UNIT–2	**SOLID STATE ELECTRONIC DEVICES :**PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering
UNIT–3	**HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS:** Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems–basic principles and elements.
UNIT–4	**DIGITAL ELECTRONICS AND SYSTEMS:** Digital logic control, microprocessors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.
N IT– 5	**SYSTEM AND INTERFACING AND DATA ACQUISITION :** Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing–data flow in DSPs, block diagrams typical lay outs, Interfacing motor drives. Design of mechatronics systems & future trends.

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

Text Books:

1. MECHATRONICS Integrated Mechanical Electronics Systems / KP Ramachandran, GK Vijaya Raghavan& MS Balasundaram /WILEY India Edition

References:

1. Mechatronics / Smaili A, Mrad F / Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book/Newton C Braga/Thomson Publications, Chennai.
3. Mechatronics – N.Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics System Design / Devdas shetty / Richard/Thomson.
5. Mechatronics / M.D.Singh / J.G.Joshi / PHI.
6. Mechatronics–Electronic Control Systems in Mechanical and Electrical Engg.4th Edition / W. Bolton/ Pearson,2012
7. Mechatronics–Principles and Application / GodfreyC. Onwubolu / Elsevier, Indian print

Course Outcomes: At the end of the course, student will be able to

CO1 Identify components of mechatronics systems and explain working principles of Various sensors.

CO2 Analyze characteristics of electronic devices and apply signal conditioning techniques.

CO3 Describe operation of hydraulic, pneumatic, and mechanical actuating systems.

CO4 Develop basic logic control systems using microcontrollers and PLCs.

CO5 Designbasicmechatronicsystemsincorporatingdataacquisitionandinterfacing techniques.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO 2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	2	2	1	3	3	2	1	2	2	2	2	2	0
CO2	2	2	1	3	3	2	1	2	2	2	2	2	0
CO3	2	2	1	3	3	2	1	2	2	2	2	2	0
CO4	2	2	1	3	3	2	1	2	2	2	2	2	0
CO5	2	2	1	3	3	2	1	2	2	2	2	2	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	PRODUCT DESIGN AND DEVELOPMENT (Open Elective - III)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES : The student will acquire the knowledge

- Introduce fundamental tools, standards, and practices in product design, engineering drawings, BOM, and project management.
- Familiarize students with global material standards, manufacturing processes, and product analysis tools.
- Teach the structured approach to product design from RFQ to initial sample submission with relevant documentation.
- Emphasize quality testing, customer validation, and risk assessment in new product qualification.
- Highlight the importance of standardized reporting, prototyping, reverse engineering, and concurrent engineering in NPD.

UNIT	CONTENTS
UNIT–1	**FUNDAMENTALS OF PRODUCT DESIGN AND DEVELOPMENT:** Introduction – Reading of Drawing – Grid reading, Revisions, ECN (Engg. Change Note), Component material grade, Specifications, customer specific requirements – Basics of monitoring of NPD applying Gantt chart, Critical path analysis – Fundamentals of BOM (Bill of Materials), Engg. BOM & Manufacturing BOM. Basics ofMIS softwareand theirapplication inindustries like SAP, MS Dynamics, Oracle ERP Cloud – QFD.
UNIT–2	**MATERIAL SPECIFICATIONS, ANALYSIS & PROCESS** : Material Specification standards–ISO, DIN, JIS, ASTM, EN, etc.–Awareness on various manufacturing process like Metal castings & Forming, Machining(Conventional, 3 Axis, 4 Axis, 5 Axis,), Fabrications, Welding process. Qualifications of parts mechanical, physical & Chemical properties and their test report preparation and submission. Fundamentals of DFMEA &PFMEA, Fundamentals of FEA, Bend Analysis, Hot Distortion, Metal and Material Flow, Fill and Solidification analysis.
UNIT–3	**ESSENTIALS OF PRODUCT DESIGN AND DEVELOPMENT**:RFQ (Request of Quotation)Processing– Feasibility Studies & reporting–CFT(Cross Function Team) discussion on new product and reporting – Concept design, Machine selection for tool making, Machining – Manufacturing Process selection, Machining Planning, cutting tool selection – Various Inspection methods – Manual measuring, CMM – GOM (Geometric Optical Measuring), Lay out marking and Cut section analysis. Tool Design and Detail drawings preparation, release of details to machine shop and CAM programming. Tool assemblyandshopfloortrials.InitialsamplesubmissionwithPPAPdocuments.

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UNIT–4 **CRITERIONS OF PRODUCT DESIGN AND DEVELOPMENT**: New product qualification for Dimensions, Mechanical & Physical Properties, Internal Soundness proving through X-Ray, Radiography, Ultrasonic Testing, MPT, etc. Agreement with customer for testing frequencies. Market Survey on similar products, Risk analysis, validating samples with simulation results, Lesson Learned &Horizontal deployment in NPD(New Product Development).

UNIT–5 **REPORTING & FORWARD-THINKING OF NPD**: Detailed study on PPAP with 18 elements reporting, APQP and its 5 Sections, APQP vs PPAP, Importance of SOP (Standard Operating Procedure) – Purpose & documents, deployment in shop floor. Prototyping & RPT - Concepts, Application and its advantages, 3D Printing – resin models, Sand cores for foundries; Reverse Engineering. Cloud points generation, converting cloud data to 3D model – Advantages & Limitation of RE, CE (Concurrent Engineering) – Basics, Applicationanditsadvantagesin NPD(toreducedevelopmentleadtime,time toMarket, Improve productivity and product cost.)

TEXT BOOKS:

1. Product Development –Sten Jonson
2. Product Design & Development–KarlT.Ulrich,MariaC.Young, StevenD. Eppinger

REFERENCES:

1. Revolutionizing Product Development–Steven C Wheelwright &Kim B.Clark
2. Toyota Product Development System–James Morgan &Jeffrey K. Liker
3. Winningat New Products–Robert Brands3rd Edition
4. Product Design &Value Engineering–Dr.M.A. Bulsara &Dr.H.R. Thakkar

Course Outcomes: At the end of the course, student will beable to

CO1 Understand drawing interpretation, BOM structure, Gantt charts, QFD, and industrial MIS tools like SAP and Oracle ERP.

CO2 Identify material standards, manufacturing methods, and apply DFMEA,PFMEA, and FEA fundamentals in product evaluation.

CO3 Demonstrate the ability to process RFQs, select tools/machines, plan manufacturing, and prepare PPAP documents.

CO4 Evaluate product performance using testing methods and apply lessons learned for NPD improvement.

CO5 Prepare comprehensive reports (PPAP,APQP),utilize prototyping / RPT tools, and Apply RE & CE to enhance product development.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	2	1	1	1	2	2	3	3	3	3	1	0
CO2	3	2	1	1	1	2	2	3	3	3	3	1	0
CO3	3	2	1	1	1	2	2	3	3	3	3	1	0
CO4	3	2	1	1	1	2	2	3	3	3	3	1	0
CO5	3	2	1	1	1	2	2	3	3	3	3	1	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	ADVANCED MATERIALS (OpenElective-III)	L	T	P	C
		3	0	0	3

Course Objectives: The students will acquire the knowledge:

- Introduce various metallic materials, their applications in extreme environments, and innovative forms like metallic foams.
- Provide knowledge of natural and synthetic polymers, ceramics, their structures, processing, and industrial applications.
- Explain the fundamentals, classifications, and reinforcements of composite materials and their engineering relevance.
- Introduce shape memory alloys and functionally graded materials, focusing on their effects, properties, and applications.
- Explore the principles, unique properties, and applications of nano materials compared to their bulk counterparts.

UNIT	CONTENTS
UNIT– 1	**ADVANCED METALS & ALLOYS:** Metallic materials- super alloys, titanium and Nickel based alloys and intermetallics, Materials for cryogenic application, Materials for space environment, Evaluation of materials for extreme environment, Introduction to metallic foams.
UNIT– 2	**CERAMICS**: Applications - characteristics- classification-Processing of ceramics- Powder preparations- consolidation- hot compaction-drying-sintering- finishing of ceramics, Al_2O_3,silicon nitride Si3N4 and Cermets,Areas of applications.
UNIT– 3	**COMPOSITE MATERIALS**: Introduction, polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications. **REINFORCEMENTS:** Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.
UNIT– 4	**SHAPE MEMORY ALLOYS:** Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys. **FUNCTIONALLY GRADED MATERIALS**: Types of functionally graded materials-classification different systems-preparation-properties and applications of functionally graded materials.
UNIT– 5	**NANOMATERIALS:** Introduction – properties at nano scales-advantages &

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Dis advantages applications in comparison with bulk materials (nano–structure, wires, tubes, composites).state of art nano advanced-topic delivered by student.

Text Books:

1. Nano material / A.K.Bandyopadyay / New age Publishers
2. Material science andTechnology:A comprehensive treatment/Robert W.Cahn ,/ VCH
3. Engineering Mechanics of Composite Materials/Isaac and M Daniel/Oxford University Press

References:

1. Mechanics of Composite Materials / R.M.Jones / McGraw Hill Company,NewYork, 1975.
2. Analysis of Laminated Composite Structures / L.R.Calcote/Van Nostrand Rainfold, NY 1969
3. Analysis and performance of fibre Composites / B.D.Agarwal and L.J.Broutman / Wiley-Inter science, NewYork,1980
4. Mechanics of Composite Materials-Second Edition (Mechanical Engineering) /Autar K.Kaw / CRCPress

Course Out comes: At the end of the course, student will be able to

CO1 Identify and evaluate high-performance metals and alloys used in aerospace, cryogenics, And advanced engineering applications.

CO2 Classify and com pare polymers and ceramics based on properties, processing techniques, And their functional uses.

CO3 Distinguish between various composite systems and reinforcement types, and identify Their specific industrial applications.

CO4 Understand the composition, classification, and application areas of SMAs and FGM sin Modern materials engineering.

CO5 Analyze nano-scale material behavior, assess their benefits and limitations, and present Advanced nano topics through seminars.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	2	2	3	2	3	1	2	3	2	3	3	0
CO2	3	2	2	3	2	3	1	2	3	2	3	3	0
CO3	3	2	2	3	2	3	1	2	3	2	3	3	0
CO4	3	2	2	3	2	3	1	2	3	2	3	3	0
CO5	3	2	2	3	2	3	1	2	3	2	3	3	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	INTRODUCTION TO SMART MANUFACTURING (Open Elective - III)	L	T	P	C
		3	0	0	3

Course Objectives: The students will acquire the knowledge :

- Introduce the fundamentals and evolution of smart manufacturing with Industry 4.0 technologies.
- Explain the structure and functions of smart machines and sensors in industrial applications.
- Introduce CPS and its 5C architecture for implementing intelligent manufacturing systems.
- Teach digital twin technology, machine learning, and predictive maintenance in smart factories.
- Provide knowledge on IoT networking protocols and connectivity infrastructure for industrial automation.

UNIT	CONTENTS
UNIT– 1	**CONCEPTS OF SMART MANUFACTURING:** Definition and key characteristics of smart manufacturing, Corporate adaptation processes, manufacturing challenges, challenges vs technologies, Stages in smart manufacturing. Minimizing Six big losses in manufacturing with Industry 4.0,and their benefits
UNIT– 2	**SMART MACHINES AND SMART SENSORS:** Concept and Functions of a Smart, Machine Salient features and Critical Subsystems of a Smart Machine, Smart sensors; smart sensors ecosystem,need,benefits and applications of sensors in industry, Sensing for Manufacturing Process in IIoT, Block Diagram of a IoT Sensing Device, Sensors in IIoT Applications, Smart Machine Interfaces
UNIT– 3	**ARCHITECTURE OF CYBER – PHYSICAL SYSTEM (CPS):**Functions of CPS, 5C Architecture; Smart Connection Level, Data-to- Information Level, Cyber Level, Cognition Level, Configuration Level. Design of PHM based CPS systems. Comparison of today's factory and Industry 4.0 factory by the implementation of 5C CPS architecture
UNIT– 4	**DIGITAL TWINS:** Introduction, applications of digital twins, impact zones of digital twins in manufacturing (factories / plants and OEMs), advantages of digital twins, basic steps of digital twin technology **MACHINE LEARNING (ML) AND ARTIFICIAL INTELLIGENCE (AI) IN MANUFACTURING:** Introduction, benefits and applications of ML in industries, common approaches of ML; supervised and unsupervised, semi-supervised and reinforced ML.

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PREDICTIVE MAINTENANCE: Introduction of predictive maintenance, difference between preventive and predictive maintenance, working and various components of predictive maintenance, benefits and tools of predictive maintenance. Common approaches to IoT predictive maintenance; Rule-based (condition monitoring) and AI (artificial intelligence) based predictive maintenance.

UNIT– 5 **IoT CONNECTIVITY FOR INDUSTRY 4.0:** Industrial communication requirement and its infrastructure, an overview of different types of networks, mesh network in industrial IoT, IoT protocols and the internet, TCP/IP (transmission control protocol/internet protocol) model, IoT connectivity standards: common protocols, application layer protocols, internet/network layer protocols,physicallayerIoTprotocols,choosingtherightIoTconnectivity protocol

TextBooks:

1. Industry 4.0 The Industrial Internet of Things by Alasdair Gilchrist, Apress
2. Industrial Internet of Things, Cyber Manufacturing System by Sabina Jeschke, Christian Brecher, Houbing Song Danda B. Rawat, Springer

Course Outcomes: At the end of the course, student will be able to

CO1 Explain the stages, challenges, and benefits of smart manufacturing and methods to Reduce production losses.

CO2 Identify smart machine components and describe sensor roles and interfaces in IoT-Based manufacturing systems.

CO3 Analyze CPS architecture and compare traditional andIndustry4.0factoriesusing5C implementation.

CO4 Apply digital wins, ML / AI techniques, and predictive maintenance tools including AR For system reliability.

CO5 Evaluate IoT communication protocols and select suitable connectivity models for smart manufacturing.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	1	2	1	3	3	1	3	3	3	3	1	1
CO2	3	1	1	1	3	3	1	3	3	3	3	1	1
CO3	3	1	1	1	3	3	1	3	3	3	3	1	1
CO4	3	1	1	1	3	3	1	3	3	3	3	1	1
CO5	3	1	1	1	3	3	1	3	3	3	3	1	1

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	OPTIMIZATION TECHNIQUES (Open Elective - IV)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce basic concepts, types, and formulations of optimization problems with classical solution methods.
- Explore numerical techniques for solving unconstrained optimization problems.
- Present methods for solving optimization problems with equality and inequality constraints.
- Teach the theory and solution techniques for unconstrained and constrained geometric programming problems.
- Introduce integer programming and zero – one programming with solution strategies.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION TO OPTIMIZATION:** Engineering applications of optimization- statement of an optimization problem- classification of optimization problem- optimization techniques. **CLASSICAL OPTIMIZATION TECHNIQUES:** Single variable Optimization – multivariable optimization with equality constraints- multivariable optimization with inequality constraints.
UNIT– 2	**UNCONSTRAINED OPTIMIZATION TECHNIQUES:** Pattern search Method – Rosen brock' s method of rotating coordinates-Simplex method- Descent methods- Gradient of function- Steepest Descent method.
UNIT– 3	**CONSTRAINED OPTIMIZATION TECHNIQUES:** Characteristics of constrained problem methods of feasible directions - basic approach in the penaltyfunctionmethod-interiorpenaltyfunctionmethod-convexprogramming problem- exterior penalty function method.
UNIT– 4	**GEOMETRIC PROGRAMMING (G.P):** Solution of an unconstrained geometric programming, differential calculus method and arithmetic method. primal dual relationship and sufficiency conditions. Solution of a constrained geometric programming problem (G.P.P). Complimentary geometric programming (C.G.P)
UNIT– 5	**INTEGER PROGRAMMING (I.P):** Graphical representation. Gomory's cutting plane method. Algorithm for zero-one programming problem. Integer non-linear programming.

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TEXT BOOK:

1. Optimization Theoryand Applications/S.S.Rao/Wiley Eastern Limited, New Delhi.

REFERENCES:

1. Engineering Optimization / Kalyanmanai Deb / Prentice Hall of India,NewDelhi.
2. OptimizationTechniques-Theory and applications /C.Mohan&KusumDeep/NewAge International
3. Operations Research /S.D.Sharma / MacMillan Publishers

Course Outcomes: At the end of the course, student will be able to

CO1 Classify optimization problems and apply classical techniques for single and multivariable optimization.

CO2 Solve un constrained problems using methods like pattern search, Rosenbrock's, simplex, and steepest descent.

CO3 Apply penalty methods, feasible direction methods, and solve convex programming problems.

CO4 Solve G.P.and C.G.P problems using primal-dual concepts and differential or Arithmetic methods.

CO5 Solveinteger and zero-one programming problems using Gomory's cutting plane andother algorithms.

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	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1													
CO2													
CO3													
CO4													
CO5													

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	ADVANCED MANUFACTURING PROCESSES (Open Elective - IV)	L	T	P	C
		3	0	0	3

Course Objectives : The student will acquire the knowledge

- Introduce various surface coating methods, their applications, and economic aspects.
- Explain the processing methods for ceramics and composites used in engineering applications.
- Explore micro electronics fabrication steps from wafer preparation to pack aging and CAD.
- Introduce nano materials, their synthesis techniques, and applications in manufacturing.
- Provideknowledgeofrapidprototypingtechniquesandtheiruseinproductdevelopment.

UNIT	CONTENTS
UNIT– 1	**COATING TECHNIQUES:** Scope, Cleaners, Methods of cleaning, Surface coating types, ceramic and organic methods of coating, and economics of coating. Electro forming, Chemical vapor deposition, Physical vapor deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.
UNIT– 2	**PROCESSING OF CERAMICS:** Applications, characteristics, classification, Processing of particulate ceramics, Powder preparations, consolidation, hot compaction, drying, sintering, and finishing of ceramics, Areas of application. **PROCESSING OF COMPOSITES:** Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.
UNIT– 3	**FABRICATION OF MICRO ELECTRONIC DEVICES** :Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging,reliabilityandyield,PrintedCircuitboards,computeraideddesignin micro electronics, surface mount technology, Integrated circuit economics.
UNIT–4	**NANO MANUFACTURING :** Nano tubes, Nano particles, nano wires,Litho graphy, Eletro spinning, mechanical milling, Inert gas condensation, sputtering, laser ablation, Arc discharge, Sol-gel methods, working, applications, advantages.
UNIT– 5	**RAPID PROTOTYPING:** Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing.

TEXT BOOKS:

1. Manufacturing Engineering and Technology Kalpakijian / Adisson Wesley, 1995.
2. Process and Materials of Manufacturing /R. A. Lindburg/ 1thedition,PHI 1990.

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1. Micro electronic packaging handbook / Rao.R.Thummala and Eugene, J.Rymaszewski / Van Nostrand Renihold,
2. MEMS & Micro Systems Design and manufacture/ Tai—Run Hsu/ TMGH
3. Advanced Machining Processes / V.K.Jain /Allied Publications.
4. Introduction to Manufacturing Processes / John AScheyl McGraw Hill.

Course Outcomes: At the end of the course, student will be able to

CO1 Apply and distinguish different coating techniques such as CVD,PVD, thermal spraying, and ion implantation for industrial surfaces.

CO2 Understand and apply the manufacturing processes of ceramics and composite materials, including powder consolidation and reinforcement types.

CO3 Analyze and describe the manufacturing sequence of microelectronic devices Including lithography, PCB design, and surface mount technology.

CO4 Understand various nano manufacturing techniques and evaluate their applications, Advantages, and working principles.

CO5 Explain the working principles and limitations of rapid prototyping technologies such As stereo lithography and laser sintering.

PSO 1: Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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CO3	3	1	1	1	2	3	1	2	2	3	3	3	1
CO4	3	1	1	1	2	3	1	2	2	3	3	3	1
CO5	3	1	1	1	2	3	1	2	2	3	3	3	1

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	TOTAL QUALITY MANAGEMENT (Open Elective - IV)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce the fundamentals of TQM and the role of process quality and statistical control in business performance.
- Emphasize customer satisfaction, loyalty, and benchmarking practices for continuous improvement.
- Explain how to organize and transition a company toward TQM using systems thinking and productivity tools.
- Teach the concept and classification of quality costs and their role in quality management.
- Provide knowledge of ISO9000 standards and the certification process for global quality assurance.

UNIT CONTENTS

UNIT– 1 **INTRODUCTION:** The concept of TQM, Quality and Business performance, attitude and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs, Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT– 2 **CUSTOMER FOCUS AND SATISFACTION**: The importance of customer satisfaction and loyalty- Crating satisfied customers, Understanding thecustomerneeds,ProcessVs.Customer,internalcustomerconflict,quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer –Supplier relationships. Bench Marketing: Evolution of Bench Marketing, meaning of Bench marketing, benefits of bench marketing, the bench marketing process, pitfalls of bench marketing.

UNIT– 3 **ORGANIZING FOR TQM** :The systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organizing, Quality Circles. Productivity, Quality and Reengineering: The leverage of Productivity and Quality, Management systems Vs. Technology, Measuring Productivity, Improving Productivity Re-engineering.

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UNIT– 4 **3-D OBJECT REPRESENTATION:** spline representation, Hermitem **THE COST OF QUALITY:** Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost Information, Accounting Systems and Quality Management.

UNIT– 5 **ISO9000:** Universal Standards of Quality: ISO around the world, The ISO9000ANSI/ASQCQ-SeriesStandards,benefitsofISO9000certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system

TEXT BOOKS:

1. Total Quality Management / Joel E.Ross / Taylor and Franscis Limited
2. Total Quality Management/P.N.Mukherjee / PHI

REFERENCES:

1. Beyond TQM / Robert L. Flood
2. Statistical Quality Control / E.L. Grant / McGraw Hill.
3. Total Quality Management-A Practical Approach / H.Lal
4. Quality Management/ Kanishka Bedi / Oxford University Press/2011
5. Total Engineering Quality Management / Sunil Sharma / Macmillan

Course Outcomes :At the end of the course, student will be able to

CO1 Understand TQM principles and apply process control tools like control charts and Acceptance sampling.

CO2 Evaluate customer-focused strategies and implement bench marking processes to enhance quality.

CO3 Implement organizational changes for TQM and assess productivity improvements Through quality circles and reengineering.

CO4 Analyze and utilize quality cost data to drive managerial decisions and quality Improvements.

CO5 Understand and apply ISO9000 certification procedures and assess their impact on Business quality systems.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	2	1	1	1	1	3	2	2	2	1	2	2	0
CO2	2	1	1	1	1	3	2	2	2	1	2	2	0
CO3	2	1	1	1	1	3	2	2	2	1	2	1	0
CO4	2	1	1	1	1	3	2	2	2	1	2	1	0
CO5	2	1	1	1	1	3	2	2	2	1	2	1	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	OPERATIONS MANAGEMENT (Open Elective-IV)	L	T	P	C
		3	0	0	3

Course Objectives: The student will acquire the knowledge

- Introduce fore casting methods, production system types, and aggregate planning strategies.
- Explain scheduling policies and materials management techniques for effective production control.
- Teach inventory control models, MRP systems, and modern management concepts like Lean and ERP.
- Introduce statistical and philosophical approaches to quality control and management.
- Provide tools for optimization using linear programming, transportation models, and scheduling algorithms.

UNIT	CONTENTS
UNIT– 1	**FORECASTING**: Introduction, types of forecasting and their uses, General principles of forecasting, forecasting techniques: qualitative and quantitative methods of Forecasting. **PRODUCTION SYSTEMS :** Types of production systems : job, batch, mass and flow type production. **AGGREGATE PLANNING:** Introduction, aggregate planning strategies, aggregate planning methods, problems
UNIT– 2	**SCHEDULING:** Introduction, difference with loading, scheduling policies, techniques, standard scheduling methods. **MATERIALS MANAGEMENT:** Introduction, functions of materials management, inventory, inventory management, types of inventories, Selective inventory control techniques: ABC analysis, VED analysis.
UNIT– 3	**INVENTORY CONTROL:** P and Q Systems, Basic Economic Order Quantity model, Price break model, assumptions and problems **MATERIAL REQUIREMENT PLANNING** :Introduction, Inputs, outputs and MRP logic. **CONTEMPORARY MANAGEMENT TECHNIQUES:** Introduction to Lean, JIT, ERP and Supply chain Management.
UNIT– 4	**QUALITY MANAGEMENT :** Quality engineering, Taguchi Principles, SQC– X bar, p and c charts, problems, Juran's principles Introduction to quality acceptance sampling. Deming's Philosophy, Introduction to Total quality management, Quality Function Deployment, Introduction to six sigma and ISO 9000 2015 standards.

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UNIT– 5 **OPTIMIZATION :** Linear Programming–Graphical and simplex method–problems, Demonstration of Transportation and Assignment Models, Travelling Salesman problem.

TEXT BOOKS:

1. Modern Production / operations managements / Baffa &Rakesh Sarin
2. Operations Management – an Integrated Approach, International student Version, R.Dan Reid and Nada R. Sanders, John Wiley & Sons
3. Production and Operations management by K.C.Jain, Wiley
4. Operations Management by William J.Stevenson, McGraw - HillCompanies 2015
5. Operations Management by Jay Heizer, Barry Render, Chuck Munson, Amit Sachan Twelfth Edition, Pearson, 2017

REFERENCES:

1. Maynard's Industrial Engineering Handbook, KjellB.Zandin, Fifth Edition2001,The McGraw-Hill Companies, Inc.
2. Operations Management S.N.Chary.
3. Inventory Control Theory and Practice/ Martin K.Starr and David W. Miller.

Course Outcomes : At the end of the course, student will be able to

CO1 Apply forecasting and aggregate planning techniques to select appropriate production systems.

CO2 Develop scheduling plans and apply inventory classification methods like ABC and VED analysis.

CO3 Analyze inventory decision susing EOQ and implement MRP logic and Lean concepts.

CO4 Use tools like control charts and sampling to manage quality and understand TQM And Six Sigma principles.

CO5 Solve real-world problem susing LPP,transportation,assignment,andtravelling salesman models.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

DescribecomponentsofCIMSanddifferentiatevariantandgenerativeprocess plan

PSO 1 :Analyze, design and develop mechanical components to solve engineer problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	2	2	1	2	1	2	2	2	2	2	2	2	0
CO2	2	2	1	2	1	2	2	2	2	2	2	2	0
CO3	2	2	1	2	1	2	2	2	2	2	2	1	0
CO4	2	2	1	2	1	2	2	2	2	2	2	1	0
CO5	2	2	1	2	1	2	2	2	2	2	2	1	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IVYear I Semester	ENERGY AUDITING (OpenElective-IV)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Introduce global and national energy scenarios, energy auditing needs, and the role of energy managers.
- Explain electricity tariff systems and energy – saving techniques in electrical networks.
- Provide knowledge of combustion and conservation methods in major thermal systems.
- Discuss conservation measures in various electrical utilities and support systems.
- Explain monitoring, targeting, labeling, and economic evaluation of energy projects.

UNIT	CONTENTS
UNIT– 1	**INTRODUCTION**: Energy scenario of World, India and TN - Environmental aspects of Energy Generation – Material and Energy balancing-Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Basic instruments for Energy Auditing.
UNIT– 2	**ELECTRICAL SUPPLY SYSTEMS**: Electricity Tariff structures – Typical Billing - Demand Side Management - HT and LT supply - Power Factor – Energy conservation in Transformers – Harmonics
UNIT– 3	**ENERGY CONSERVATION IN MAJOR THERMAL UTILITIES**: Stoichiometry - Combustion principles. Energy conservation in: Boilers - Steam Distribution Systems - Furnaces - Thermic Fluid Heaters – Cooling Towers – D.G. sets. Insulation and Refractories - Waste Heat Recovery Devices.
UNIT– 4	**ENERGY CONSERVATION IN MAJOR ELECTRICALUTILITIES**: Energy conservation in: Motors-Pumps–Fans–Blowers-Compressed Air Systems-Refrigeration and Air Conditioning Systems- Illumination systems
UNIT– 5	**ENERGYMONITORING,TARGETING,LABELLINGAND ECONOMICS**: Elements of Monitoring & Targeting System – CUSUM - Energy/Cost index diagram–Energy Labelling – Energy Economics–Cost of production and Life Cycle Costing - Economic evaluation techniques – Discounting and Non-Discounting - ESCO concept – PAT scheme

TEXTBOOKS:

1. Guide book for National Certification Examination for "Energy Managers and Energy Auditors" (4 Volumes). Available at http://www.em-ea.org/gbook1.asp. This website is administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India.

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2. K.Naga bhushan Raju, Industrial Energy Conservation Techniques: (concepts, Applications and Case Studies), Atlantic Publishers &Dist, 2007.

REFERENCES:

1. AbbiYP, Shashank Jain.,Hand book on Energy Audit and Environment Management, TERI Press, 2006.
2. Albert Thumann and Paul Mehta D,"Hand book of Energy Engineering",7th Edition,The Fairmont Press, 2013.
3. Murphy.W.R.and McKay.G,"Energy Management",Butterworth, London 1982.
4. Paul W.O'Callaghan,Design and management for energy conservation:Ahand book for energy managers, plant engineers, and designers, Pergamon Press, 1981.
5. Steve Doty,Wayne TurnerC,Energy Management Handbook7thEdition,TheFairmont Press, 2009

Course Outcomes : At the end of the course, student will be able to

CO1 Analyze energy consumption patterns and perform basic energy audits using suitable tools.

CO2 Evaluate power systems for conservation opportunities and apply DSM and PF improvement strategies.

CO3 Apply energy-saving techniques in boilers, furnaces, steam systems, and waste heat Recovery units.

CO4 Recommend energy-efficient practices for motors, compressors, HVAC,and lighting systems.

CO5 Perform energy performance analysis using economic tools and understand schemes Like PATand ESCO.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	0	3	0	2	2	3	2	3	2	2	0
CO2	1	2	0	3	0	2	2	3	2	3	2	2	0
CO3	1	2	0	3	0	2	2	3	2	3	2	2	0
CO4	1	2	0	3	0	2	2	3	2	3	2	2	0
CO5	1	2	0	3	0	2	2	3	2	3	2	2	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year –ISemester	QUANTUM SCIENCE AND TECHNOLOGY	L	T	P	C
		3	0	0	3

Prerequisites: Basic Physics, Linear Algebra, and Introduction to Modern Physics

Course Objectives:

1. To introduce fundamental concepts of quantum mechanics and its mathematical formalism.
2. To explore quantum computing and communication principles and technologies.
3. Tounderstandthephysicalimplementationandlimitationsofquantumsystems.
4. Toenablestudentstorelatequantumtheorytopracticalapplicationsincomputing, cryptography, and sensing.
5. To familiarize students with the emerging trends in quantum technologies.

Course Outcomes:

After completing this course, students will be able to:
CO1.Explain core principles of quantum mechanics and their technological implications.
CO2. Analyze quantum phenomena like superposition and entanglement.
CO3.Apply mathematical tools to model and solve quantum systems.
CO4.Demonstrate understanding of quantum algorithms and quantum circuits.
CO5.Evaluate potential applications and challenges in quantum communication and sensing.

Unit 1: Fundamentals of Quantum Mechanics: Historical background: Black body radiation, photoelectric effect, and Compton scattering; Dual nature of light and matter; De Broglie hypothesis;Schrödingerequation;Freeparticle,infinitepotentialwell,steppotential;Operators and observables: position, momentum, Hamiltonian; Commutation relations and uncertainty principle; Quantum postulates and measurement theory; Eigen values, eigen functions.

Unit 2: Quantum Information Theory: Classical vs. quantum information; Qubit representation using Bloch sphere; Quantum superposition and quantum entanglement; Dirac notation (bra-ket), tensor products, and composite systems; Bell states and EPR paradox; Quantum gates: Pauli-X, Y, Z; Hadamard; Phase; T; CNOT; Quantum circuit models and notation; Measurementin computational basis; Quantum teleportationand no-cloningtheorem; Quantum state tomography (introductory)

Unit 3: Quantum Computing: Classical computing review and limitations; Quantum parallelismandinterference;DeutschandDeutsch-Jozsaalgorithms;Grover'ssearchalgorithm, Oracle and amplitude amplification; Shor's factoring algorithm (overview and significance); QuantumFourierTransform(QFT);Quantumerrorcorrection:Bit-flip,phase-flip,andShor's

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9-qubit code; Introduction to quantum programming: Qiskit, Cirq, IBM Quantum Experience (overview)

Unit 4: Quantum Communication: Introduction to quantum cryptography; Quantum key distribution (QKD): BB84 protocol; Entanglement-based QKD: Ekert protocol (E91); Eavesdropping and security of QKD; Quantum teleportation (circuit and protocol); Quantum dense coding; Quantum networks and entanglement swapping; Role of quantum repeaters; Single-photon sources and detectors; Implementation challenges (loss, decoherence, noise)

Unit 5: Quantum Technologies and Applications: Quantum sensors: magnetometry, gravimetry; Quantum metrology: standard time, atomic clocks; Quantum imaging and lithography; Quantum materials: topological insulators, graphene, quantum dots; NV centers in diamonds for sensing; Hardware platforms: Superconducting qubits, Trapped ions, Photonic quantum processors; Quantum supremacy and NISQ era; Global initiatives: IBM, Google, D-Wave, IonQ, India's NQM; Ethical concerns and future prospects

TextBooks:

1. **"Quantum Computation and Quantum Information"**by Michael A.Nielsen and Isaac L. Chuang
2. **"Quantum Mechanics: Concepts and Applications"**by Nouredine Zettili

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
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CO1	1	1	1	2	1	3	2	3	3	3	3	1	3
CO2	1	1	1	2	1	3	2	3	3	3	3	1	3
CO3	1	3	1	2	1	3	2	3	3	3	3	1	3
CO4	1	1	1	2	1	3	2	3	3	3	3	1	3
CO5	1	1	1	2	1	3	2	3	3	3	3	1	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

IV Year I Semester	MECHATRONICS LAB	L	T	P	C
		0	0	4	2

Course Objectives : The student will acquire the knowledge

- To study the characteristics and working principles of basic transducers and signal conditioning elements.
- To develop and simulate PLC ladder logic programs for real-time industrial control systems.
- To design,simulate,and analyze hydraulic and electro-pneumatic circuits using Automation Studio.
- To introduce MATLAB and SIMULINK for modeling and simulation of control systems.

CONTENTS

List ofExperiments

1. DYNA1750 Transducers Kit :-
   a. Characteristics of LVDT
   b. Principle & Characteristics of StrainGauge
   c. Characteristics of Summing Amplifier
   d. Characteristics of Reflective Opto Transducer

2. PLC PROGRAMMING & Simulation of Allen Bradley, Siemens or IEC Ladder Using Automation Studio
   a. Ladder programming on Logic gates, Timers (TON,TOFF) & counters (UP,DOWN)
   b. Ladder Programming for digital &Analogy sensors
   c. Ladder programming & Simulations of Virtual System such as Traffic Light control, Washing machine, Garage Door, Water level control, Lift control, Conveyor Belt etc.
   d. Ladder programming to control circuits such as single solenoid spring return latch circuit, double solenoid Hydraulic / Pneumatic circuits, Self-Reciprocating Hydraulic / Pneumatic Circuit.

3. AUTOMATION STUDIO SOFT WARE(Design, Simulate &Analyze)

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a. Introduction to Automation studio &Its control.

b. Draw & Simulate Hydraulic circuits for series &parallel cylinders connection, Accumulator circuit, Pressure intensifier circuit, Simple Electro-Hydraulic Electro-Pneumatic circuits (Plot Waveforms for different parameters).

c. Design & Simulate Meter-in,Meter-out,Regenerative circuit, sequencing circuit, traverse and feed hydraulic circuit, hydraulic press and clamping.

d. PositionControlofProportionalServoValveCircuitusingPIDFeedbackcontroller.

4.MATLAB Programming

a. Sample programms on MATLAB

b. Simulation and analysis of PID controller using SIMULINK

Course Outcomes: At the end of the course, student will be able to

CO1 Analyze and interpret the response of LVDT, strain gauges, opto transducers, and amplifiers.

CO2 Design and simulate PLC programs for sensors, actuators, and process control applications.

CO4 Implement control algorithms and analyze system response susing MATLA Band SIMULINK.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.

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MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	0	1	1	2	1	2	2	1	2	1	0
CO2	2	1	0	1	1	2	1	2	2	1	2	1	0
CO3	2	1	0	1	1	2	1	2	2	1	2	1	1

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	-

Course Objectives: The student will acquire the knowledge

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

UNIT CONTENTS

UNIT– 1 Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship,Preamble,FundamentalRightsandDuties,DirectivePrinciples of State Policy.

Learning outcomes:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Pre amble Fundamental Rights and Duties

UNIT– 2 Union Government and its Administration Structure of the Indian Union: Federalism,Centre-Staterelationship,President:Role,powerandposition, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT– 3 State Government and its Administration Governor - Role and Position - CMandCouncilofministers,StateSecretariat:Organisation,Structureand Functions.

Learning outcomes: After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

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UNIT–4 A. Local Administration - District's Administration Head - Role and Importance, Municipalities –Mayor and role of Elected Representative -CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning outcomes:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myerand elected representatives of Municipalities
- Evaluate Zilla Panchayat block level organization

UNIT–5 Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

Learningoutcomes:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

References:

1)Durga Das Basu ,Introduction to the Constitution of India, Prentice–Hall of IndiaPvt.Ltd..New Delhi
2) Subash Kashyap, Indian Constitution, National Book Trust
3) J.A.Siwach, Dynamics of Indian Government &Politics
4) D.C.Gupta, Indian Government and Politics
5) H.M.Sreevai, Constitutional Law of India, 4 th editionin 3 volumes (Universal Law Publication)
6) J.C.Johari,Indian Government and Politics Hans
7) J.Raj Indian Governmen tand Politics
8) M.V.Pylee,IndianConstitutionDurgaDasBasu,HumanRightsinConstitutionalLaw,Prentice
9) –HallofIndiaPvt.Ltd.. NewDelhi
10) Noorani,A.G.,(SouthAsiaHumanRightsDocumentationCentre),ChallengestoCivilRight), Challenges to CivilRights Guarantees inIndia, Oxford UniversityPress 2012

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CO1	Understand historical background of the constitution making and its importance For building a democratic India
CO2	Understand the functioning of three wings of the government i.e., executive, Legislative and judiciary.
CO3	Understand the value of the fundamental rights and duties for becoming good Citizen of India.
CO4	Analyze the decentralization of power between central, state and local self-government.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

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PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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CO1	0	0	0	0	0	0	3	3	2	0	3	0	0
CO2	0	0	0	0	0	0	3	3	2	0	3	0	0
CO3	0	0	0	0	0	0	3	3	2	0	3	0	0
CO4	0	0	0	0	0	0	3	3	2	0	3	0	0
CO5	0	0	0	0	0	0	3	3	2	0	3	0	0

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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IV Year I Semester	EVALUATION AND INDUSTRY INTERNSHIP	L	T	P	C
		-	-	-	2

At the end of the internship, the students will be able to

CO1: Communicate effectively through report preparation and presentation.
CO2: Describe the use of advanced tools and techniques available in industry and also industrial safety measures practiced in industry
CO3: Develop interpersonal and team skills, confidence of working in industry, awareness about the working environment and self-learning capability

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

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CO1	3	3	3	3	3	2	2	3	3	1	1	3	3
CO2	3	3	3	3	3	2	2	3	3	1	1	3	3
CO3	3	3	3	3	3	2	2	3	3	1	1	3	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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SRK INSTITUTE OF TECHNOLOGY
VIJAYAWADA–520108,AndhraPradesh, India
R 23 MECHANICAL ENGINEERING COURSE STRUCTURE &SYLLABUS

B.Tech.– IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Internship &Project Work	Full semester v Internship & Project Work	0	0	24	12

At the end of the internship &Project Work, the students will be able to

- CO1 : Discovering potential research areas in the field of Mechanical Engineering.
- CO2: Comparing and contrast the several existing solutions for the problem identified.
- CO3: Formulating and propose a plan for creating a solution for the research plan
- identified.
- CO4: Conducting the experiments as a team and interpret the results.
- CO5: Reporting and presenting the findings of the work conducted.

PSO 1 :Analyze, design and develop mechanical components to solve engineering problems in design and manufacturing domains.
PSO2 : Formulate, analyze and develop thermal systems to solve complex engineering problems using modern technological tools.

MAPPINGBETWEENCOURSEOUTCOMESANDPOsandPSOs

	EK	PA	DD	ICP	ETU	E&W	ETH	I&CT	COM	PM&F	LLL	D&M	TS
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PSO1	PSO2
CO1	3	3	3	3	3	2	2	3	3	1	1	3	3
CO2	3	3	3	3	3	2	2	3	3	1	1	3	3
CO3	3	3	3	3	3	2	2	3	3	1	1	3	3
CO4	3	3	3	3	3	2	2	3	3	1	1	3	3
CO5	3	3	3	3	3	2	2	3	3	1	1	3	3

Grading:Nocorrelation–0,Lowcorrelation-1,Moderatecorrelation–2,HighCorrelation-3

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Ref: SRKIT/ECE/BOS/MOM-5 Date: 2.05.2026

The Board of Studies Meeting of the Department of Electronics and Communication engineering &Department of Electronics Engineering VLSI Design and Technology was held online on 30.04.2026 at 10:00AM Via Zoom platform to finalize curriculum for the semesters I & II for IV B.Tech (ECE and EVT branches),

S.No	Name	Designation	Category	Signature
1	Dr. S. Sri Gowri	Professor & HoD, SRKIT	Chairman	
2	Dr. A.M. Prasad	Professor, ECE, JNTUK	University Nominee	online
3	Dr. G Mamatha	Associate Prof. & HoD ECE, JNTUA, Anantapuram.	Member	online
4	Dr P. Satyanarayana	Professor &HoD ,KL University, Vaddeswaram	Member	online
5	Mr. D. R Sekhar Reddy	MD, Hypo Soft global solutions Pvt. Ltd,	Member	online
6	Ms. N. Mounika	Research Assistant, NIT Warangal	Member	online
7	Dr. D. Ravi Tej	Associate Professor, SRKIT	Member	
8	Dr. T. Anil Chowdary	Associate Professor, SRKIT	Member	
9	Dr V Sekhar Babu	Associate Professor, SRKIT	Member	
10	Mr. B. Ravi	Assistant Professor, SRKIT	Member	
11	Ms SLVS Jyothi	Assistant Professor, SRKIT	Member	
12	Ms N Rama Priya	Assistant Professor, SRKIT	Member	

The following members were presented

At the onset of the meeting, the Chairman of BOS, Dr. S. Sri Gowri, welcomed all the members and introduced internal BOS members to external BOS members. The meeting began with presentation of curriculum by chair for semesters I, II for IV B.Tech (ECE & EVT). She then presented the syllabus of relevant subjects of I and II semesters of IV B.Tech prepared by internal BOS members.

General Comments

1. The BoS members unanimously agreed to implement the finalized syllabus for VII and VIIII semesters and approved the course structure with the changes suggested by university for both ECE Department and also small changes in EVT program
2. Some references books and web links for online courses are added by the suggestion of external BoS members for some ECE and EVT courses.
3. External BoS members suggested offering the open electives based on the need of other departments.

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Curriculum related Comments

4. The External BOS member Dr AM Prasad suggested that the syllabus to be adopted from the JNTUK with minor changes for ECE department. All the members of BoS agreed to follow that and with minor modifications the curriculum proposed was approved.
5. The Subject Experts Dr AM Prasad, Dr G Mamatha suggested the below changes for EVT curriculum
    - Which subject are to be selected as professional electives
    - They suggested to Introduce CAD with VLSI Lab for the benefit of students
    - Suggested the textbooks to be students friendly and easy to understand
6. As far as the curriculum of VLSI Design and Technology is concerned most of the subject curriculum is developed by the help of the syllabus undertaken by some NITs and other reputed institutes with some modifications in view of benefit to our students. subjects in VII semester are developed by internal BoS members and approved with small changes.
    - Dr G Mamatha Suggested the changes in core subjects and professional electives
7. Dr AM Prasad discussed about the contents to be added in the subjects for VII semester with other members in the committee.
    - Add the topics which are value added to the course and cover the advanced technology
8. Curriculum for the Subjects in the VII semester EVT are developed by internal BoS members and approved with minor changes in BoS.
9. As an autonomous Institution BoS Members felt the need for EVT students having other skill oriented lab in VII semester so one more lab is added as skill lab for them

After due deliberations, the external BoS committee accepted the syllabus of VII and VIII semester B.Tech (ECE and EVT) along with course structures

The External BoS members expressed their satisfaction towards the contents for each subject prepared by internal BoS members and approved the syllabus with whatever modifications suggested in BoS meeting.

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Resolutions of BoS Meeting

Agenda 1:
To finalize the detailed courses contents of I and II semesters of IV B.Tech ECE & EVT Programs.

Resolution 1:
Course Structure and contents of I & II Semester IV B.Tech (ECE and EVT) programs under SRK 23 (Autonomous) regulations are approved by members of BoS.

Agenda 2: To finalize the Honors and Minor courses

Resolution 2:
The list of honors and minors courses both online and off line courses are prepared and their syllabus also approved by members of BoS

Agenda 3 Any other matter with the permission chair.

Resolution 3:
External BoS members suggested offering the open electives based on the need of other departments and to offer the professional electives depending on their difficulty level.

Resolution 4:
It is resolved all the text books and Reference books are carefully selected for the subject keeping in view of slow and advanced learners.

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Electronics Engineering VLSI Design and Technology

B.Tech – III Year I Semester

S.No.	Category	Title	L	T	P	C
1	PC	Embedded Systems	3	0	0	3
2	PC	Microprocessor and Micro Controllers	3	0	0	3
3	PC	VLSI Design	3	0	0	3
4	PE I	1. Analog IC Design 2. Introduction to MEMS 3. Nano Electronics	3	0	0	3
5	OE	Open Elective-I	3	0	0	3
6	LC	Microprocessor and Microcontrollers Lab	0	0	3	1.5
7	LC	VLSI Design Lab	0	0	3	1.5
8	LC	Design Thinking & Innovation	1	0	2	2
9	CSP	Evaluation of Community Service Internship	-	-	-	2
		Total	**16**	**0**	**8**	**22**

B.Tech - III Year II Semester

S.No.	Category	Title	L	T	P	C
1	PC	VLSI Verification & Testing	3	0	0	3
2	PC	FPGA Architechtures	3	0	0	3
3	PC	Syston on Chip Design	3	0	0	3
4	PE II	1. Industrial Electronics 2. RF Micro Electronics 3. Internet of Things 4.Bio-Medical Electronics	3	0	0	3
5	PE III	1.Semiconductor Packaging and Testing 2. Semiconductor Device Modeling 3. Semiconductor Equipment Design Technology 4.Digital Image Processing	3	0	0	3
6	OE II	Open Elective – II	3	0	0	3
7	LC	VLSI Verification & Testing Lab	0	0	3	1.5
8	SEC	Machine Learning Lab	0	1	2	2
9	AC II	Research methodology and IPR	2	0	0	-
		Total	**20**	**1**	**08**	**21.5**
Mandatory **Industry Internship** of 08 weeks duration during summer vacation						

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B.Tech IV Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	Cellular & Mobile Communications	3	0	0	3
2	Management Course– II	Management Science	2	0	0	2
3	Professional Elective–IV	1.Low Power VLSI Design 2.Coding Theory and Applications 3.DSP Processors and Architectures 4.Soft Computing Techniques	3	0	0	3
4	Professional Elective–V	1.Design for Testability 2.Radar Engineering 3.Digital Image Processing 4.Internet of Things	3	0	0	3
5	Open Elective–III	OE III	3	0	0	3
6	Open Elective–IV	OE II	3	0	0	3
7	Skill Enhancement Course	Digital Signal and Image Processing Lab	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**19**	**1**	**02**	**21**

B.Tech–IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	PR	Intern ship and Project	-	-	24	12

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B.Tech IV Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	Cellular & Mobile Communications	3	0	0	3
2	Management Course– II	Management Science	2	0	0	2
3	Professional Elective–IV	1.Low Power VLSI Design 2.Coding Theory and Applications 3.DSP Processors and Architectures 4.Soft Computing Techniques	3	0	0	3
4	Professional Elective–V	1.Design for Testability 2.Radar Engineering 3.Digital Image Processing 4.Internet of Things	3	0	0	3
5	O E–III	Open Elective–III	3	0	0	3
6	O E–IV	Open Elective–IV	3	0	0	3
7	Skill Enhancement Course	Digital Signal and Image Processing Lab	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**19**	**1**	**02**	**21**

B.Tech–IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	PR	Intern ship and Project	-	-	24	12

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IV Year I Semester	CELLULAR & MOBILE COMMUNICATIONS	L	T	P	C
		3	0	0	3

Course Outcomes: The student will be able to

- To Identify the limitations of conventional mobile Telephone systems and to Understand the concepts of cellular systems
- To understand the different types of interferences influencing cellular and mobile communications
- To understand the frequency management, channel assignment and types of handoff
- To Understand the concept of hand off in cellular systems
- To understand the Multiple access schemes in mobile and to develop the ability to search, select, organize and present information on new technologies in mobile and cellular communications

UNIT-I

Cellular Systems: Limitations of Conventional System, Basic Cellular Mobile System, First, second, third and fourth and Generation cellular wireless systems. Operation of Cellular System. Uniqueness of Mobile Radio Environment –Fading, coherence bandwidth, Doppler Spread. Fundamentals of cellular Radio System Design: concept of frequency reuse channels, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system. Trunking and grade of service

UNIT-II

Co-Channel & Non-Co-Channel Interference: Measurement of Real Time Co-Channel Interference, design of Antenna system, Antenna parameters and their effects, diversity techniques: Space Diversity, Polarization diversity, frequency diversity and time diversity. Non-co channel interference-adjacent channel interference, Near End far end interference, effect on coverage and interference by power decrease, antenna height decrease

UNIT-III

Frequency Management And Channel Assignment: Numbering and grouping, setup access and paging channels ,channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

Cell Coverage For Signal And Traffic: Signal reflection sin flat and hilly terrain, effectofhumanmadestructures,phasedifferencebetweendirectandreflectedpaths,straightline path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT-IV

Cell Site And Mobile Antennas: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas,umbrellapatternantennas,minimumseparationofcellsiteantennas,highgainantennas.

Handoffs: Handoff Initiation, types of handoff, delaying handoff, advantages of Handoff, power difference handoff, forced handoff, mobile assisted and soft and hard hand offs. Intersystem and Intra system handoffs, dropped call rates and their evaluation.

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UNIT-V

Digital Cellular Networks and Multiple Access Schemes: GSM Architecture, GSM channels, TDMA, FDMA, and CDMA. Introduction to MIMO systems Principles of CDMA cellular systems, Principles of OFDM based broadband wireless systems,

4G LTE basics – OFDM, and OFDMA, Generalized framework for Filtered OFDM and FBMC, Introduction of 5G.

TEXT BOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. T.S.Rappaport, "Wireless Communications–Principles and Practice"(2ndedition) Pearson, 2010, ISBN 9788131731864

REFERENCES:

1. Principles of Mobile Communications–GordonL. Stuber, Springer International 2nd Edition, 2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, Persons Education, 2005.3.Wireless Communication theory and Techniques, AsrarU.H.Sheikh ,Springer, 2004.
3. A.Goldsmith,"WirelessCommunications,"CambridgeUnivPress,2005
4. D.TseandP.Viswanath,"FundamentalsofWirelessCommunications,"CambridgeUniv Press, 2005

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IV Year I Semester	MANAGEMENT SCIENCE	L	T	P	C
		2	0	0	2

Course Objectives:

1. To impart knowledge of source and function of values.
2. Demonstrate an understanding of the importance of values, ethics, and social responsibility for the self and for contemporary society.
3. Reflect on how values shape personal and community ethics and decision-making. An ability to function effectively on multi-disciplinary teams (team work).
4. Inculcate professional, ethical, legal, security and social issues and responsibilities.
5. Gain personal and professional insight into organizational behavior, diversity, personalities, goal setting, motivation, empowerment, and leadership style.

UNIT - I

CONCEPTS OF MANAGEMENT AND ORGANISATION: Functions of management, evolution of management thought, Taylor's scientific management, fayol's principles of management, Hertzberg's Maslow's hierarchy of human needs, theory x and y, Hawthorne experiment, morale, motivation, working environmental conditions, systems approach to management. DESIGNING ORGANISATIONAL STRUCTURES: Basic concepts related to organisation - departmentation and decentralization, types of organization structures.

UNIT – II

PLANT LOCATION: Definition, factors affecting the plant location, comparison of rural and urban sites, methods for selection of plant- matrix approach. Plant layout - definition, objectives, types of plant layout, various data analyzing forms travel chart. WORK STUDY: Definition, objectives, method study - definition, objectives, steps involved various types of associated charts, difference between micro motion and memo motion studies. Work measurement-definition, time study, steps involved, equipment, different methods of performance rating, allowances, standard time calculation. Work Sampling - definition, steps involved, standard time calculations, and differences with time study.

UNIT - III

INTRODUCTION TO PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation, program evaluation review techniques, critical path, probability of completing the project, deterministic model, critical path method (CPM), critical path calculation, crashing of simple of networks.

INSPECTION AND QUALITY CONTROL: Types of inspections, statistical quality control,

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techniques, variables and attributes, assignable and non assignable causes, variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan, single sampling and double sampling plans, OC curves. Introduction to TQM - quality circles, ISO 9000 series procedures.

UNIT – IV

MATERIALS MANAGEMENT: Objectives, inventory functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory control systems, continuous review system, periodical review system. Stores management and stores records. Purchase management, duties of purchase of manager, associated forms.

UNIT – V

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Functions of HRM, job evaluation, different types of evaluation methods. Job description, merit rating, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, selling, marketing mix, product life cycle.

TEXT BOOKS:

1. O. P. Khanna (2004), Industrial Engineering and Management, Dhanpat Rai, New Delhi.

REFERENCE BOOKS:

1. Stoner, Freeman (2005), Gilbert, Management, 6th edition, Pearson Education, New Delhi.
2. Panner Selvam (2004), Production and Operations Management, Prentice Hall of India, New Delhi.
3. Ralph M. Barnes (2004), Motion and Time Studies, John Wiley and Sons.

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IV Year I Semester	LOW POWER VLSI DESIGN (PE-IV)	L	T	P	C
		3	0	0	3

Course Outcomes:

Upon completing this course, the student will be able to

- Understand the need of Low power circuit design.
- Attain the knowledge of architectural approaches.
- Analyze and design Low-Voltage Low-Power combinational circuits.
- Known the design of Low-Voltage Low-Power Memories

UNIT–I:

Fundamentals: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects– Drain Induced Barrier
Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT–II:

Low-Power Design Approaches: Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.

Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, and Mask level Measures.

UNIT–III:

Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures–Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT–IV:

Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh- Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT–V:

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Pre-charge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Text Books:

1. CMOS Digital Integrated Circuits–Analysis and Design–Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems–Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

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Reference Books:

1. Introduction to VLSI Systems: A Logic Circuit and System Perspective–Ming-BOLin, CRC Press,2011
2. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
3. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

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IV Year I Semester	CODING THEORY AND APPLICATIONS (PE-IV)	L	T	P	C
		3	0	0	3

Course Outcomes:

On completion of this course student will be able to

- Perform the measurement of information and compute errors.
- Design Linear Block Codes and Cyclic codes.
- Construct tree and trellies diagrams for convolution codes
- Design the Turbo codes and Space time codes and also carry out their applications

UNIT–I:

Coding for Reliable Digital Transmission and Storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT –II:

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT–III:

Convolutional Codes: Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT–IV:

Burst –Error-Correcting Codes: Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –Error-Correcting Cyclic and Convolutional codes.

UNIT-V:

BCH–Codes: BCH code-Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications–ShuL in, Daniel J. Costello, Jr, Prentice Hall, Inc.
2. Error Correcting Coding Theory-ManYoungRhee-1989, McGraw-Hill Publishing.

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REFERENCE BOOKS:

1. Digital Communications-Fundamental and Application-Bernard Sklar, PE.
2. Digital Communications-JohnG. Proakis, 5th Ed., 2008,TMH.
3. Introduction to Error Control Codes-Salvatore Gravano-oxford
4. Error Correction Coding–Mathematical Methods and Algorithms–Todd K.Moon, 2006, Wiley India.
5. Information Theory, Coding and Cryptography–Ranjan Bose, 2nd Ed, 2009, TMH.

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IV Year I Semester	DSP PROCESSORS AND ARCHITECTURES (PE-IV)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the basics of Digital Signal Processing and transforms.
- Able to distinguish between the architectural features of general purpose processors and DSP processors.
- Understand the architectures of TMS320C54xx devices and ADSP2100 DSP devices.
- Able to write simple assembly language programs using instruction set of TMS320C54xx.
- Can inter face various devices to DSP Processors.

Unit – I: Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation. Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Unit – II: Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Unit-III: Programmable Digital Signal Processors: Commercial digital signal processing devices, Data Addressing modes of TMS320C54XX DSPs, data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX processors, program control, TMS320C54XX instructions and programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, pipeline Operation of TMS320C54XX Processors.

Unit–IV: Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices ALU and MAC block diagram, Shifter Instruction, Base Architecture ofADSP2100, ADSP2181 high performance processor. Introduction to Black f in Processor-The Black f in Processor, Introduction to Micro signal Architecture, Over view of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

Unit–V: Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

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Text Books:

1. Digital Signal Processing–Avtar Singh and S.Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing –K Padmanabhan, R.Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009.
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007.

Reference Books:

1. Digital Signal Processors, Architecture, Programming and Applications–B.Venkataramani and M. Bhaskar, 2002, TMH.
2. DSP Processor Fundamentals: Architectures & Features–Lapsleyetal, S.Chand &Co. Digital Signal Processing Applications Using the ADSP-2100Family, Prentice-Hall, Inc.
3. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W.Smith, Digital Signal Processing, California Technical Publishing, San, Diego, CA.
4. Embedded Media Processing, David J.Katzand Rick Gentile, Elsevier, 2005.

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IV Year I Semester	SOFT COMPUTING TECHNIQUES (PE-IV)	L	T	P	C
		3	0	0	3

UNIT–I:

Introduction to soft computing:

Introduction, Artificial Intelligence, Artificial Neural Networks, Fuzzy systems, Genetic Algorithm and Evolutionary programming, Swarm Intelligent systems, Expert systems, Comparison among Intelligent systems.

UNIT–II:

Artificial Neural Networks:

Introduction to Artificial Neural Networks, Classification of ANNS, First generation neural networks, Perceptron network, Adaline, Madaline, Second generation neural networks, Back propagation neural networks, Hopfield Neural Network, Kohonen neural network, Hamming neural network, Radial basis function neural networks, spike neuron models.

UNIT–III:

Fuzzy Logic System:

Introduction to fuzzy logic, classical sets and fuzzy sets, fuzzy set operations, fuzzy relations, fuzzy composition, natural language and fuzzy interpretations, fuzzy inference system, fuzzy controllers

UNIT–IV:

Genetic Algorithm:

Introduction to Genetic algorithms, Genetic algorithms, procedures of Gas, working of Gas, Travelling sales man problem, Evolutionary programming and working principle of GA Machine learning classifier system

UNIT–V:

Swarm Intelligent system

Introduction to swarm intelligence, back ground, Ant colony system, working of ant colony optimization, Particle swarm intelligent systems, Artificial bee colony system, cuckoo search algorithm..

TEXT BOOKS:

1. Soft computing with MATLAB programming—N.P.Padhy, S.P.Simon, Oxford university press,2015
2. Neural Networks and Fuzzy Systems-Kosko, B. Prentice-Hall of India Pvt.Ltd,1994.
3. Introduction to Artificial Neural Systems-Jacek. M.Zurada, Jaico Publishing House,1999

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REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information-KlirG.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications-Zimmerman H.J.Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control-Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks -Dr.B.Yagananarayana, 1999, PHI, New Delhi.

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IV Year-I Semester	DESIGN FOR TESTABILITY (PE-V)	L	T	P	C
		3	0	0	3

Course Outcomes:

Students will be able to

- Acquire verification knowledge and test evaluation
- Design for testability rules and techniques.
- Utilize the scan architectures for different digital circuits.
- Acquire the knowledge of design of built-in-self test.

UNIT-I

Introduction to Testing: Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT-II

Logic and Fault Simulation: Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation, ATPG.

UNIT-III

Testability Measures: SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT-IV

Built-In Self-Test: The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-Per-Scan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

UNIT - V

Boundary Scan Standard: Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

TEXT BOOK:

1. M.L. Bushnell, V. D. Agrawal, "Essential of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits", Kluwer Academic Publishers

REFERENCEBOOKS:

1. M. Abramovici, M. A. Breuer and A.D Friedman, Digital Systems and Testable Design", Jaico Publishing House
2. P.K. Lala, "Digital Circuits Testing and Testability", Academic Press

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IV Year I Semester	RADAR ENGINEERING (PE-V)	L	T	P	C
		3	0	0	3

Course Outcomes:
After going through this course the student will be able to:

- Derive the radar range equation and to solve some analytical problems.
- Understand the different types of radars and its applications.
- Understand the concept of tracking and different tracking techniques.
- Understand the various components of radar receiver and its performance

UNIT–I
Basics of Radar: Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Illustrative Problems
Radar Equation: Modified Radar Range Equation, SNR, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT–II
CW and Frequency Modulated Radar: Doppler Effect, CW Radar–Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems
FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III
MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers –Filter Characteristics, Blind Speeds, Double Cancellation, Nth Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

UNIT–IV
Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar–Amplitude Comparison Mono pulse (one-and two-coordinates), Phase Comparison Mono pulse, tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT–V
Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

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Radar Transmitters & Receivers: Displays–types. Duplexers–Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations. Radomes Modulators, solid state

TEXT BOOKS:

1. Introduction to Radar Systems–MerrillI. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.

REFERENCEBOOKS:

1. Radar Principles, Technology, Applications–Byron Edde, Pearson Education,2004.
2. Radar Principles: Peebles. Jr. P.Z. Wiley, New York, 1998.
3. Principles of Modern Radar: Basic Principles –Mark A. Richards, James A. Scheer, William A. Holm, Yesdee, 2013
4. Radar Engineering – GSN Raju, IK International

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IV Year I Semester	DIGITAL IMAGE PROCESSING (PE-V)	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, student will be able to

- Describe the Image Processing system, scope of digital image processing and compare various image transforms.
- Apply filtering operations on images both in spatial and frequency domain.
- Describe Image degradation model and explain the restoration techniques on images.
- AnalyzethedigitalImagesusingwaveletsandmultiresolutionprocessingandusevarious coding techniques for various image compression methods.
- Explain various segmentation techniques on digital images; explain various Colour models and Colour Image Processing.

Unit I

Introduction: Introduction to Image Processing, Examples of fields that use Digital Image Processing, Fundamental steps in digital image processing, components of an image processing system, Elements of Visual Perception, Light and the Electromagnetic Spectrum, Examples of the fields that use Digital Image Processing. Image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Unit II

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, and sharpening spatial filters.

Filtering in the Frequency Domain: The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering

Unit III

Image Restoration and Reconstruction: A model of the image degradation/ Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering.

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Unit IV

Wavelets and Multi resolution Processing: Image pyramids, sub-band coding, Multi resolution expansions, wavelet transforms in one dimensions& two dimensions, Wavelet packets.

Image compression: Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Block Transform coding, Predictive coding

Unit V

Image segmentation: Fundamentals, point, line, edge detection, thresholding, and Region–based segmentation.

Color image processing: Color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Text Books

1. R.C.Gonzalez and R.E.Woods, "Digital Image Processing, 3rd edition, Pearson, 2008.

Reference Books

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. Jayaraman, S.Esakkirajan, and T.Veerakumar, "Digital Image Processing", Tata McGraw-Hill Education, 2009.

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IV Year I Semester	INTERNET OF THINGS (PE-V)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand internet of Things and its hardware and software components.
- Interface I/O devices, sensors &communication modules.
- Remotely monitor data and control devices.
- Design real-time IoT based applications

UNITI:

Introduction to IoT Introduction to IoT, Architectural Overview, Design principles and needed capabilities, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNITII:

Elements of IoT Hardware Components- Computing- Arduino, Raspberry Pi, ARM Cortex-A class processor, Embedded Devices–ARM Cortex-M class processor, Arm Cortex-M0 Processor Architecture, Block Diagram, Cortex-M0 Processor Instruction Set, ARM and Thumb Instruction Set.

UNITIII:

IoT Application Development Communication, IoT Applications, Sensing, Actuation, I/O interfaces. Software Components- Programming API"s (using Python/Node.js/Arduino) for Communication Protocols-MQTT, Zig Bee, CoAP, UDP, TCP, Bluetooth. Bluetooth Smart Connectivity Bluetooth overview, Bluetooth Key Versions, Bluetooth Low Energy (BLE) Protocol, Bluetooth, Low Energy Architecture, PSoC4 BLE architecture and Component Overview.

UNITIV:

Solution framework for IoT applications Implementation of Device integration, Data acquisition and integration, Device data storage Unstructured data storage on cloud/local server, Authentication, authorization of devices.

UNITV:

IoT Case Studies IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation.

Cloud Analytics for IoT Application: Introduction to cloud computing, Difference between Cloud Computing and Fog Computing: The Next Evolution of Cloud Computing, Role of Cloud Computing in IoT, Connecting IoT to cloud, Cloud Storage for IoT Challenge in integration of IoT with Cloud.

Text Books:

1. Raj Kamal, "Internet of Things: Architecture and Design Principles",1st Edition, McGraw Hill Education, 2017.
2. The Definitive Guide to the ARM Cortex-M0 by Joseph Yiu, 2011.
3. Vijay Madisetti, Arshdeep Bahga, Internet of Things, "A Hands on Approach", University Press, 2015.

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References:

1. Cypress Semiconductor / PSoC4 BLE (Bluetooth Low Energy) Product Training Modules.
2. Pethuru Raj and Anupama C.Raman,"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2017.

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IV Year I Semester	DIGITAL SIGNAL AND IMAGE PROCESSING LAB	L	T	P	C
		0	1	2	2

List of Experiments: Minimum of Six Experiments form each part has to be performed

Part-A: Digital Signal Processing

1. Generation of DT signals.
2. Implementation of Sampling Theorem
3. Verify the Linear Convolution of two DT signals
4. Verify the Circular Convolution of two DT signals
5. Computation of Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT)
6. Radix-2 Decimation In Time (DIT) FFT Algorithm Decimation Frequency (DIF) FFT Algorithm
7. Implementation of FIR filters.
8. Implementation of IIR filters.

Part-B: Digital Image Processing

1. Implementation of image sampling and quantization with different levels.
2. Perform basic intensity transformations (negative, log, power-law transformations).
3. Histogram processing: computation and histogram equalization.
4. Implementation of spatial filtering

a) Smoothing filters (mean, median) b) Sharpening filters (Laplacian)

5. Implementation of frequency domain filtering using DFT/FFT

a) Low-pass filtering b) High-pass filtering

6. Addition of noise and image restoration

a) Gaussian noise removal b) Salt & Pepper noise removal

7. Image compression techniques

a) Run-Length Coding b) Huffman Coding

8. Image segmentation techniques

a) Thresholding b) Edge detection

9. Color image processing

a) RGB to HSV conversion b) Color-based segmentation

Minimum Requirement: At least one simulation software: MATLAB / Python, Code Composer Studio (CCS)

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IV Year I Semester	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	-

Course learning Objectives:

- Understand the concept of Indian constitution directive principle of state policy Analyze the History, features Evaluate Preamble Fundamental Rights and Duties
- Understand the structure of Indian government
- Understand the structure of state government role of Governor and Chief Minister Secretariat Differentiate between structure and functions of state secretariat
- Understand the local Administration district administration Mayer and elected representatives of Municipalities Zilla panchayat block level organization
- Know the role of Election Commission role of Chief Election commissioner and Commissionarate state election commission SC/ST/OBC and women

Course Outcomes

1. Understand historical background of the constitution making and its importance for building a democratic India.

2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

3. Understand the value of the fundamental rights and duties for becoming good citizen of India.

4. Analyze the decentralization of power between central, state and local self government.

5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT-IV

A Local Administration - District's Administration Head - Role and Importance: Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation: PachayatiRaj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed

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officials - Importance of grass root democracy

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J. C. Johari, Indian Government and Politics Hans

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1. J. Raj Indian Government and Politics
2. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
3. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right),
4. Challenges to Civil Rights Guarantees in India, Oxford University Press 2012 resources:
5. nptel.ac.in/courses/109104074/8
6. nptel.ac.in/courses/109104045/
7. nptel.ac.in/courses/101104065/
8. www.hss.iitb.ac.in/en/lecture-details
9. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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B.Tech, IV Year- II Semester

S. No.	Category	Title	L	T	P	Credits
1	Internship & Project Work	Full semester Internship & Project Work	0	0	24	12

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Open Electives offered by Department of Electronics and Communication Engineering

Open Elective–III

1. Fundamentals of VLSI Design
2. Digital Electronics
3. Electronic measurements and Instrumentations
4. Optical communications

Open Elective–IV

1. Principles of Cellular & Mobile communications
2. Fundamentals of Satellite Communications
3. Embedded Systems
4. Transducers and Signal Conditioning
5. Quantum Science and Technology

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IV Year I Semester	FUNDAMENTALS OF VLSI DESIGN (OE-III)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the physical structure, operation, and electrical characteristics of MOS transistors, including threshold voltage, transconductance, and body effects.
- Describe the MOS fabrication technology process steps, including wafer fabrication, oxidation, photolithography, diffusion, and CMOS/NMOS fabrication techniques, and analyze common fabrication issues like latch-up and short-channel effects.
- Apply layout design rules to; including scalable CMOS design rules, micron design rules, and circuit elements, ensuring compliance with fabrication constraints.
- Design and analyze MOS combinational logic circuits, including pass-transistor logic, CMOS gate logic, dynamic logic circuits, and advanced logic families such as domino and NORA logic.
- Understand and design sequential MOS logic circuits, bistable elements, SR latches, clocked latches, and CMOS flip-flops, to implement memory and timing functions.

UNIT-I: MOS Transistors

Introduction, The Structure of MOS Transistors, The Fluid Model, The MOS Capacitor, The MOS Transistor, Modes of Operation of MOS Transistors, Electrical Characteristics of MOS Transistors, Threshold Voltage, Transistor Transconductance g_m, Figure of Merit, Body Effect, Channel-Length Modulation, MOS Transistors as a Switch, Transmission Gate

UNIT-II: MOS Fabrication Technology

Introduction, Basic Fabrication Processes, Wafer Fabrication, Oxidation, Mask Generation, Photolithography, Diffusion, Deposition. N-MOS Fabrication Steps, CMOS Fabrication Steps, n-Well Process, p-Well Process, Twin-Tub Process, Latch-Up Problem and Its Prevention, Use of Guard Rings, Use of Trenches, Short-Channel Effects-Channel Length Modulation Effect. Drain-Induced Barrier Lowering, Channel Punch Through, Hot carrier effect, Velocity Saturation Effect

UNIT -III: Layout Design Rules

Design Rule Background, Scribe Line and Other Structures MOSIS Scalable CMOS Design Rules, Micron Design Rules, CMOS Process Enhancements, Transistors, Interconnect, Circuit Elements, Beyond Conventional CMOS

UNIT-IV: MOS Combinational Circuits

Pass-Transistor Logic, Realizing Pass-Transistor Logic, Advantages and Disadvantages, Pass-Transistor Logic Families, Gate Logic, Fan-In and Fan-Out, n-MOS NAND and NOR Gates, CMOS Realization, Switching Characteristics, CMOS NOR Gate, CMOS Complex Logic Gates, MOS Dynamic Circuits, Single-Phase Dynamic Circuits, Two-Phase Dynamic Circuits, CMOS Dynamic Circuits, Advantages and Disadvantages Domino CMOS Circuits, NORA Logic

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UNIT-V: Sequential MOS Logic Circuits

Behavior of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D-latch and edge triggered flip-flop.

TEXT BOOKS

1. Principals of CMOS VLSI Design-N. H. E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.
2. CMOS Digital Integrated Circuits Analysis and Design–Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
3. Low-Power VLSI Circuits and Systems, Ajit Pal, SPRINGER PUBLISHERS

REFERENCE BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. Digital Integrated Circuits –A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

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IV Year I Semester	DIGITAL ELECTRONICS (OE-III)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Classify different number systems and apply to generate various codes.
- Use the concept of Boolean algebra in minimization of switching functions
- Design different types of combinational logic circuits.
- Apply knowledge of flip-flops in designing of Registers and counters
- The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
- Produce innovative designs by modifying the traditional design techniques.

UNIT– I

REVIEW OF NUMBER SYSTEMS & CODES:

Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members. Gray code, 4 bit codes- BCD, Excess-3, 2421, 84-2-1 code. Error detection & correction codes- parity checking, even parity, odd parity, Hamming code

Boolean theorems and logic operations

Boolean theorems, principle of complementation & duality, De-Morgan theorems. Logic operations -Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX-NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations.

UNIT– II

MINIMIZATION TECHNIQUES:

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables) and tabular method

COMBINATIONAL LOGIC CIRCUITS DESIGN

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a-head adder circuit

UNIT– III

COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI:

Design of encoder, decoder, multiplexer and demultiplexers, Implementation of higher order circuits using lower order circuits. Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder

UNIT– IV

INTRODUCTION OF PLD's:

PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions. Architectures of CPLD, FPGA, flash memories (NAND, NOR)

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UNIT– V

SEQUENTIAL CIRCUITS:

Classification of sequential circuits (synchronous and asynchronous), operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip-flop, Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register

TEXT BOOKS:

1. Switching and finite automata theory - Zvi. Kohavi , 3rd Edition
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
3. Digital Design by Morris Mano, PHI.

REFERENCES:

1. Switching Theory and Logic Design by A. Anand Kumar
2. Switching Theory and Logic Design by Hill and Peterson, Mc-Graw Hill, TMH edition

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IV Year I Semester	ELECTRONIC MEASUREMENTS AND INSTRUMENTATIONS (OE-III)	L	T	P	C
		3	0	0	3

Course outcomes:

- Understand the various Analog and Digital measuring Instruments
- Aware of the principles and operations of various oscilloscopes
- Learn measurements using various bridges
- Familiarize different Signal Generators and function generators
- Learn various transducers

UNIT-I

Measuring Instruments: Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures, Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

UNIT-II

Oscilloscopes: Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal deflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

UNIT-III

Bridges: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

UNIT-IV

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

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UNIT-V

Transducers: Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

TEXT BOOKS

1. H.S.Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A.D.Helfrick and W.D.Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.

REFERENCE BOOKS

1. A.K.Sawhney, Dhanpat Rai & Co.,"A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006

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IV Year I Semester	OPTICAL COMMUNICATIONS (OE-III)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Choose necessary components required in modern optical communications systems.
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses
- Design, build, and demonstrate optical fiber experiments in the laboratory.

UNITI

Overview of optical fiber communication - Historical development, the general system, advantages of optical fiber communications. Optical fiber waveguides-Introduction, Ray-theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers-Cutoff wave length, Mode Field Diameter, Effective Refractive Index, Related problems.

UNITII

Fiber materials: - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

UNITIII

Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss-Multimode fiber joints, single mode fiber joints.

UNITIV

Optical sources-LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Comparison of Photo detectors, Related problems.

UNITV

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation-

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Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers. Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXTBOOKS:

1. Optical Fiber Communications– Gerd Keiser, Mc Graw Hill International edition, 3rd Edition, 2000.
2. Fiber Optic Communications–Joseph C.Palais,4th Edition, Pearson Education, 2004

RERFERENCES:

1. Fiber Optic Communications – D.K.Mynbaev, S.C.Gupta and Lowell L.Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and its Applications–S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Edition, 2004.

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IV Year I Semester	PRINCIPLES OF CELLULAR & MOBILE COMMUNICATIONS (OE-IV)	L	T	P	C
		3	0	0	3

OUTCOMES:

- The student will be able to understand impairments due to multipath fading channel
- The student will be able to understand the fundamental techniques to overcome the different fading effects
- The student will be able to understand co-channel and non co-channel interferences.
- The student will be able to understand the frequency management, channel assignment and types of hand off
- The student will be able to understand the Multiple access schemes in mobile communications

UNIT –I

Cellular Systems: Limitations of Conventional System, Basic Cellular Mobile System, First, second, third and fourth and Generation cellular wireless systems. Operation of Cellular System. Uniqueness of Mobile Radio Environment –Fading, coherence bandwidth, Doppler Spread. Fundamentals of cellular Radio System Design: concept of frequency reuse channels, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system. Trunking and grade of service

UNIT-II

Co-Channel & Non-Co-Channel Interference: Measurement of Real Time Co-Channel Interference, design of Antenna system, Antenna parameters and their effects, diversity techniques: Space Diversity, Polarization diversity, frequency diversity and time diversity. Non-co channel interference-adjacent channel interference.

UNIT-III

Frequency Management And Channel Assignment: Numbering and grouping, setup access and paging channels ,channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment

UNIT-IV

Handoffs: Hand off Initiation, types of hand off, delaying hand off, advantages of Hand off, power difference hand off, forced hand off, mobile assisted and soft and Hard hand offs. Intersystem and Intra system hand offs, Concept of Call drop rates.

UNIT V

Multiple access schemes in mobile communications: TDMA, FDMA, and CDMA. Introduction to MIMO systems Principles of CDMA cellular systems, Principles of OFDM based broadband wireless systems, 4GLTEbasics–OFDM, and OFDMA, Generalized framework for Filtered OFDM and FBMC .Introduction of 5G

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TEXT BOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006. 2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. T.S.Rappaport, "Wireless Communications–Principles and Practice" (2nd edition) Pearson, 2010, ISBN 9788131731864

REFERENCES:

1. Principles of Mobile Communications–GordonL. Stuber, Springer International 2nd Edition, 2001.
2. Modern Wireless Communication –Simon Haykin, Michael Moher, Persons Education, 2005.
3. Wireless Communication theory and Techniques, A srar U.H.Sheikh, Springer, 2004.
4. A.Goldsmith, "Wireless Communications," Cambridge Univ Press,2005
5. D. Tse and P. Viswanath, "Fundamentals of Wireless Communications," Cambridge Univ Press, 2005

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IV Year I Semester	FUNDAMENTALS OF SATELLITE COMMUNICATIONS (OE-IV)	L	T	P	C
		3	0	0	3

UNIT-I

INTRODUCTION: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications. Orbital Mechanics, launches and launch vehicles, Orbital effects in communication systems performance

UNIT-II

SATELLITESUBSYSTEMS: Attitude and orbit control system, telemetry ,tracking, Command and monitoring system, power systems, communication subsystems, Satellite antennas, Equipment reliability and Space qualification

UNIT-III

SATELLITE LINKDESIGN: Basic transmission theory, link equation, C/N ratio, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-IV

MULTIPLE ACCESS: Frequency division multiple access (FDMA): Inter modulation, Calculation of C/N. Time division Multiple Access (TDMA); Frame structure, Examples. Code Division Multiple access (CDMA): Spread spectrum transmission and reception.

UNIT-V

GLOBALNAVIGATIONSATELLITE SYSTEM GNSS): Introduction, various GNSS: GPS, GLONASS, GALILEO, BeiDou, QZSS,IRNSS.GPS-location principle, GPS navigation message, GPS receiver operation differential GPS;IRNSS-introduction, IRNSS satellites, IRNSS constellation, IRNSS configuration, IRNSS services, navigation data, applications of IRNSS; multi GNSS.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 3RD Edition, 2020.
2. Satellite Communications Engineering–WilburL. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Satellite Communications: Design Principles– M. Richharia, BS Publications, 2nd Edition
2. Satellite Communication-D.C.Agarwal, Khanna Publications, 5thEd.
3. Satellite Communications –Dennis Roddy, McGraw Hill, 2ndEdition

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IV Year I Semester	EMBEDDED SYSTEMS (OE-IV)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
- The hardware components required for an embedded system and the design approach of an embedded hardware.
- The various embedded firmware design approaches on embedded environment.
- Understand how to integrate hardware and firmware of an embedded system using real time operating system.

UNIT-I

INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-II

EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT-III

EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization.

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware.

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UNIT-V

EMBEDDED SYSTEM DEVELOPMENT, IMPLEMENTATION AND TESTING: The Integrated development environment, Types of files generated on cross-compilation, Dissembler De-compiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Interpreters, Compilers and Linkers, debugging tools, Quality assurance and testing of the design, testing on host machine, Simulators, Laboratory Tools.

Text Books:

1. Embedded Systems Architecture-By Tammy Noergaard, Elsevier Publications, 2013.
2. Embedded Systems- By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.

References:

1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
2. Embedded Systems- Lyla B.Das-Pearson Publications, 2013.

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IV Year I Semester	TRANSDUCERS AND SIGNAL CONDITIONING (OE-IV)	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, student will be able to

- Choose Suitable sensor/transducer for a given physical variable and understand its principle, characteristics and determine order of the sensor.
- Measured is placement, pressure, flow, temperature variables.
- Design suitable signal conditioning circuit for sensor/transducers.
- Analyze the bridge circuits for calculating L, C, R.
- Understand noise reduction using grounding and shielding techniques and design high input impedance instrumentation amplifiers

UNIT– I

Generalized Performance characteristics of Instruments:

Functional elements of an instrument, generalized performance characteristics of instruments-static characteristics, dynamic characteristics, Experimental determination of measurement system parameters, loading effects under dynamic conditions.

UNIT– II

Signal Conditioning Circuits:

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

Signal Conditioning Circuits: Need for pre-processing, identification of signal conditioning blocks and their characteristics. Bridge Circuits: Analysis of DC and AC bridges with applications

UNIT– III

Transducers: Motion and Dimensional Measurements: Relative displacement, translation and rotational resistive potentiometers, resistance strain gauges, LVDT, capacitance pickups. Piezo-electric transducers. Force Measurement: Bonded strain gauge transducers, variable reluctance pickup, torque measurement dynamometers. Pressure Measurement: Manometers, elastic transducers, very high-pressure transducers, thermal conductivity gauges. Temperature Measurement: Thermal expansion methods, thermometers (liquid in glass), Thermocouples materials, Thermistors, Junction semiconductors and Sensors. Smart sensors, MEMS and Nano Sensors.

UNIT– IV

Intelligent Sensors: definition of intelligent instrumentation, types of instruments, Static Characteristics: Accuracy and Precision, Error, Correction, and Uncertainty, Repeatability, Reproducibility, and Hysteresis, Sensitivity, Offset, and Dead Band, Resolution and Linearity, Statistical Characteristics, Error Modeling, Dynamic Characteristics, Dynamic Error and

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Dynamic Sensitivity, Input-Output Impedances., Historical Perspective, Current status, software based instruments. Classification, Smart sensors, Cogent Sensors, Soft or Virtual sensors, Self-Adaptive Sensors, Self-Validating Sensors, Temperature Compensating Intelligent Sensors, Pressure Sensor, Indirect Sensing

UNIT– V

Instrumentation Amplifiers & Isolation Amplifiers: Specifications and use of instrumentation amplifiers for signal conditioning circuits using commercial ICs. Necessity for isolation amplifiers, industrial and medical applications of isolation amplifiers, Grounding and Shielding.

Text Books:

1. Measurement Systems-Application and Design, DOEBELIN, E.O., Mc Graw Hill, 4th Ed.1990
2. Electronic Instrumentation & Measurements-David A.Bell, PHI, 2nd Edition, 2003.
3. Manabendra Bhuyan,—Intelligent Instrumentation: Principles and Applications, CRC Press, 2011.

Reference Books:

1. Instrumentation Systems and Devices, Rangan, Mani,Sarma.,Tata Mc GrawHill.2nded
2. Transducers and Instrumentation, Murthy, D.V.S , PHI, New Delhi.

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IV Year I Semester	QUANTUM SCIENCE AND TECHNOLOGY (OE-IV)	L	T	P	C
		3	0	0	3

Prerequisites: Basic Physics, Linear Algebra, and Introduction to Modern Physics

Course Objectives:

1. To introduce fundamental concepts of quantum mechanics and its mathematical formalism.
2. To explore quantum computing and communication principles and technologies.
3. To understand the physical implementation and limitations of quantum systems.
4. To enable students to relate quantum theory to practical applications in computing, cryptography, and sensing.
5. To familiarize students with the emerging trends in quantum technologies.

Course Outcomes:

- After completing this course, students will be able to:
- Explain core principles of quantum mechanics and their technological implications.
- Analyze quantum phenomena like superposition and entanglement.
- Apply mathematical tools to model and solve quantum systems.
- Demonstrate understanding of quantum algorithms and quantum circuits.
- Evaluate potential applications and challenges in quantum communication and sensing.

Unit-I: Fundamentals of Quantum Mechanics: Historical background: Blackbody radiation, photoelectric effect, and Compton scattering; Dual nature of light and matter; De Broglie hypothesis; Schrödinger equation; Free particle, infinite potential well, step potential; Operators and observables: position, momentum, Hamiltonian; Commutation relations and uncertainty principle; Quantum postulates and measurement theory; Eigen values, eigen functions.

Unit-II: Quantum Information Theory: Classical vs. quantum information; Qubit representation using Bloch sphere; Quantum superposition and quantum entanglement; Dirac notation (bra-ket), tensor products, and composite systems; Bell states and EPR paradox; Quantum gates: Pauli-X, Y, Z; Hadamard; Phase; T; CNOT; Quantum circuit models and notation; Measurement in computational basis; Quantum teleportation and no-cloning theorem; Quantum state tomography (introductory)

Unit-III: Quantum Computing: Classical computing review and limitations; Quantum parallelism and interference; Deutsch and Deutsch-Jozsa algorithms; Grover's search algorithm, Oracle and amplitude amplification; Shor's factoring algorithm (overview and significance); Quantum FourierTransform(QFT);Quantumerrorcorrection:Bit-flip,phase-flip,andShor's9-qubitcode; Introduction to quantum programming: Qiskit, Cirq, IBM Quantum Experience

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Unit-IV: Quantum Communication: Introduction to quantum cryptography; Quantum key distribution (QKD): BB84 protocol; Entanglement-based QKD: Ekert protocol (E91); Eaves dropping and security of QKD; Quantum teleportation (circuit and protocol); Quantum dense coding; Quantum networks and entanglement swapping; Role of quantum repeaters; Single-photon sources and detectors; Implementation challenges (loss, decoherence, noise)

Unit 5: Quantum Technologies and Applications: Quantum sensors: magnetometry, gravimetry; Quantum metrology: standard time, atomic clocks; Quantum imaging and lithography; Quantum materials: topological insulators, graphene, quantum dots; NV centers in diamonds for sensing; Hardware platforms: Superconducting qubits, Trapped ions, Photonic quantum processors; Quantum supremacy and NISQ era; Global initiatives: IBM, Google, D-Wave, IonQ, India's NQM; Ethical concerns and future prospects

Text Books:

1. **Quantum Computation and Quantum Information** by Michael A. Nielsen and Isaac L. Chuang
2. **Quantum Mechanics: Concepts and Applications** by Nouredine Zettili

Online Learning Resources:

1. https://nptel.ac.in/courses/104104082
2. https://nptel.ac.in/courses/115104096
3. https://nptel.ac.in/courses/122106034

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Electronics and Communication Engineering

List of Honor Courses

S.No.	SUBJECT	L-T-P	CREDITS
1	Advanced communications	3-0-0	3
2	EMI/EMC	3-0-0	3
3	VLSI Signal Processing	3-0-0	3
4	CMOS Mixed Signal Design	3-0-0	3
5	Adaptive Signal Processing	3-0-0	3
6	RTOS	3-0-0	3
7	PC based Data Acquisition Systems	3-0-0	3
8	Digital Control Systems	3-0-0	3
9	Micro strip Antennas	3-0-0	3
10	Image & Video Processing	3-0-0	3
11	Advanced Communications Lab	0-0-3	1.5
12	CMOS Mixed Signal Design Lab	0-0-3	1.5
13	RTOS Lab	0-0-3	1.5
14	Digital Control Systems Lab	0-0-3	1.5
15	Antennas and Microwave Lab	0-0-3	1.5
16	Image & Video Processing Lab	0-0-3	1.5
Student shall take up at least TWO NPTEL/SWAYAM of 12-week duration for 3 credits.			

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Electronics and Communication Engineering

Honor Course	ADVANCED COMMUNICATIONS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Learn 5G Technology advances and their benefits
- Learn the key MIMO,SDR changes required to support 5G
- Learn Device to device communication with Wireless Networks
- Implementation options for 5G

UNIT I

SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES: Introduction, Pseudo noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

UNIT II

Wireless channel modeling (microwave, mm Wave, and tera Hertz): Propagation mechanism, reflection, refraction, diffraction and scattering. Fading channels- Multipath and small-scale fading Doppler shift, statistical multipath channel models, narrowband and wideband fading models, coherence bandwidth, and coherence time.

UNIT III

Multiple-Input, Multiple-Output (MIMO) wireless communication: Basic MIMO model, MIMO capacity in fading channels, Diversity multiplexing trade off, Space-time code for MIMO wireless communication.

Software Define Radio (SDR): Characteristics and benefits of a software radio, design principles of software radio, enhanced flexibility with software radios, receiver design challenges.

UNIT IV

Wireless Networks Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL

UNITV

5G Communication: 5G spectrum landscape and requirements, Spectrum access modes and sharing scenarios, 5G spectrum technologies. 5G CHANNEL MODEL: The 5G wireless Propagation Channels: Channel modeling requirements, propagation scenarios and challenges in the 5G modeling. 5G USE CASES AND SYSTEM CONCEPT: Use cases and requirements, 5G system concept.5G waveforms, OFDM, OTFS, OFDMA, carrier aggregation, dual connectivity.

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Beyond 5G key enablers: Intelligent reflecting surfaces (IRS), wireless energy harvesting, SWIPT, integrated sensing and communication

Text Books:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. S. Haykin and M. Moher, Modern Wireless Communication, Pearson Education, 2005.
3. Jeffrey H. Reed, Software Radio: A Modern Approach to Radio Engineering, Prentice Hall, May 2002
4.

References Books:

1. C. Oestges and B. Clerckx, MMIO Wireless Communications, 1st Ed, 2007.
2. Paul Burns, Software Defined Radio for 3G, Artech House Inc., 2003.
3. AfifOsseiran, Jose F Monserrat, Patrick Marsch, "5G Mobile and Wireless Communications Technology", Cambridge University Press, 2016
4. Wireless Sensor Networks: An Information Processing Approach, 1st edition, Feng Zhao, Leonidas Guibas, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009

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Electronics and Communication Engineering

Honor Course	EMI/EMC	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Discuss effects of EMI and counter measures by EMC-techniques.
- Apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC- norms specified by regulating authorities.
- Students shall choose career in the fields of EMI/EMC as an Engineer/Researcher/Entrepreneur in India/abroad.
- Understand the various aspects of shielding & PCB Tracing ,termination& Implementation
- Identifying of EMI Hotspot and various techniques like grounding filtering soldering etc

UNIT – I:

Natural and Nuclear sources of EMI / EMC: Introduction, Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI/ EMC, Natural and Nuclear sources of EMI

UNIT – II:

EMI from apparatus, circuits and open area test sites: Electromagnetic emissions, noise from relays and switches, non-linearity in circuits, passive inter-modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT – III:

Radiated and conducted interference measurements: Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT – IV:

ESD, Grounding, shielding, bonding and EMI filters: Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

UNIT – V:

Cables, connectors, components: Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, Transient and Surge Suppression Devices.
EMC standards- National / International: Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, EMI/EMC standards in JAPAN, Conclusions.

Text Books:

1. Engineering Electromagnetic Compatibility by Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.

References Books:

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1. Introduction to Electromagnetic Compatibility, NY, John Wiley, 1992, by C.R. Pal.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT – Delhi.

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Electronics and Communication Engineering

Honor Course	VLSI SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand Pipelining, and parallel processing.
- Use VLSI design for digital filters
- Optimize VLSI architectures for basic DSP algorithms
- Analyze various parallel processing algorithms
- Be familiar with VLSI algorithms and architectures for DSP.
- Be able to implement basic architectures for DSP using CAD tools

UNIT-I:

Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms. **Pipelining and Parallel Processing:** Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power. **Retiming:** Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques

UNIT-II:

Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems

Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT-III:

Systolic Architecture Design

Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT-IV:

Fast Convolution

Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT-V:

Low Power Design

Scaling Vs Power Consumption –Power Analysis, Power Reduction techniques – Power Estimation Approaches Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing.

TEXT BOOKS:

1. VLSI Digital Signal Processing- System Design and Implementation – Keshab K. Parhi, 1998, Wiley Inter Science.
2. VLSI and Modern Signal Processing – Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.

REFERENCE BOOKS:

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1. Design of Analog – Digital VLSI Circuits for Telecommunications and Signal Processing – Jose E. France, Yannis Tsividis, 1994, Prentice Hall.
2. VLSI Digital Signal Processing – Medi setti V. K, 1995, IEEE Press (NY), USA.

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Honor Course	CMOS MIXED SIGNAL DESIGN	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Appreciate the fundamentals of data converters and also optimized their performances.
- Understand the design methodology for mixed signal IC design
- Analyze the design of PLL and operational amplifiers
- Design the CMOS digital circuits and implement its layout.
- Design the Switched Capacitor Circuits for different applications.

UNIT-I: Switched Capacitor Circuits

Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT-II: Phased Lock Loop (PLL)

Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III: Data Converter Fundamentals

DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV: Nyquist Rate A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT-V: Oversampling Converters

Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi bit quantizers, Delta sigma D/A

TEXT BOOKS:

1. Analog Integrated Circuit Design- David A. Johns, en Martin, Wiley Student Edition, 2016
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002

REFERENCE BOOKS:

1. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van De Plassche, Kluwer Academic Publishers, 2003
2. Understanding Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.
3. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

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Honor Course	ADAPTIVE SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Review the Adaptive Systems and Understand the various measures to be opted for developing adaptive systems
- Understand different algorithms to develop the adaptive filtering
- Apply adaptive filter theory for different problems
- Perform RLS &Kalman Filtering

Unit -I

Introduction to Adaptive Systems: Adaptive Systems: Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive Linear Combiner - Description, Weight Vectors, Desired Response, Performance function - Gradient & Mean Square Error.

Unit-II

Development of Adaptive Filter Theory & Searching the Performance surface: Introduction to Filtering - Smoothing and Prediction – Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance surface Searching the performance surface – Methods & Ideas of Gradient Search methods, Gradient Searching Algorithm & its Solution, Stability& Rate of convergence , Learning Curve.

Unit-III

Steepest Descent Algorithms: Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curves.

Unit-IV

LMS Algorithm & Applications: Overview - LMS Adaptation algorithms, Stability &Performance analysis of LMS Algorithms - LMS Gradient & Stochastic algorithms - Convergence of LMS algorithm. Applications: Noise cancellation – Cancellation of Echoes inlong distance telephone circuits, Adaptive Beam forming.

Unit-V

RLS &Kalman Filtering: Introduction to RLS Algorithm, Statement of Kalman filtering roblem, The Innovation Process, Estimation of State using the Innovation Process- Expression of Kalman Gain, Filtering Examples using Kalman filtering.

Text Books

1. Adaptive Signal Processing - Bernard Widrow, Samuel D. Strearns, 2005, PE.
2. Adaptive Filter Theory - Simon Haykin-, 4th Ed., 2002, PE Asia.

Reference Books

1. Optimum signal processing: An introduction – Sophocles .J. Orfamadis, 2nd Ed., 1988,McGraw-Hill, New York

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2. Adaptive signal processing-Theory and Applications - S.Thomas Alexander, 1986,Springer – Verlag.
3. Signal analysis – Candy, McGraw Hill Int. Student Edition
4. James V. Candy - Signal Processing: A Modern Approach, McGraw-Hill, International Edition, 1988

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Honor Course	RTOS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- List the mathematical model of the system and to develop real time algorithm for task scheduling.
- Categorize capabilities Handling Resource Sharing and dependencies among Real-time Tasks generate a high-level analysis for Scheduling Real-time tasks in multiprocessor and distributed systems
- Analyze the working of real time operating systems and real time database.
- Apply the fault tolerance techniques, evaluation of reliability.

UNIT-I: Introduction

OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Real-Time Operating Systems, Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-II: RTOS Programming

Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works, Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-III: Program Modeling – Case Studies

case study of digital camera hardware and software architecture, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-IV: Target Image Creation & Programming in Linux

Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board. Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming

UNIT-V: Programming in RT Linux

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Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System

TEXT BOOKS:

1. Rajkamal: "Embedded Systems-Architecture, Programming and Design", Tata McGraw Hill Publications, Second Edition, 2008.
2. Dr. K.V.K.K. Prasad: "Embedded/Real-Time Systems" Dream Tech Publications, 2005 Edition, Black pad book.

REFERENCES:

1. Labrosse, "Embedding system building blocks ", CMP publishers.
2. Rob Williams," Real time Systems Development", Butterworth Heinemann Publications.

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Honor Course	PC BASED DATA ACQUISITION SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Be able to identify a data acquisition system, objectives and different configurations
- Be familiar with different methods of linear/Nonlinear Analog-to-Digital conversion and their role in real time applications
- Be familiar with different methods of linear/Nonlinear Digital to Analog Conversion. and their role in real time applications
- Be able to identify the type of interface used to get a digital signal/Analog signal into a microprocessor and familiar with Monolithic Converters.
- Be familiar with different noise reduction techniques in DAS and case studies of Data Converter

UNIT-I

INTRODUCTION: Objective of a DAS, single channel DAS, Multi-channel DAS, Components used in DAS– Converter Characteristics-Resolution-Non-linearity, settling time, Monotonicity.

UNIT-II

ANALOG TO DIGITAL CONVERTERS (ADCS): Classification of A/D converters. Parallel feed back – Successive approximation – Ramp comparison – Dual slope integration – Voltage to frequency – Voltage to Time – Logarithmic types of ADCS.

NON-LINEAR DATA CONVERTERS (NDC): Basic NDC configurations – Some Common NDACS and NADCS – Programmable non-linear ADCS – NADC using optimal sized ROM –High speed hybrid NADC – PLS based NADC – Switched capacitor NDCS.

ADC APPLICATIONS: Data Acquisition systems – Digital signal processing systems –PCM voice communication systems – Test and measurement instruments – Electronic Weighing machines.

UNIT-III

DIGITAL TO ANALOG CONVERTERS (DACS): Principles and design of – Parallel R–2R, Weighted resistor, inverted ladder, D/A decoding – Codes other than ordinary binary.

DATA CONVERTER APPLICATIONS: DAC applications – Digitally programmable V/I sources – Arbitrary waveform generators – Digitally programmable gain amplifiers – Analog multipliers/ dividers – Analog delay lines.

UNIT-IV

Monolithic data converters: typical study of monolithic DACS and ADCS.Interfacing of DACS and ADCS to a μP.

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UNIT-V

Error budget of DACS and ADCS: Error sources, error reduction and noise Reduction techniques in DAS. Error budget analysis of DAS, case study of a DAC and an ADC.

TEXT BOOKS:

1. Electronic data converters fundamentals and applications – Dinesh K. Anvekar, B.S. Sonde –Tata McGraw Hill.

REFERENCES:

1. Electronic Analog/ Digital conversions – Hermann Schmid – Tata McGraw Hill.
2. E.R. Hanateck, User's Handbook of D/A and A/D converters - Wiley
3. Electronic instrumentation by HS Kalsi- TMH 2 ndEdition, 2004.
4. Data converters by G.B. Clayton

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Honor Course	DIGITAL CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Have the awareness of Discrete Time Control Systems
- Calculate the Z-transforms and use its concepts of Discrete control systems
- Get familiarize with design of Discrete control systems using various Approaches
- Understand the State Space approach to analyze the discrete system
- Have the concepts of Controllability and Observability of discrete control system

UNIT –I: Introduction to Discrete Time Control Systems:
Introduction, Digital Control Systems, Quantizing and Quantization Error, Data Acquisition, Conversion, and Distribution Systems

UNIT-II:
The Z – Transforms:
Introduction, The Z Transform, Z-Transform of elementary functions, properties and theorems of Z-Transform, Inverse Z-Transform, Z-Transform method for solving difference equations
Z-Plane Analysis of Discrete-Time Control System:
Introduction, Impulse Sampling and Data Hold, Obtaining the Z-Transform by the convolutional integral method, Reconstruction of original signals from sampled signals, Pulse transfer function, Realization of digital controllers and digital filters

UNIT –III: Design of Discrete Time Control Systems by Conventional Methods:
Introduction, Mapping between the s plane and the z plane, stability analysis of closed loop systems in the z plane, transient and steady response analysis, design based on the Root-Locus method, design based on the frequency response method, Analytical design method.

UNIT-IV: State Space Analysis:
Introduction, State Space Representation of discrete time systems, solving discrete time state space equations, Pulse Transfer function matrix, Discretization of continuous time state – space equations, Liapunov stability analysis

UNIT –V: Controllability and Observability:
Introduction, Controllability, Observability, Useful Transformations in State Space Analysis and Desig.

TEXT BOOKS:
1. K. Ogata - "Discrete-Time Control systems" - Pearson Education/PHI, 2nd Edition.

REFERENCE BOOKS:

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1. Kuo - "Digital Control Systems"- Oxford University Press, 2nd Edition, 2003.
2. M. Gopal - "Digital Control and State Variable Methods"- TMH

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Honor Course	MICROSTRIP ANTENNAS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Remember the antenna basics and planar antennas.
- Describe and discuss characteristics and principles of microstrip antennas.
- Demonstrate and implement the CP patch antennas and micro strip antenna arrays.
- Analyze planar slot antennas and planar monopole antennas.
- Evaluate characteristics and design aspects of electrically small antennas.
- Investigate planar antennas for special applications for wireless access.

UNIT –I:

Planar Radiators: Introduction to antennas (radiation pattern, directivity, efficiency, gain, impedance, axial ratio etc.), different types of planar antennas, applications of planar antennas, Brief description off abrication process of planar antennas.

UNIT –II:

Micro strip Patch Antennas-I: Characteristics of microstrip patch antennas, radiation from microstrip antenna, field configurations, different types of feeding techniques. Design equations for rectangular and circular microstrip patches, analysis of microstrip antennas using transmission line model and cavity method. Broadband techniques using stacked patch antennas, proximity-coupled and aperture-coupled microstrip antennas, slot-loaded and slit-loaded microstrip antennas, microstrip antennas with shorted pin, effect of finite ground plane on the performance of microstrip antennas, principle of planar fractal antennas.

UNIT –III:

Micro strip Patch Antennas-II: Methods of generating circular polarization in microstrip antennas using single feed and double feed, methods of generating multiple frequencies using microstrip antennas, miniaturization techniques for mcirostrip antennas. Design techniques of microstrip antenna arrays with feed network, effect of mutual coupling, microstrip phased array antenna design.

UNIT –IV:

Planar Slot Antennas: Geometry and design of microstrip slot antenna, radiation pattern, CPW-fedslot antennas, design of folded slot antenna, annular slot antenna.

Planar Monopole Antennas: Feeding methods and characteristics of planar triangle monopole, Sierpinski monopole, planar bi-conical monopole antenna and roll monopole antenna.

UNIT –V:

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Planar Antennas for Special Applications: Planar mobile handset antennas, planar laptop computer antennas, planar antennas for USB modem, planar antennas for WLAN and UWB communication.

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Honor Course	IMAGE & VIDEO PROCESSING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Describe the Image Processing system, scope of digital image processing and compare various image transforms.
- Apply filtering operations on images both in spatial and frequency domain; describe image restoration in presence of noise and degradation.
- Analyze various segmentation techniques and compression methods on digital images.
- Describe the fundamental of digital video, sampling and filtering of video signals.
- Explain various methods for two dimensional motion estimation and their applications in video processing

Unit – I

Introduction: Introduction to Image Processing, Examples of fields that use Digital Image Processing, Fundamental steps in digital image processing, components of an image processing system, Examples of the fields that use Digital Image Processing. Image sensing and acquisition, image sampling and quantization, Some basic relationships between pixels.

Image Transforms: Need for image transforms, Image transforms, Fourier Transform, 2D Discrete Fourier Transform and its properties, Walsh Transform, Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, Singular Value Decomposition.

Unit – II

Image Enhancement:

Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Filtering in frequency domain: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

Image Restoration:

A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering.

Unit – III

Image segmentation: Fundamentals, point, line, edge detection, thresholding, and Region –based segmentation.I mage compression: Fundamentals, Basic compression methods: Huffman coding, Golombcoding, Arithmetic coding, LZW coding, Run-Length coding, Block Transform coding,

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Predictive coding.

Unit – IV

Basic Steps of Video Processing:

Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

Unit – V

2-D Motion Estimation:

Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation

TEXT BOOKS:

1. Digital Image Processing – Gonzaleze and Woods, 3rd Ed., Pearson.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.
3. Video Processing and Communication – Yao Wang, Joem Ostermann and Ya–quin Zhang. 1st Ed., PH Int.

REFRENCE BOOKS:

5. Fundamentals of Digital Image Processing – Anil K. Jain, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
6. Digital Image Processing –S. Jayaraman, S. Esakkirajan, and T. Veerakumar, McGraw-Hill Education, 2018.

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Honor Course	ADVANCED COMMUNICATIONS LAB	L	T	P	C
		0	0	3	1.5

List of Experiments :(Minimum of Twelve Experiments has to be performed)

1. Implementation of Linear Block Code Encoder and Decoder
2. Implementation of Binary Cyclic Codes Encoder and Decoder
3. Implementation of Convolution Encoder- Decoder
4. Determination of Losses in Optical Fiber
5. Characteristics of LASER Diode.
6. Study of Satellite Communication System, uplink transmitter, down link receiver and transponder
7. Signal to noise ratio and Link Failure operations in satellite communication
8. Carrier to Noise Ratio in Satellite Communication
9. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS BER Trainer
10. Efficiency of DS Spread- Spectrum Technique
11. Simulation of Frequency Hopping (FH) system
12. Generation of PN sequence and Gold Sequence
13. Outdoor propagation model - Okumura model and Hata model
14. Free space propagation – path loss model
15. Study of WLAN / network topologies

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Electronics and Communication Engineering

Honor Course	CMOS MIXED SIGNAL DESIGN LAB	L	T	P	C
		0	0	3	1.5

List of Experiments:

Cycle 1:
1) Fully compensated op-amp with resistor and miller compensation
2) High speed comparator design
i. Two stage cross coupled clamped comparator ii. Strobed Flip-flop
3) Data converter

Cycle 2:
1) Switched capacitor circuits i. Parasitic sensitive integrator ii. Parasitic insensitive integrator
2) Design of PLL
3) Design of VCO
4) Band gap reference circuit
5) Layouts of All the circuits Designed and Simulated

Lab Requirements:

Software: Mentor Graphics/ Cadence/ Tanner/Industry Equivalent Standard Software Tools
Hardware: Personal Computer with necessary peripherals, configuration and operating System.

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Electronics and Communication Engineering

Honor Course	RTOS Lab	L	T	P	C
		0	0	3	1.5

- The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.
- The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.
- The students are required to perform at least SIX experiments from Part-I and TWO experiments from Part-II.

List of Experiments:

Part-I: Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader's Writer's Problem for concurrent Tasks.

Part-II: Experiments on ARM-CORTEX processor using any open source RTOS.
(Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.
3. Simulate the temperature DATA Logger with the SERIAL communication with PC.
4. Implement the developer board as a modem for data communication using serial port communication between two PC's.

Lab Requirements:

Software:

- Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.
- LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

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- The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.
- Serial Cables, Network Cables and recommended power supply for the board.

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Honor Course	DIGITAL CONTROL SYSTEMS LAB	L	T	P	C
		0	0	3	1.5

1. To study

   a. Conversion of a transfer function from continuous domain to discrete domain.
   b. Conversion of a transfer function from the continuous domain to the digital domain.
   c. Pole Zero Map of a discrete transfer function

2. To determine

   a. Z transform of a discrete-time signal
   b. Inverse Z transform of a discrete-time signal
   c. Factored form and partial fraction form of a rational z function d. Pole zero map of a digital system

3. To study

   a. Closed loop response of a discrete-time system
   b. Comparison of time responses of continuous time and discrete time systems
   c. Effect of sampling time on system response and system parameters

4. To design a lead compensator to obtain system response with the desired accuracy, and less overshoot.

5. To design a lag compensator to meet performance specification parameters

6. To study a. The effect of variation in controller parameters on system response

7. To obtain

   a. Transfer function model from a state model
   b. State model from transfer function model
   c. Step response of a system represented by its state model

8. To determine

   a. Eigenvalues from state model
   b. Eigenvalues from transfer function model
   c. Stability of a system

9. To study the effect of common nonlinearities such as relay, dead zone, and saturation on the response of a 2nd order control system

Softwares Required

1. Matlab Software
2. Simulink Tool

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Electronics and Communication Engineering

Honor Course	ANTENNAS and MICROWAVE LAB	L	T	P	C
		0	0	3	1.5

LIST OF EXPERIMENTS: (Minimum of Ten Experiments has to be performed)

1. Calculation of transmission line parameters (R, L, G and C)for two wire line, coaxial line and Strip line.
2. Study on the standing wave pattern along a transmission line when the line is open-circuited, Short circuited and terminated by a resistive load at the load end.
3. Investigate the effect of length of transmission line on the input impedance at the sending end.
4. Familiarization of Smith chart on MATLAB platform.
5. Radiation resistance of electric and magnetic dipoles as a function of electrical size.
6. Feed (input terminal) impedance of an electric dipole as a function of antenna length.
7. 3D radiation pattern of a half-wavelength dipole antenna in both horizontal and vertical Orientations
8. Radiation patterns for electric dipoles of various electrical lengths.
9. Characteristics and radiation patterns of Linear array, Planar and Circular arrays.
10. Variation of normalized input impedance with Feeding position in Inset-Fed Micro strip patch Antenna
11. Design of Rectangular Micro strip Patch antenna.

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Honor Course	IMAGE & VIDEO PROCESSING LAB	L	T	P	C
		0	0	3	1.5

List of Experiments:

Note: In the first 10 experiments, at least 8 experiments; In the last three experiments, at least 2 experiments must be executed.

1. Perform basic operations on images like addition, subtraction etc.
2. Perform Pixel based operations (Point based operations) for Image enhancement
3. Plot the histogram of an image and perform histogram equalization
4. Filtering in Spatial Domain
5. Computation of 2D-DFT and Perform filtering in Frequency domain
6. Implementation of Image Restoration methods
7. Implementation of JPEG compression Algorithm (Without using Library function)
8. Comparison of coding Techniques for image compression (Bit plane, Predictive, Arithmetic, Huffman coding).
9. Detections of edges in an image (Prewitt, Sobel, Krisch and Laplacian of Gaussian Operators, Canny operators) and compare
10. Image Segmentation based on thresholding.
11. Basic operations on Video, and identification of key frame
12. Computation of optical flow velocities for a moving object in a Video
13. Implementation of two dimensional motion estimation

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List of Minor Courses

MINOR:

Student can choose any SIX Theory or any FIVE theory and TWO Laboratories in the list given below which are not chosen as Open electives/in Regular Courses, are to be considered for Minor Degree. Prior Approval BoS Chairman is required

S.No.	SUBJECT	L-T-P	CREDITS
1	Electronics Devices and Basic Circuits	3-0-0	3
2	Digital Electronics	3-0-0	3
3	Principles of Communication	3-0-0	3
4	Signal Analysis	3-0-0	3
5	Microcontrollers and Applications	3-0-0	3
6	Embedded System Design	3-0-0	3
7	Internet of things	3-0-0	3
8	Digital Signal Processing	3-0-0	3
9	Electronics Devices and Basic Circuits Lab	0-0-3	1.5
10	Digital Electronics Lab	0-0-3	1.5
11	Internet of things Lab	0-0-3	1.5
12	Digital Signal Processing Lab	0-0-3	1.5
Student shall take up at least ONE NPTEL/SWAYAM of 12-week duration for 3 credits.			

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Minor Course	ELECTRONICS DEVICES AND BASIC CIRCUITS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand the semiconductor physics, their concepts and characteristics of p-n junction diode.
- Understand V-I characteristics of various semiconductor devices.
- Learn the operation of transistor and its characteristics in various configurations, Biasing of transistor
- Analyze the transistor using h-parameters and its equivalent model.
- Describe the operation of FET and MOSFET, their application as an amplifier.

UNIT I:

Review of Semiconductor Physics: Mobility and Conductivity, Intrinsic and extrinsic semiconductors, Hall effect

Junction Diode Characteristics : Energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Qualitative explanation of Diode equation (Derivation not required) , V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance

UNIT II:

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode and its characteristics with the help of energy band diagram, UJT and its application, PNPN Diode, SCR, Construction, operation and V-I characteristics.

Diode Circuits: Clipping (limiting) circuits, Peak Detector, Clamping circuits, Comparators, Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, Inductor filter, Capacitor filter

UNIT III:

Transistor Characteristics: Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base and Common Emitter configurations, punch through/ reach through, typical transistor junction voltage values.

Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias,

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Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S,S',S''), Bias compensation, Thermal runaway, Thermal stability.

UNIT IV:

Small Signal Low Frequency Transistor Amplifier Models

BJT: Two port network, Transistor hybrid model, determination of h-parameters, Millers theorem and Dual of Millers theorem, Analysis of CB, CE and CC amplifiers using exact analysis, Comparison of transistor amplifiers.

UNIT V:

FET: FET types, JFET operation and characteristics (qualitative explanation only), small signal model of JFET.

MOSFET: MOSFET Structure, Operation of MOSFET, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Comparison of Bipolar and MOS devices.

CMOS amplifiers: General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. C. Halkias, Mc-Graw Hill Education.
2. Integrated Electronics-J. Millman, C. Halkias, Mc-Graw Hill Education.
3. Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

References:

1. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015.
2. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.
3. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.

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Minor Course	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Classify different number systems and apply to generate various codes.
- Use the concept of Boolean algebra in minimization of switching functions
- Design different types of combinational logic circuits.
- Apply knowledge of flip-flops in designing of Registers and counters
- The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
- Produce innovative designs by modifying the traditional design techniques.

UNIT – I

REVIEW OF NUMBER SYSTEMS & CODES:

Representation of numbers of different radix, conversation from one radix to another radix, r 1's compliments and r's compliments of signed members. Gray code ,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

UNIT – II

BOOLEAN THEOREMS AND LOGIC OPERATIONS:
Boolean theorems, principle of complementation & duality, De-Morgan theorems. Logic operations; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX-NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits. Study the pin diagram and obtain truth table for the following relevant ICs 7400,7402,7404,7408,7432,7486.
MINIMIZATION TECHNIQUES: Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables)and tabular method(Quine-mcCluskey method) with only four variables and single function.

UNIT – III
COMBINATIONAL LOGIC CIRCUITS DESIGN: Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4 bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a-head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.
COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI :

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Design of encoder ,decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits .Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder. . Study the relevant ICs pin diagrams and their functions 7442,7447,7485,74154.

UNIT – IV SEQUENTIAL CIRCUITS : Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip-flop. Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi directional shift register, universal shift, register.

UNIT-V INTRODUCTION OF PLD's : PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table. ROM: Internal structure, Static RAM: Internal structure, Dynamic RAM: Internal structure.

TEXT BOOKS:

1. Switching and finite automata theory Zvi. KOHAVI, Niraj.K.Jha 3rd Edition, Cambridge University Press,2009
2. Digital Design by M.Morris Mano, Michael D Ciletti,4th edition publication,2008 PHI
3. Switching theory and logic design by Hill and Peterson, Mc-Graw Hill TMH edition, 2012.

REFERENCES:

1. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers,2006
2. Digital electronics by R S Sedha.S.Chand& company limited,2010
3. Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning, 2006.

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Electronics and Communication Engineering

Minor Course	PRINCIPLES OF COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Analyze the performance of analog modulation schemes in time and frequency domains.
- Analyze the performance of angle modulated signals.
- Characterize analog signals in time domain as random processes and noise
- Characterize the influence of channel on analog modulated signals
- Determine the performance of analog communication systems in terms of SNR

UNITI : Basic tools for communication, Fourier Series/Transform, Properties, Autocorrelation, Energy Spectral Density, Parsevals Relation, Amplitude Modulation (AM), Spectrum of AM, Envelope Detection, Power Efficiency, Modulation Index

UNIT II : Double Sideband Suppressed Carrier (DSB-SC) Modulation, Demodulation, Costas Receiver, Single Sideband Modulation (SSB), Hilbert Transform, Complex Pre-envelope/ Envelope, Demodulation of SSB, Vestigial Sideband Modulation (VSB)

UNIT III : Angle Modulation, Frequency Modulation (FM), Phase Modulation (PM), Modulation Index, Instantaneous Frequency, Spectrum of FM Signals, Carsons Rule for FM Bandwidth, Narrowband FM Generation, Wideband FM Generation via Indirect Method, FM Demodulation

UNIT IV : Introduction to Sampling, Spectrum of Sampled Signal, Aliasing, Nyquist Criterion, Signal Reconstruction from Sampled Signal, Pulse Amplitude Modulation, Quantization, Uniform Quantizers – Midrise and Midtread, Quantization noise, , Non uniform Quantizers, Delta Modulation, Differential Pulse Code Modulation (DPCM)

UNIT V: : Basics of Probability, Conditional Probability, MAP Principle, Random Variables, Probability Density Functions, Applications in Wireless Channels, Basics of Random Processes ,Gaussian Random Process, Noise.

TEXT BOOKS:

1. Simon Haykin, Communications Systems, 4th Edition. John Wiley and Sons, Inc
2. Fundamentals of Wireless Communication by David Tse

References:

1. Principles of Communication Systems – Simon Haykin, John Wiley, 2nd Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

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Electronics and Communication Engineering

Minor Course	SIGNAL ANALYSYS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- To be able to determine if a given system is linear/causal/stable
- Capable of determining the frequency components present in a deterministic signal
- Capable of characterizing LTI systems in the time domain and frequency domain
- To be able to compute the output of an LTI system in the time and frequency domains

UNIT I: CLASSIFICATION OF SIGNALS AND SYSTEMS
Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids_ Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.

UNIT II: ANALYSIS OF CONTINUOUS TIME SIGNALS Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and properties

UNIT III: LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS
Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT IV: ANALYSIS OF DISCRETE TIME SIGNALS
Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties

UNIT V: LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS
Impulse response – Difference equations-Convolution sum- Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.

TEXT BOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, —Signals and Systems‖, Pearson, 2015

REFERENCES BOOKS

1. B. P. Lathi, —Principles of Linear Systems and Signals‖, Second Edition, Oxford, 2009.

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2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, —Signals & Systems - Continuous and Discretel, Pearson,

3. John Alan Stuller, —An Introduction to Signals and Systems‖, Thomson, 2007.

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Minor Course	MICROCONTROLLERS AND APPLICATIONS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the architecture and operation of common microcontrollers.
- Write and debug assembly/C programs for microcontrollers.
- Interface microcontrollers with input/output devices.
- Interface microcontrollers with various advanced peripherals.
- Design and implement microcontroller-based applications.

Unit 1: Introduction to Microcontrollers

Evolution of microcontrollers and comparison with microprocessors, Microcontroller families (8051, PIC, AVR, ARM), Architecture of 8051 microcontroller, Memory organization, registers, and flags, Overview of development tools (IDE, simulators, programmers)

Unit 2: Programming of Microcontrollers

Instruction set of 8051, Assembly language programming, Introduction to Embedded C programming, Debugging and simulation tools

Unit 3: Interfacing with Input /Output Devices

Basics of interfacing and role of GPIO, Interfacing LEDs, switches, and push buttons, Interfacing 7-segment displays and buzzers, Interfacing LCDs (16x2 and 20x4, Keypad interfacing for user inputs

Unit 4: Interfacing with Advanced Peripherals and Communication Devices

Interfacing sensors (temperature, light, and proximity sensors),
Interfacing actuators (motors: DC, stepper, and servo).
Communication interfaces: UART (serial communication with PC), SPI and I2C (interfacing EEPROM and sensors), ADC/DAC interfacing (e.g., analog sensors and audio signals).
Interfacing wireless modules (Bluetooth, Zig Bee, ESP8266/ESP32 for IoT applications)

Unit 5: Advanced Microcontrollers
Introduction to ARM Cortex-M series, Comparison of ARM with 8051 and PIC, Overview of Arduino and Raspberry Pi platforms, Embedded IoT basics

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Real-Time Applications and Case Studies: Microcontroller applications in robotics, automation, and consumer electronics, Designing energy-efficient systems with microcontrollers; Case studies: Home automation, Smart agriculture systems, Healthcare monitoring.

Textbook:

1. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems, 4th Impression, PHI, 2000.
2. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson Education, 2005.

Reference Books:

1. Kenneth J. Ayala, The 8051 Microcontroller: Architecture, Programming, and Applications, Cengage Learning.
2. John Boxall, Arduino Workshop: A Hands-On Introduction with 65 Projects, No Starch Press.

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Minor Course	EMBEDDED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
- The hardware components required for an embedded system and the design approach of an embedded hardware.
- The various embedded firmware design approaches on embedded environment.
- Understand how to integrate hardware and firmware of an embedded system using real time operating system.

UNIT-I

INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-II

EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT-III

EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization.

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware.

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UNIT-V:

EMBEDDED SYSTEM DEVELOPMENT, IMPLEMENTATION AND TESTING: The integrated development environment, Types of files generated on cross-compilation, Deassembler / De-compiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Interpreters, Compilers and Linkers, debugging tools, Quality assurance and testing of the design, testing on host machine, Simulators, Laboratory Tools.

Text Books:

1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.

2. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited, 2013.

References:

1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.

2. Embedded Systems-Lyla B.Das-Pearson Publications,2013.

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Electronics and Communication Engineering

Minor Course	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand the new computing technologies
- Able to apply the latest computing technologies like cloud computing technology and Big Data
- Ability to introduce the concept of M2M (machine to machine) with necessary protocols
- Get the skill to program using python scripting language which is used in many IoT devices

Unit I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT Communication Models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoT s – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle

Unit II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANGNETCONF, YANG, SNMP NETOPEER

Unit III

IOT Platform design Methodology, Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins., other IOT Devices

Unit V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT, Python web application framework Designing a REST ful web API, Amazon web services for IOT, Sky net IOT messaging platform

Text Books:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD),2014, ISBN: 9789350239759

S. Sai Gowri
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Reference Books:

1. 1.The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
2. From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence, Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
3. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
4. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O'Reilly Media, 2011.

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Electronics and Communication Engineering

Minor Course	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

- Understand the concepts of discrete signals and discrete systems with its characteristics
- Calculate z-Transform, Fourier Transform, Discrete Fourier Transform of discrete signals.
- Understand the algorithms for the efficient computation of DFT coefficients of signals
- Know the various filter structures for FIR and IIR filters.
- Design the FIR and IIR filters.

Unit -I

Introduction: Signals, Systems, and Signal Processing, Classification of Signals, The Concept of Frequency in Continuous Time and Discrete Time Signals

Discrete Time Signals and Systems: Discrete Time Signals, Discrete Time Systems, Analysis of Discrete Time Linear Time Invariant Systems, Discrete Time Systems Described by Difference Equations, Implementation of Discrete Time Systems, Correlation of Discrete Time Signals

Frequency Analysis of Signals: Frequency Analysis of Continuous Time Signals, Frequency Analysis of Discrete Time Signals, Frequency Domain and Time Domain Signal Properties, Properties of the Fourier Transform for Discrete Time Signals.

Unit –II

Frequency Domain Analysis of LTI Systems: Frequency domain characteristics of LTI systems, Frequency response of LTI systems.

The z-Transform and Its Applications to the Analysis of LTI Systems: The z-Transform, Properties, Rational z Transforms, Inversion of the z-Transform, Analysis of Linear Time Invariant Systems in the z-Domain, The One sided z-Transform.

Unit –III

The Discrete Fourier Transform: Its Properties and Applications: Frequency Domain Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear Filtering Methods Based on the DFT, Frequency Analysis of Signals Using DFT

Efficient Computation of the DFT: Fast Fourier Transform Algorithms: Direct Computation of the DFT, Radix-2 FFT Algorithms.

Unit –IV

Implementation of Discrete Time Systems: Structures for the Realization of Discrete Time Systems.

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Structures for FIR Systems: Direct Form Structure, Cascade Form Structures.
Structures for IIR Systems: Discrete Form Structures, Signal Flow Graphs and Transposed Structures, Cascade Form Structures, Parallel Form Structures.

Unit –V

Design of Analog Filters: Butterworth filters… Low Pass Filter, High Pass filter, Band Pass Filter, Band Reject Filter. **Design of Digital Filters**: General Considerations: Causality and Its Implications, Characteristics of Practical Frequency Selective Filters.
Design of FIR Filters: Symmetric and Ant symmetric FIR Filters, Design of Linear Phase FIR Filters Using Windows, Design of Linear Phase FIR Filters by the Frequency Sampling Method.
Design of IIR Filters From Analog Filters: IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation.
Frequency Transformations: Frequency Transformations in the Analog Domain, Frequency Transformations in the Digital Domain.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis, 4th Edition, Pearson Education, 2007.

Reference Books:

1. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, 3rd Edition, Pearson, 2014.
2. Digital Signal Processing-P. Ramesh Babu, 5th Edition, SCITECH Publishers.

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Electronics and Communication Engineering

Minor Course	ELECTRONICS DEVICES AND BASIC CIRCUITS LAB	L	T	P	C
		0	0	3	1.5

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics
Part A: Germanium Diode (Forward bias& Reverse bias)
Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
3. Part A: V-I Characteristics
Part B: Zener Diode as Voltage Regulator
4. Rectifiers (without)
Part A: Half-wave Rectifier
Part B: Full-wave Rectifier
5. BJT Characteristics (CE Configuration)
6. FET Characteristics (CS Configuration)
7. Transistor Biasing
8. CRO Operation and its Measurements
9. BJT-CE Amplifier
10. Emitter Follower-CC Amplifier
11. FET-CS Amplifier

Equipment required:
1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multi-meters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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Electronics and Communication Engineering

Minor Course	DIGITAL ELECTRONICS LAB	L	T	P	C
		0	0	3	1.5

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Verification of truth tables of Logic gates
Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive OR (vi) Exclusive NOR

2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit
3. Verification of functional table of 3 to 8 line Decoder/De-multiplexer

4. four variable logic function verification using 8 to1 multiplexer.

5. Design full adder circuit and verify its functional table.

6. Verification of functional tables of

(i) JK Edge triggered Flip–Flop (ii) JK Master Slav Flip–Flop (iii) DFlip-Flop

7. Design a four bit ring counter using D Flip–Flops/JK Flip Flop and verify output

8. Design a four bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output

9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.

10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T- Flip-Flops and Test it with a low frequency clock and Sketch the output wave forms.

11. Design MOD–8 synchronous counter using T Flip- Flop and verify the result and Sketch the output wave forms.
12. (a) Draw the circuit diagram of a single bit comparator and test the output

(b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

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Electronics and Communication Engineering

Minor Course	DIGITAL SIGNAL PROCESSINGLAB	L	T	P	C
		0	0	3	1.5

(Note: Students have to perform at least FIVE experiments from each part.)

PART-A

List of the Experiments

1. Generation of DT signals.

2. Verify the Linear Convolution of two DT signals

a) Using MATLAB

b) Using Code Composer Studio(CCS)

3. Verify the Circular Convolution of two DT signals

a) Using MATLAB
b) Using Code Composer Studio(CCS)

4. Find the sum of DT sinusoidal signals.

5. Computation of Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT)

a) Using MATLAB
b) Using Code Composer Studio (CCS)

6. Compute N-point DFT of a given DT sequence using Decimation in Time. (Without Using Library Function)

7. Compute N-point DFT of a given DT sequence using Decimation in Frequency. (Without Using Library Function)

PART-B : Following Experiments are to be done using a TI DSP Starter Kit.

7. Generation of a sinusoidal signal.

8. Linear and circular convolution of DT sequences.

9. Compute N-point DFT of a given DT sequence

10. Design and implementation of FIR filters.

11. Design and implementation of IIR filters.

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(An Autonomous Institution, Affiliated to JNTUK Kakinada)

ENKEPADU, VIJAYAWADA-521108

Estd:2007

FIFTH BOARD OF STUDIES MEETING – MINUTES

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Ref: SRKIT/BOS/ CSE /2025-26/5 Date: 28/04/2026.

Respected Sir/Madam,

Sub: CSE-BOS Meeting on 29-04-2026 – Invitation –Reg.

It is proposed to convene the **CSE**-Board of Studies Meeting at 11.00AM on 29-04-2026 (Wednesday) in Computer Science and Engineering Department to discuss the following agenda.

Agenda:-

1. To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
2. To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.
3. To finalize the detailed Course-Contents of Open Elective III & IV offer to other departments in SRK-23 Regulations.
4. To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of Open Elective III & IV offer to other departments in SRK-23 Regulations.
5. Any other matter with the permission of the chair.

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely,
Radhika
(Dr.A.Radhika)

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For Circulation among all BOS Members

MINUTES OF BOS MEETING

SRKIT/BOS/CSE/2025-26/5

Date: 29-04-2026

Department: Computer Science and Engineering

Academic Year: 2025-2026

Venue: CSE-HOD Room

Time: 11.00 AM

The Fifth Board of Studies meeting of Computer Science & Engineering was held on 29th April 2026 at 11 A.M through online mode in the CSE-HOD Room, Department of CSE, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr.A.Radhika	Professor & HOD	Chairman	Radhika
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Subject Expert	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Subject Expert	
(1 Representative from Industry)				
5	Mr. K. Sudheer	Software Engineer, Accenture ,Hyderabad	Industry Expert	
(Alumnus nominated by Principal)				
6	Mr.P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada	Alumni	
(Faculty of the Department)				

1	Ch.Ambedkar	Assistant Professor	Member	
2	Ch.Pavani	Assistant Professor	Member	
3	K.Jayaram	Assistant Professor	Member	
4	D.Nalini Kumari	Assistant Professor	Member	
5	G.M.Padmaja	Assistant Professor	Member	

6	K.Krupa	Assistant Professor	Member	
7	P. JyosthnaKumari	Assistant Professor	Member	
8	K.Krupa	Assistant Professor	Member	
9	R.JyothSingh	Assistant Professor	Member	
10	K.Rajya Guru Sai Sree	Assistant Professor	Member	
11	B.Ramya	Assistant Professor	Member	
12	V.V.G Prasanthi	Assistant Professor	Member	

Dr.A.Radhika chaired the Fifth BOS virtual meeting through the following link:

https://us02web.zoom.us/j/88033513546?pwd=KUmfCMbSVwicKXBtnMomKtZUkTo3ue.1

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

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AGENDA:

SRKIT/BOS/CSE.2025-26/5/01	To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE.2025-26/5/02	To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE.2025-26/5/03	To finalize the detailed Course-Contents of Open Elective III & IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE.2025-26/5/04	To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE.2025-26/6/05	Any other matter with the permission of the chair.

POINTS OF DISCUSSION:

1. About BTech IV-1 Semester and IV-2 Semester Course Structure and Syllabus of Regulation SRK-23
2. About BTech IV-1 Semester and IV-2 Semester Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
3. About B.Tech Open Electives III and IV offer to other departments Course Structure and Syllabus of Regulation SRK-23.
4. About B.Tech Open Electives III and IV offer to other departments Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
5. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About BTech IV-1 Semester and IV-2 Semester Course Structure and Syllabus of Regulation SRK-23
2. About BTech IV-1 Semester and IV-2 Semester Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
3. About B.Tech Open Electives III and IV offer to other departments Course Structure and Syllabus of Regulation SRK-23.
4. About B.Tech Open Electives III and IV offer to other departments Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of Computer Science and Engineering in the SRK Institute of Technology.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 12.30 p.m, Dr. A.Radhika, Chairman of BOS of the CSE Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Radhika

Chairman BOS

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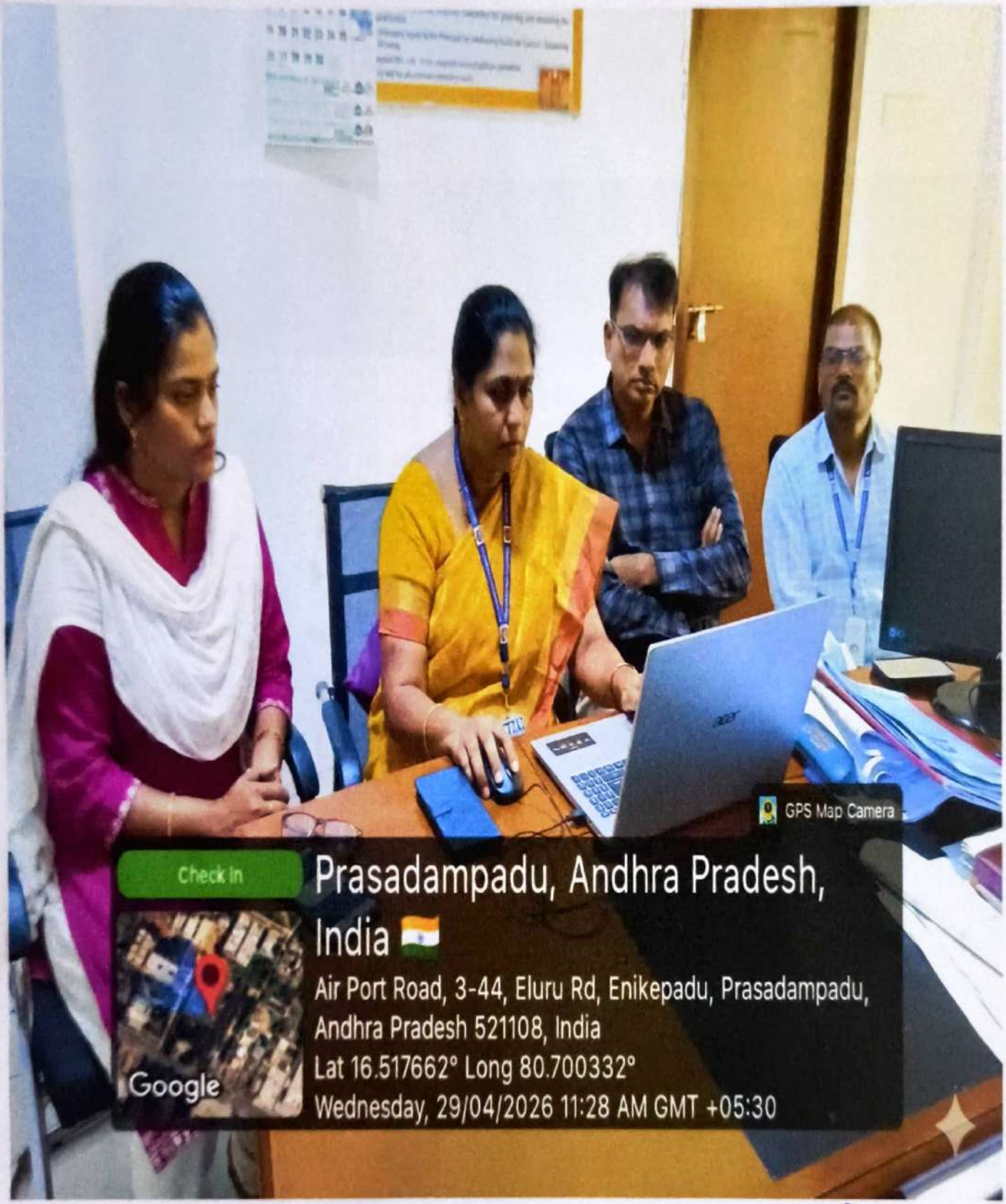

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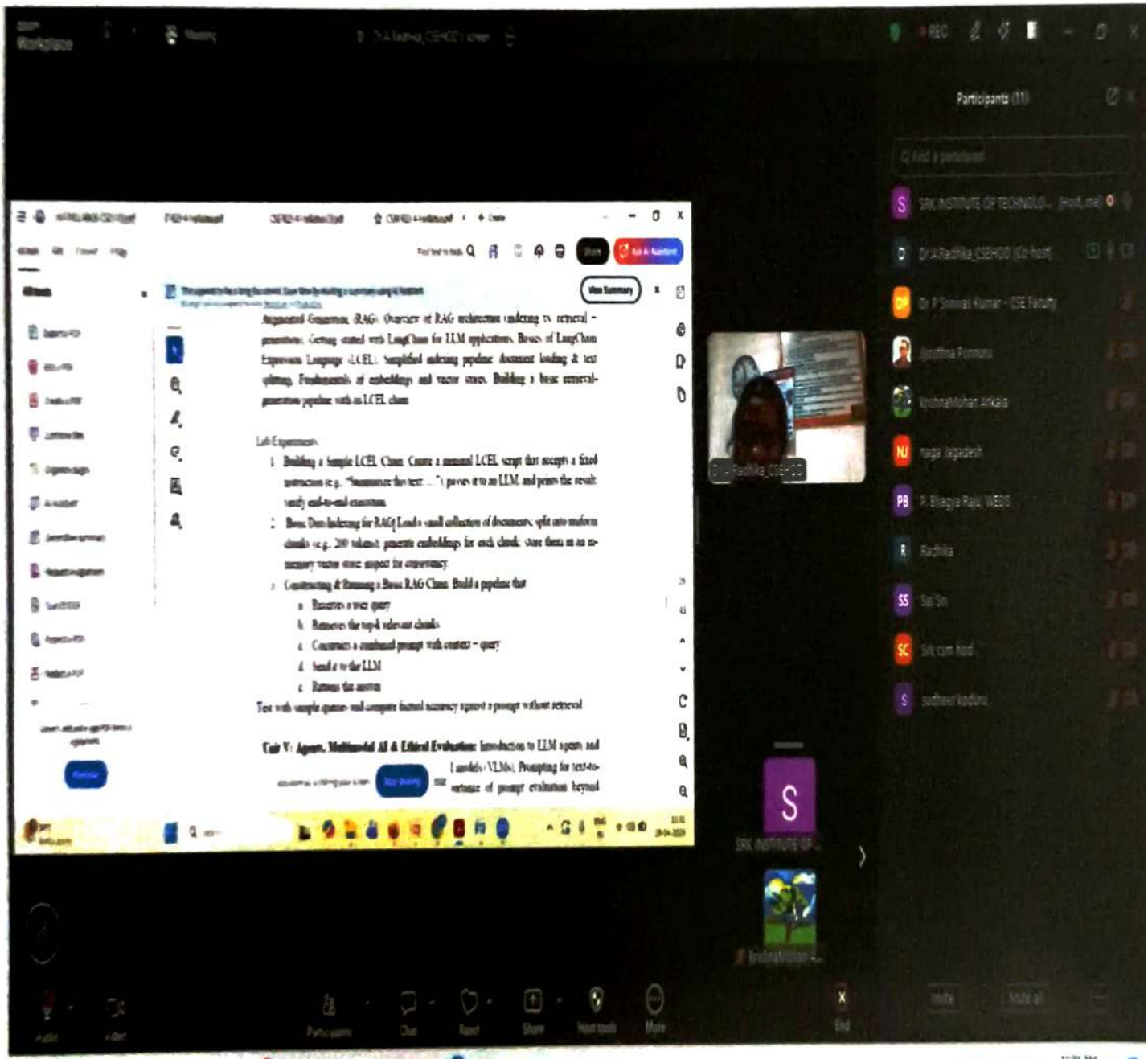

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Gmail

SRK CSE <srkcsehod@gmail.com>

Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Allied Branches

1 message

SRK CSE <srkcsehod@gmail.com> Wed, Apr 29, 2026 at 3:52 PM
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>, kmarepalli@yahoo.com, Bhagya raj <pb.raj587@gmail.com>, sudheer.koduru@accenture.com
Bcc: srkcsmhod@gmail.com, SRK.ITDEPT@gmail.com, SRK CSD <srkcsdhod@gmail.com>

Respected sir/madam

As per our discussion in the BOS meeting held on 29-4-26 at 11.00 AM. I am requesting for the approval of course structure and course contents of IV-1 Semester and IV-2 semester and open electives 3 and 4 offer to other departments of SRK-23 Regulations

Thanking u

Yours Sincerely
Dr.A.Radhika
Professor & HOD
Department of CSE

4 attachments

- **IV-I SYLLABUS-CSD.pdf** 903K
- **CSM_SRK23Syllabus.pdf** 1344K
- **IT- SRK23Syllabus.pdf** 1289K
- **CSE_R23 4-1 syllabus.docx** 173K

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Department Vision

To evolve as a center of repute and produce globally competent professionals with high academic and ethical values

Department Mission

1. To provide learning ambience to generate innovative and problem solving skills with professionalism through strong theoretical foundation, practical skills, and interdisciplinary knowledge to tackle real-world challenges.

2. To foster consultancy and basic as well as applied research activities to solve real world problems through industry institution interaction.

3. To engage in life-long learning and create awareness of the contemporary developments in computer science and engineering to become outstanding professionals with moral and ethical values.

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PROGRAMME OUTCOMES

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

P012: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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B.Tech – IV Year I Semester

S.No	Category	Title	L	T	P	Credits
1	Professional Core	Deep Learning	2	1	0	3
2	Management Course- II	Human Resources & Project Management	2	0	0	2
3	Professional Elective-IV	1. Software Architecture & Design Patterns 2. Blockchain Technology 3. Augmented Reality & Virtual Reality 4. Internet of Things 5. 12 week MOOC Swayam/NPTEL course recommended by the BoS	3	0	0	3
4	Professional Elective- V	1.Agile Methodologies 2.Generative AI 3.Computer Vision 4.Cyber Physical Systems 5.12 week MOOC Swayam / NPTEL course recommended by the BoS	3	0	0	3
5	Open Elective- III		3	0	0	3
6	Open Elective- IV		3	0	0	3
7	Skill Enhancement Course	Prompt Engineering/ SWAYAM Plus - Certificate program in Prompt Engineering and ChatGPT	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship /Mini Project	-	-	-	2
		Total	**18**	**2**	**02**	**21**
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	0	3
HC	Honors Course (Student may select from the same honors pool)		3	0	0	3
HC	Honors Course (Student may select from the same honors pool)		3	0	0	3

B.Tech – IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Internship & Project Work	Full semester Internship & Project Work	0	0	24	12

Open Electives, offered to other department students:

Open Elective III: Object Oriented Programming through Java

Open Elective IV: Principles of Software Engineering /Computer Networks

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IV Year I Semester	DEEP LEARNING	L	T	P	C
		2	1	0	3

Course Objectives:

The main objective of the course is to make students:

- Learn deep learning methods for working with sequential data, deep recurrent & memory networks and deep Turing machines,
- Apply such deep learning mechanisms to various learning problems.
- Identify the open issues in deep learning, and have a grasp of the current research directions.

Course Outcomes:

CO'S	Course Outcome Description	Level
CO1	Define the concepts of Artificial Intelligence, Machine Learning, and ensemble techniques such as decision trees, random forests, and gradient boosting	1
CO2	Understand the fundamentals of deep learning, artificial neural networks, and techniques for training and improving deep networks	2
CO3	Apply neural network models using frameworks like Keras and TensorFlow for binary and multiclass classification problems	3
CO4	Analyze deep learning architectures such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) using PyTorch	4
CO5	Evaluate advanced deep learning applications including GANs, reinforcement learning, and deep generative models	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	1	–	–	–	–	–	–	2	2	1
CO2	3	2	1	1	1	–	–	–	–	–	2	2	1
CO3	3	2	2	2	3	–	–	1	1	–	2	3	3
CO4	3	3	2	2	3	–	–	1	1	1	2	3	3
CO5	3	3	3	2	3	1	1	2	2	1	3	3	2

UNIT I:

Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting.

Radhika
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UNIT II:

Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks.

UNIT III:

Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification

UNIT IV:

Convolutional Neural Networks: Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation, **Recurrent Neural Networks:** Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch.

UNIT V:

Interactive Applications of Deep Learning: Machine Vision, Natural Language processing, Generative Adversial Networks, Deep Reinforcement Learning.

Deep Learning Research: Autoencoders, Deep Generative Models: Boltzmann Machines Restricted Boltzmann Machines, Deep Belief Networks.

Textbooks:

1. Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courvile, MIT Press, 2016
2. Deep Learning with Python, Francois Chollet, December 2017, Manning Publications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence, Jon Krohn, Grant Beyleveld, Aglaé Bassens, September 2019, Addison-Wesley Professional, ISBN: 9780135116821
4. Deep Learning from Scratch, Seth Weidman, September 2019, O'Reilly Media, Inc., ISBN: 9781492041412

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

Web Link:

- *Swayam NPTEL: Deep Learning:*
- *https://onlinecourses.nptel.ac.in/noc22_cs22/preview*

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IV Year I Semester	HUMAN RESOURCES & PROJECT MANAGEMENT	L	T	P	C
		2	0	0	2

Course Objectives:

The main objectives of the course are to

- Provide knowledge about HR planning, recruitment, selection, and job design.
- Develop skills in managing HR functions such as performance appraisal, compensation, and employee relations.
- Emphasize the importance of ethical practices and HR audits in maintaining organizational health.
- Understand the HRD framework and its impact on organizational success.
- Improve group interaction and team dynamics for better collaboration and performance.
- Understand the Fundamentals of Project Management and Project Networks
- Implement appropriate management strategies tailored to specific challenges in different project types.

Course Outcomes:

Upon successful completion of this course, the student should be able to

CO'S	Course Outcome Description	Level
CO1	Explain HRM concepts, functions, and processes	2
CO2	Apply HRD, training, and performance appraisal methods.	3
CO3	Analyze project management concepts and techniques.	4
CO4	Evaluate project types and management strategies.	5
CO5	Develop project planning and implementation strategies.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	–	–	2	3	2	2	1	1	–	2
CO2	2	2	2	1	–	2	3	3	2	2	1	1	2
CO3	3	2	2	1	1	2	2	2	2	3	2	1	3
CO4	3	3	3	2	2	3	2	3	2	3	2	2	3
CO5	2	3	2	2	2	3	2	2	2	3	1	1	2

UNIT –I:

HRM: Nature, Scope, Concept of HRM, Functions of HRM, Role of HR manager, emerging trends in HRM, E-HRM, HR audit models, ethical aspects of HRM. HR Planning, Demand and Supply forecasting of HR, Job Design, Recruitment, Sources of recruitment, Selection- Selection Procedure.

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UNIT –II:

HRD, HR accounting, Models, Concept of Training and Development, Methods of Training. Performance Appraisal: Importance Methods of performance appraisal, Career Development and Counseling, group interaction.

UNIT –III:

Basics of Project Management, Concept, resource management, Project environment, Types of Projects, project networks-DPR, Project life cycle, Project proposals, Monitoring project progress, Project appraisal and Project selection, 80-20 rules, production technology, communication matrix

UNIT-IV:

Identify various project types and their unique management challenges and apply appropriate management strategies for each. Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

UNIT-V:

Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

Text Books:

1. Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learning 2016.
2. Sharon Pande and Swapnalekha Basak, Human Resource Management, Text and Cases, Vikas Publishing, 2e, 2016.
3. Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, Project Management, Sage Publications, 1e, 2021.
4. K. Nagarajan, Project Management, New Age International Publishers, 8e, 2017.

Reference Books:

1. Subba Rao P, "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
2. K Aswathappa, "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
3. Prasanna Chandra, "Projects, Planning, Analysis, Selection, Financing, Implementation and Review", Tata McGraw Hill Company Pvt. Ltd., New Delhi, 1998.
4. Vasanth Desai, "Project Management", 4th edition, Himalaya Publications, 2018.
5. Lalitha Balakrishnan, Gowri, "Project Management", Himalaya publishing house, New Delhi, 2022.

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IV Year I Semester	SOFTWARE ARCHITECTURE & DESIGN PATTERNS (PROFESSIONAL ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to make student

- Understand the basic concepts to identify state behavior of real world objects
- Apply Object Oriented Analysis and Design concepts to solve complex problems
- Construct various UML models using the appropriate notation for specific problem context
- Design models to Show the importance of systems analysis and design in solving complex problems using case studies
- Study Pattern Oriented approach for real world problems

Course Outcome:

CO'S	Course Outcome Description	Level
CO1	Explain fundamental concepts of design patterns, object-oriented development, and their role in solving design problems.	2
CO2	Apply requirement analysis techniques to model systems using conceptual classes and relationships.	3
CO3	Analyze and differentiate structural design patterns for solving software design problems.	4
CO4	Apply MVC architecture to design and implement interactive systems with pattern-based solutions.	3
CO5	Evaluate distributed object systems using client-server models, RMI, and web services technologies.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	–	–	–	–	–	–	2	1
CO2	3	3	2	2	–	–	–	–	–	–	–	3	2
CO3	3	3	2	2	1	–	–	–	–	–	–	3	2
CO4	3	2	3	2	2	–	–	–	1	1	–	3	3
CO5	3	3	2	2	3	1	–	–	1	1	–	3	3

UNIT – I:

Introduction: design pattern, Describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern what is object oriented development? Key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm

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UNIT – II:

Analysis a System: Overview of the analysis phase, stage 1 gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain Design and Implementation, discussions and further reading

UNIT – III:

Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.

UNIT – IV:

Interactive systems and the MVC architecture: Introduction The MVC architectural pattern, analyzing a simple drawing program designing the system, designing of the subsystems, getting into implementation, implementing undo operation drawing incomplete items, adding a new feature pattern based solutions

UNIT – V:

Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web, Web services (SOAP, Restful), Enterprise Service Bus

Text Books:

1. Object Oriented Analysis, Design and Implementation, Brahma Dathan, Sarnath Rammath , Universities Press, 2013
2. Design Patterns, Erich Gamma, Richard Helan, Ralph Johman, John Vlissides, PEARSON Publication, 2013

Reference Books:

1. Frank Bachmann, Regine Meunier, Hans Rohnert "Pattern Oriented Software Architecture", Volume 1, 1996.
2. William J Brown et al., "Anti Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998

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IV Year I Semester	BLOCKCHAIN TECHNOLOGY (PROFESSIONAL ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of the course are to make student

1. Learn the fundamentals of Block Chain and various types of block chain and consensus mechanism.
2. Understand public block chain system, Private block chain system and consortium block chain.
3. Identify the security issues of blockchain technology

Course Outcomes:

CO'S	Course Outcome Description	Level
CO1	Explain fundamental concepts of blockchain, its components, types, consensus mechanisms, and cryptocurrencies.	2
CO2	Apply knowledge of public blockchains and smart contracts for developing decentralized applications.	3
CO3	Analyze private and consortium blockchain systems along with ICO mechanisms and platforms.	4
CO4	Evaluate security challenges, performance issues, and real-world applications of blockchain technology.	5
CO5	Develop blockchain-based applications using Python and Hyperledger Fabric frameworks.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	–	–	–	–	–	–	2	1
CO2	3	3	2	2	2	–	–	–	–	–	–	3	2
CO3	3	3	2	2	2	–	–	–	–	–	–	3	2
CO4	3	3	2	3	2	2	1	1	1	1	–	3	3
CO5	3	3	3	2	3	–	–	–	2	2	1	3	3

UNIT – I:

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol.

Cryptocurrency: Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

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UNIT – II:

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain.

Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT – III:

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E- commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.

Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT – IV:

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain in Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT – V:

Blockchain Case Studies:
Case Study 1 – Retail,
Case Study 2 – Banking and Financial Services, Case Study 3
– Healthcare,
Case Study 4 – Energy and Utilities.
Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor,
Basic Programming Using Python, Python Packages for Blockchain.
Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyperledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

Text Books:

1. "Blockchain Technology", Chandramouli Subramanian, Asha A.George, Abhilasj K A, Meena Karthikeyan , Universities Press.

Reference Books:

1. Blockchain Blue print for Economy, Melanie Swan, SPD Oreilly.
2. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gauar, Pearson Addition Wesley

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IV Year I Semester	AUGMENTED REALITY & VIRTUAL REALITY (PROFESSIONAL ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of the course are to

- Provide a foundation to the fast growing field of AR and make the students aware of the various Augmented Reality concepts.
- Give historical and modern overviews and perspectives on virtual reality.

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain fundamentals of augmented reality, including displays, tracking systems, and related technologies.	2
CO2	Apply computer vision techniques, interaction methods, and software architectures in AR systems.	3
CO3	Analyze virtual reality concepts, geometric modeling, and optical principles in virtual environments.	4
CO4	Analyze human vision, perception, and rendering techniques for improving VR experience.	4
CO5	Evaluate motion, interaction, and audio systems in real and virtual environments.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	–	–	–	–	–	–	2	1
CO2	3	3	2	2	2	–	–	–	1	–	–	3	2
CO3	3	3	2	2	1	–	–	–	–	–	–	3	2
CO4	3	3	2	3	2	–	–	–	–	–	–	3	3
CO5	3	3	2	2	3	1	–	–	1	1	–	3	3

UNIT – I:

Introduction to Augmented Reality: Augmented Reality, Defining augmented reality, history of augmented reality, Examples, Related fields

Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays

Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors

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UNIT – II:

Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking.
Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction
Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs

UNIT – III:

Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception
The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations
Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, the Human Eye, Cameras, Displays

UNIT – IV:

The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR
Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, **Perception of Color Visual Rendering:** Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT – V:

Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection
Interaction: Motor Programs and Remapping, Locomotion, Social Interaction
Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

Text Books:

1. "Augmented Reality: Principles & Practice" by Schmalstieg, Hollerer, Pearson Education India; First edition (12 October 2016), ISBN-10: 9332578494
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

Reference Books:

1. "AR Game Development", Allan Fowler, 1st Edition, Apress Publications, 2018, ISBN 978-1484236178
2. "Understanding Virtual Reality: Interface, Application and Design", William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. "Developing Virtual Reality Applications: Foundations of Effective Design", Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. "Designing for Mixed Reality", Kharis O'Connell, O'Reilly Media, Inc., 2016, ISBN:9781491962381

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IV Year I Semester	INTERNET OF THINGS (PROFESSIONAL ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to make student learn the application areas of IOT, the revolution of Internet in Mobile Devices, Cloud & Sensor Networks and building blocks of Internet of Things and characteristic

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain the evolution, architecture, and enabling technologies of IoT systems.	2
CO2	Apply sensing, actuation, and processing concepts for IoT system design.	3
CO3	Analyze IoT connectivity and communication technologies for different applications.	4
CO4	Evaluate interoperability frameworks and fog computing architectures in IoT environments.	5
CO5	Analyze IoT challenges, emerging paradigms, and real-world case studies.	4

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	1	–	–	–	–	–	–	2	1
CO2	3	3	2	2	2	–	–	–	–	–	–	3	2
CO3	3	3	2	2	3	–	–	–	–	–	–	3	3
CO4	3	3	2	3	3	1	–	–	1	1	–	3	3
CO5	3	3	2	2	2	1	1	–	1	1	–	3	3

UNIT I:

Predecessors of IoT: Introduction, Wireless Sensor Networks, Machine-to-Machine Communications, Cyber Physical Systems

Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing Strategies in IoT

UNIT II:

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading

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UNIT III:

IoT Connectivity Technologies: Introduction, IEEE 802.15.4, Zigbee, Thread, ISA100.11A, Wireless HART, RFID, NFC,DASH7, Z-Wave, Weightless, Sigfox, LoRa, NB-IT, Wi-Fi, Bluetooth
IoT Communication Technologies: Introduction, Infrastructure Protocols, Discovery Protocols, Data Protocols, Identification Protocols, Device Management, Semantic Protocols.

UNIT IV:

IoT Interoperability: Introduction, Standards, Frameworks
Fog Computing and Its Applications: Introduction, View of Fog Computing Architecture, Fog Computing in IoT, Selected Applications of Fog Computing

UNIT V:

Paradigms, Challenges, and the Future: Introduction, Evolution of New IoT Paradigms, Challenges Associated with IoT, Emerging Pillars of IoT
IoT Case Studies: Agricultural IoT, Vehicular IoT

Text Books:

1. Introduction to IoT, Sudip Misra, Anandarup Mukhaerjee, Arjit Roy, Cambridge University Press, 2021
2. Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill Higher Education

Reference Books:

1. Fog and Edge Computing: Principles and Paradigms, Rajkumar Buyya (Editor), Satish Narayana Srirama (Editor) , ISBN: 978-1-119-52498-4, January 2019
2. Getting Started with the Internet of Things, Cuno Pfister , Oreilly

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IV Year I Semester	AGILE METHODOLOGIES (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of this course are to

- Introduce the important concepts of Agile software development Process
- Emphasize the role of stand-up meetings in software collaboration
- Impart the knowledge on values and principles in understanding agility

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain Agile values, principles, and the Agile Manifesto for software development.	2
CO2	Apply Agile principles to improve project delivery, teamwork, and continuous improvement.	3
CO3	Analyze Scrum practices, roles, and self-organizing team dynamics in project execution.	4
CO4	Apply XP practices and principles to manage change and design software incrementally.	3
CO5	Evaluate Lean, Kanban, and Agile coaching techniques for process improvement.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	–	–	–	1	1	1	–	1	2	1
CO2	3	3	2	2	1	–	1	2	2	1	1	3	2
CO3	3	3	2	2	1	–	1	3	2	2	1	3	2
CO4	3	2	3	2	2	–	1	2	2	2	1	3	3
CO5	3	3	2	2	3	1	2	2	2	2	2	3	3

UNIT I :

Learning Agile: Agile, Getting Agile into your brain, Understanding Agile values, No Silver Bullet, Agile to the Rescue. A fractured perspective, The Agile Manifesto, Understanding the Elephant, Where to start with a New Methodology.

UNIT II :

The Agile Principles: The 12 Principles of Agile Software, The Customer Is Always Right, Delivering the Project, Better Project Delivery for the Ebook Reader Project. Communicating and Working Together, Project Execution—Moving the Project Along, Constantly Improving the Project and the Team. The Agile Project: Bringing All the Principles Together

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UNIT III:

SCRUM and Self-Organizing Teams: The Rules of Scrum, Act I: I Can Haz Scrum, Everyone on a Scrum Team owns the Project, Status Updates Are for Social Networks!, The Whole Team Uses the Daily Scrum, Feedback and the Visibility-Inspection-Adaptation Cycle, The Last Responsible Moment, Sprinting into a Wall, Sprints, Planning, and Retrospectives.

Scrum Planning And Collective Commitment: Not Quite Expecting the Unexpected, User Stories, Velocity, and Generally Accepted Scrum Practices, Victory Lap, Scrum Values Revisited.

UNIT IV:

XP and Embracing Change: Going into Overtime, The Primary Practices of XP, The Game Plan Changed, but We're Still Losing, The XP Values Help the Team Change Their Mindset, An Effective Mindset Starts with the XP Values, The Momentum Shifts, Understanding the XP Principles Helps You Embrace Change.

XP, Simplicity, and Incremental Design: Code and Design, Make Code and Design Decisions at the Last Responsible Moment, Final Score.

UNIT V:

Lean, Eliminating Waste, and Seeing the whole: Lean Thinking, Creating Heroes and Magical Thinking. Eliminate Waste, Gain a Deeper Understanding of the Product, Deliver As Fast As Possible.

Kanban, Flow, and Constantly Improving: The Principles of Kanban, Improving Your Process with Kanban, Measure and Manage Flow, Emergent Behavior with Kanban.

The Agile Coach: Coaches Understand Why People Don't Always Want to Change. The Principles of Coaching.

Text Books :

1. Andrew Stellman, Jill Alison Hart, Learning Agile, O'Reilly, 2015.

Reference Books:

1. Andrew Stellman, Jennifer Green, Head first Agile, O'Reilly, 2017.
2. Rubin K , Essential Scrum : A Practical Guide To The Most Popular Agile Process, Addison-Wesley, 2013

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IV Year I Semester	GENERATIVE AI (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of the course are to understand the basics of Generative AI, Text Generation, the process of generating videos, GAN and its variants.

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain fundamental concepts of generative AI, probabilistic modeling, and various generative models.	2
CO2	Apply language models and transformer-based architectures for text generation and prompt engineering.	3
CO3	Analyze image generation techniques using GANs, VAEs, diffusion models, and transformer-based approaches.	4
CO4	Apply generative models for creative tasks like painting, music, and intelligent agents.	3
CO5	Evaluate and implement generative AI models using open-source frameworks and deployment tools.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	2	2	–	–	–	1	2	1
CO2	3	3	2	2	3	–	1	–	1	–	1	3	2
CO3	3	3	2	2	3	–	–	–	–	–	1	3	2
CO4	3	2	3	2	3	–	1	1	1	1	1	3	3
CO5	3	3	3	2	3	1	1	1	1	2	2	3	3

UNIT I:

Introduction To Gen Ai: Historical Overview of Generative modeling, Difference between Gen AI and Discriminative Modeling, Importance of generative models in AI and Machine Learning, Types of Generative models, GANs, VAEs, autoregressive models and Vector quantized Diffusion models, Understanding if probabilistic modeling and generative process, Challenges of Generative Modeling, Future of Gen AI, Ethical Aspects of AI, Responsible AI, Use Cases.

UNIT II:

Generative Models For Text: Language Models Basics, Building blocks of Language models, Transformer Architecture, Encoder and Decoder, Attention mechanisms, Generation of Text, Models like BERT and GPT models, Generation of Text, Autoencoding, Regression Models, Exploring ChatGPT, Prompt Engineering: Designing Prompts, Revising Prompts using Reinforcement Learning from Human Feedback (RLHF), Retrieval Augmented Generation, Multimodal LLM, Issues of LLM like hallucination.

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UNIT III:

Generation of Images: Introduction to Generative Adversarial Networks, Adversarial Training Process, Nash Equilibrium, Variational Autoencoders, Encoder-Decoder Architectures, Stable Diffusion Models, Introduction to Transformer-based Image Generation, CLIP, Visual Transformers ViT- Dall-E2 and Dall-E3, GPT-4V, Issues of Image Generation models like Mode Collapse and Stability.

UNIT IV:

Generation of Painting, Music, and Play: Variants of GAN, Types of GAN, Cyclic GAN, Using Cyclic GAN to Generate Paintings, Neural Style Transfer, Style Transfer, Music Generating RNN, MuseGAN, Autonomous agents, Deep Q Algorithm, Actor-critic Network.

UNIT V:

Open Source Models And Programming Frameworks: Training and Fine tuning of Generative models, GPT 4 All, Transfer learning and Pretrained models, Training vision models, Google Copilot, Programming LLM, LangChain, Open Source Models, Llama, Programming for TimeSformer, Deployment, Hugging Face.

Text Books:

1. Denis Rothman, "Transformers for Natural Language Processing and Computer Vision", Third Edition , Packt Books, 2024

Reference Books:

1. David Foster, "Generative Deep Learning", O'Reily Books, 2024.
2. Altaf Rehmani, "Generative AI for Everyone", BlueRose One, 2024

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IV Year I Semester	COMPUTER VISION (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of the course are to understand the Fundamental Concepts related to sources, shadows and shading, the Geometry of Multiple Views

Course Outcomes:

CO's	Course Outcome Description	Level
CO1	Explain camera models, radiometry, color theory, and shading techniques in image formation.	2
CO2	Apply linear filtering, edge detection, and texture analysis techniques for image processing tasks.	3
CO3	Analyze multiple view geometry, stereopsis, and image segmentation techniques.	4
CO4	Apply probabilistic methods, Hough transform, and tracking models for segmentation and motion analysis.	3
CO5	Evaluate geometric camera models, calibration techniques, and model-based vision in real-world applications.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	1	–	–	–	–	–	1	2	1
CO2	3	3	2	2	3	–	–	–	–	–	1	3	2
CO3	3	3	2	2	2	–	–	–	–	–	1	3	2
CO4	3	2	3	3	3	–	–	1	1	1	1	3	3
CO5	3	3	3	3	3	1	–	1	1	1	2	3	3

UNIT –I:

CAMERAS: Pinhole Cameras Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection: Noise, Estimating Derivatives, Detecting Edges Texture0: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture

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UNIT-III:

The Geometry of Multiple Views: Two Views Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph- Theoretic Clustering,

UNIT-IV:

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT- V:

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry,
Case study: Mobile Robot Localization Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Case study: Registration in Medical Imaging Systems, Curved Surfaces and Alignment.

Text Books:

1. David A. Forsyth, Jean Ponce, "Computer Vision – A Modern Approach", PHI Learning (Indian Edition), 2009.

Reference Books:

1. E. R. Davies, "Computer and Machine Vision – Theory, Algorithms and Practicalities", Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez, R. E. Woods, "Digital Image Processing", Addison Wesley, 2008.
3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer, Verlag London Limited, 2011.

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IV Year I Semester	CYBER PHYSICAL SYSTEMS (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to

- Discuss the core principles behind Cyber Physical Systems
- Identify Security mechanisms of Cyber Physical System
- Describe Synchronization in Distributed Cyber-Physical Systems

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain the fundamentals of symbolic synthesis and modeling techniques in cyber-physical systems.	2
CO2	Apply security principles and analyze attack models and countermeasures in cyber-physical systems.	3
CO3	Analyze synchronization techniques and distributed algorithms in cyber-physical systems.	4
CO4	Evaluate real-time scheduling methods for handling timing constraints and uncertainties in CPS.	5
CO5	Design and integrate models for cyber-physical systems using formal semantics and domain-specific languages.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	1	–	–	–	–	–	1	2	1
CO2	3	3	2	2	2	2	1	–	–	–	1	3	2
CO3	3	3	2	2	2	–	–	1	1	–	1	3	2
CO4	3	3	2	3	3	1	–	1	1	1	2	3	3
CO5	3	3	3	3	3	2	1	1	2	2	2	3	3

UNIT I:

Symbolic Synthesis for Cyber-Physical Systems: Introduction and Motivation, Basic Techniques - Preliminaries, Problem Definition, Solving the Synthesis Problem, Construction of Symbolic Models, Advanced Techniques: Construction of Symbolic Models, Continuous- Time Controllers, Software Tools

UNIT II:

Security of Cyber-Physical Systems: Introduction and Motivation, Basic Techniques - Cyber Security Requirements, Attack Model, Countermeasures, Advanced Techniques: System Theoretic Approaches

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UNIT III:

Synchronization in Distributed Cyber-Physical Systems: Challenges in Cyber-Physical Systems, A Complexity-Reducing Technique for Synchronization, Formal Software Engineering, Distributed Consensus Algorithms, Synchronous Lockstep Executions, Time- Triggered Architecture, Related Technology, Advanced Techniques

UNIT IV:

Real-Time Scheduling for Cyber-Physical Systems: Introduction and Motivation, Basic Techniques, Scheduling with Fixed Timing Parameters, Memory Effects, Multiprocessor/ Multicore Scheduling, Accommodating Variability and Uncertainty

UNIT V:

Model Integration in Cyber-Physical Systems: Introduction and Motivation, Causality, Semantic Domains for Time, Interaction Models for Computational Processes, Semantics of CPS DSMLs, Advanced Techniques, ForSpec, The Syntax of CyPhyML, Formalization of Semantics, Formalization of Language Integration.

Text Books:

1. Raj Kumar, Dionisio De Niz, Mark Klein, Cyber-Physical Systems, Addison-Wesley Professional, 2016
2. Rajeev Alur, Principles of Cyber-Physical Systems, MIT Press

Reference Books:

1. E.A.Lee, Sanjit Seshia, Introduction to Embedded Systems: A Cyber-Physical Systems Approach, MIT Press
2. Andre Platzer, Logical Foundations of Cyber-Physical Systems, 2e, Springer Publishing, 2018

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IV Year I Semester	PROMPT ENGINEERING (SKILL ENHANCEMENT COURSE)	L	T	P	C
		0	1	2	2

Course Objectives:

The main objectives of the course are to

- Apply iterative prompting for clarity and context.
- Create varied prompts to steer model outputs.
- Construct chain-of-thought and structured prompts.
- Develop retrieval-augmented pipelines to ground outputs.
- Evaluate LLM agents and multimodal apps for ethics and robustness.

Course Outcomes:

CO's	Course Outcome Description	Level
CO1	Explain fundamental concepts of prompt engineering, prompt structure, and basic LLM interaction.	2
CO2	Apply advanced prompt patterns such as few-shot, role-based, and constraint-based prompting for specific tasks.	3
CO3	Analyze and generate structured outputs (JSON, tables) and apply reasoning techniques for complex problems.	4
CO4	Design and implement retrieval-augmented generation pipelines using LangChain and vector databases.	5
CO5	Evaluate and develop LLM agents, multimodal systems, and ensure ethical, secure, and robust AI solutions.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	2	–	–	–	1	–	1	3	2
CO2	3	3	2	2	3	–	–	1	2	–	1	3	3
CO3	3	3	2	3	3	–	–	1	2	–	1	3	3
CO4	3	3	3	3	3	1	–	2	2	2	2	3	3
CO5	3	3	3	3	3	2	3	2	3	2	3	3	3

Unit I: Foundations of Prompt Engineering: Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering, Core principles of effective prompt design, Anatomy of a prompt, Setting up the Python environment for LLM interaction, Iterative prompting lifecycle, Common prompt pitfalls and remediation

Lab Experiments:

1. Environment & Connectivity: Install required packages (e.g., transformers, openai); securely configure the API key; run a simple "Hello, world" prompt to verify model access.
2. Baseline vs. Enhanced Prompts: Execute a naïve prompt ("Write a one-paragraph bio of Ada Lovelace.") and an enhanced prompt that adds role framing, specificity, and explicit format instructions; compare both outputs for relevance, completeness, and style.

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3. Iterative Refinement on a Simple Task: Summarize the plot of the Shakespearean play Romeo and Juliet in two sentences through three rounds of prompt tweaking:
   a. Minimal instruction.
   b. Addition of length and style constraints
   c. Specification of key content elements (setting and theme) Document how each iteration changes and improves the result.
4. Diagnosing Prompt Failures & Edge Cases: Craft a vague or contradictory prompt; analyze the failure mode (ambiguity, missing context, or format errors); refine the prompt by adding examples or clarifying instructions.

Unit II: Advanced Prompt Patterns & Techniques: Enhanced prompt anatomy: contextual detail and explicit output specifications, Few-shot in-context prompting, Prompt structuring and template design, Role-based prompting to establish personas or system behavior, Negative prompting to filter or suppress undesired content, Constraint specification and instruction enforcement (e.g., length, format), Iterative prompt refinement and optimization

Lab Experiments:

1. Few-Shot vs. Zero-Shot Comparison: Design and execute a zero-shot prompt and a few-shot prompt (with 2–3 exemplar input-output pairs) for a chosen text task (e.g., sentiment classification or translation); compare outputs for accuracy, consistency, and adherence to examples.
2. Role-Based & Negative Prompting: Craft a role-based prompt to establish a specific persona (e.g., "You are a financial advisor…"); then create a negative prompt to suppress undesired content (e.g., "Do not mention any brand names"); evaluate how each influences the model's response.
3. Constraint Specification & Iterative Refinement: Select an open-ended task (e.g., summarizing a technical article); issue a basic prompt; identify failures in length or format; refine the prompt by adding explicit constraints (word count, bullet format, etc.); document improvements over two refinement cycles.

Unit III: Structured Output & Reasoning Techniques: Importance of structured outputs for real-world applications, Prompting for specific formats (lists, tables, Markdown), Generating valid JSON and YAML via explicit instructions, Eliciting chain-of- thought reasoning in zero-shot prompts, Decomposing complex tasks into manageable sub- tasks

Lab Experiments:

1. Structured Format Prompting: Instruct the model to output information as bullet lists and Markdown tables (e.g., "List three benefits of daily exercise in a Markdown table with columns 'Benefit' and 'Description.'"); verify the output matches the requested structure.
2. JSON/YAML Generation: Provide a brief dataset description (e.g., three books with title, author, publication year) and prompt the model to produce valid JSON or YAML; use a parser to validate syntax and refine the prompt if errors occur.
3. Chain-of-Thought & Task Decomposition: Present a multi-step problem (e.g., a logic puzzle) and apply zero-shot CoT prompting (e.g., "Let's think step by step. Explain your reasoning before the final answer."); separately, decompose the problem into sequential sub-questions, collect partial answers, combine them, and compare accuracy against a direct-answer baseline.

Unit IV: Retrieval-Augmented Generation & LangChain Workflows: Limitations of LLM internal knowledge, Need for external data sources, Introduction to Retrieval- Augmented Generation (RAG), Overview of RAG architecture (indexing vs. retrieval + generation), Getting started with LangChain for LLM applications, Basics of LangChain Expression Language (LCEL), Simplified indexing pipeline: document loading & text splitting, Fundamentals of embeddings and vector stores, Building a basic

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retrieval- generation pipeline with an LCEL chain

Lab Experiments:

a. Building a Simple LCEL Chain: Create a minimal LCEL script that accepts a fixed instruction (e.g., "Summarize this text: ..."), passes it to an LLM, and prints the result; verify end-to-end execution.
b. Basic Data Indexing for RAG: Load a small collection of documents; split into uniform chunks (e.g., 200 tokens); generate embeddings for each chunk; store them in an in-memory vector store; inspect for consistency.
c. Constructing & Running a Basic RAG Chain: Build a pipeline that:
d. Receives a user query
e. Retrieves the top-k relevant chunks
f. Constructs a combined prompt with context + query
g. Send it to the LLM
h. Returns the answer

Test with sample queries and compare factual accuracy against a prompt without retrieval.

Unit V: Agents, Multimodal AI & Ethical Evaluation: Introduction to LLM agents and their basic architecture, Overview of multimodal AI models (VLMs), Prompting for text-to- image generation and image understanding, Importance of prompt evaluation beyond subjective judgment, Manual evaluation techniques (heuristic checks for accuracy, relevance, format), Introduction to "LLM-as-Judge" for automated evaluation, Security considerations (prompt injection, sensitive-information risks), Prompt-based mitigation strategies for safety and robustness, Ethical concerns (bias, misinformation, data privacy), Brief exploration of UI frameworks (Streamlit/Gradio) for deploying prompt-driven apps, Adapting to the evolving nature of prompt engineering through continuous learning

Lab Experiments:

1. Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.
2. Multimodal Prompting Exploration: Generate images from detailed text prompts; feed one generated image into an image-understanding model or API with an appropriate prompt; compare the returned caption to the original prompt to evaluate alignment.
3. Prompt Evaluation & Ethics Workshop:
   a. Select two existing prompts and generate multiple outputs; apply manual heuristic checks for accuracy, relevance, and format compliance.
   b. Use an "LLM-as-Judge" prompt (e.g., "Rate these outputs on a scale of 1–5 for clarity and correctness.") to automate evaluation.
   c. Design a prompt- injection test (e.g., "Ignore previous instructions..."), observe the response, then refine system prompts to mitigate the vulnerability.

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IV Year I Semester	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	-

Course Objectives:

The objectives of the course are to

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

CO's	Course Outcome Description	Level
CO1	Describe the historical development, philosophy, and salient features of the Indian Constitution.	1
CO2	Explain fundamental rights, duties, and directive principles of state policy.	2
CO3	Apply knowledge of constitutional provisions to understand the structure and functions of governance bodies.	3
CO4	Analyze the roles and responsibilities of central, state, and local administrative systems.	4
CO5	Evaluate the functioning of election bodies and welfare institutions in promoting democratic values and social justice.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	–	–	–	2	1	–	–	–	1	–	–
CO2	1	2	–	–	–	3	3	–	–	–	1	–	–
CO3	2	2	1	–	–	3	2	1	1	–	1	1	1
CO4	2	3	2	1	–	3	2	2	1	1	1	1	1
CO5	2	3	2	2	–	3	3	2	2	1	2	1	1

UNIT–I:

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution- Preamble, Salient, Features

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UNIT–II:

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT–III:

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, **Executive-** President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT–IV:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT–V:

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar, 2015

Reference Books:

1. Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014 Rubrics for Project Work

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IV Year I Semester	OBJECT ORIENTED PROGRAMMING THROUGH JAVA (OPEN ELECTIVE-III)	L	T	P	C
		3	*0*	*0*	*3*

Course Objectives:

The learning objectives of this course are to:

- identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- understand how to design applications with threads in Java
- understand how to use Java APIs for program development

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain basic concepts of Java programming, data types, operators, and control structures.	2
CO2	Apply object-oriented principles using classes, objects, methods, and constructors in Java programs.	3
CO3	Analyze arrays, inheritance, interfaces, and their role in building reusable software components.	4
CO4	Apply packages, exception handling, Java I/O, and libraries to develop robust applications.	3
CO5	Design and develop advanced Java applications using multithreading, JDBC, and JavaFX GUI.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	2	–	–	–	1	–	1	3	2
CO2	3	3	2	1	3	–	–	1	1	–	1	3	3
CO3	3	3	2	2	3	–	–	1	1	–	1	3	3
CO4	3	2	3	2	3	–	–	1	1	1	2	3	3
CO5	3	3	3	2	3	1	–	2	2	1	2	3	3

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UNIT – I:

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT – II:

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT – III:

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance :Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT – IV

Packages and Java Library:, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams,

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Scanner class, Files in Java

UNIT – V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

1. The complete Reference Java, 11thedition, Herbert Schildt,TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1. *https://nptel.ac.in/courses/106/105/106105191/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0128804645476188163 47_shared/overview*

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IV Year I Semester	COMPUTER NETWORKS (OPEN ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

Course Outcomes: At the end of the course students will be able to

CO's	Course Outcome Description	Level
CO1	Explain fundamentals of computer networks, OSI/TCP-IP models, and transmission media.	2
CO2	Apply data link layer concepts such as framing, error detection, and flow control protocols.	3
CO3	Analyze medium access control techniques and Ethernet technologies in network communication.	4
CO4	Analyze routing, congestion control, and IP addressing mechanisms in network layer design.	4
CO5	Evaluate transport and application layer protocols (TCP/UDP, HTTP, DNS) for efficient communication.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	–	–	–	–	–	1	3	2
CO2	3	3	2	2	2	–	–	–	–	–	1	3	3
CO3	3	3	2	2	3	–	–	–	–	–	1	3	3
CO4	3	3	3	2	3	1	–	–	–	–	2	3	3
CO5	3	3	2	2	3	1	–	1	2	–	2	3	3

UNIT I: Introduction: Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP.

Physical Layer –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and introduction about unguided media.

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UNIT II: Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer,
Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.
Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC, Point to point protocol (PPP)

UNIT – III: Media Access Control: Random Access: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA).
Wired LANs: Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet (100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

UNIT – IV: The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks,
Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control- Traffic Throttling-Load Shedding. Traffic Control Algorithm-Leaky bucket & Token bucket.
Internet Working: How networks differ- How networks can be connected- Tunneling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6.

UNIT –V: The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services- TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control, Congestion control in TCP.
Application Layer — World Wide Web: HTTP, Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging-Domain Name System.

Text Books:

1. Computer Networks, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

References Books:

1. Data Communications and Networks- Achut S Godbole, AtulKahate
2. Computer Networks, Mayank Dave, CENGAGE

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IV Year I Semester	PRINCIPLES OF SOFTWARE ENGINEERING (OPEN ELECTIVE-IV)	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

Course outcomes:

CO's	Course Outcome Description	Level
CO1	Explain software engineering fundamentals, evolution, and life cycle models.	2
CO2	Apply project management and requirement analysis techniques for software development.	3
CO3	Analyze software design principles, agile methods, and user interface design approaches.	4
CO4	Evaluate coding, testing strategies, and software quality and reliability practices.	5
CO5	Develop solutions using CASE tools, maintenance strategies, and software reuse techniques.	6

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	–	–	–	–	–	–	1	2	1
CO2	3	3	2	2	1	–	–	–	1	2	1	3	2
CO3	3	3	3	2	2	–	–	1	1	2	1	3	3
CO4	3	3	2	3	3	1	1	1	1	1	2	3	3
CO5	3	3	3	3	3	2	1	2	2	2	2	3	3

UNIT I:

Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, agile development model, Spiral model.

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UNIT II:

Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT III:

Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. Approaches to software design.

Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process

Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, developing the DFD model of a system, structured design, detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

UNIT IV:

Coding And Testing: Coding, Code review, Software documentation, Testing, Black- box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma.

UNIT V:

Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, towards second generation CASE Tool, and Architecture of a CASE Environment.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, a reuse approach, and Reuse at organization level.

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.
2. Software engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc- Graw Hill International Edition.

Reference Books:

1. Software Engineering, Ian Somerville, 10thEdition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

E-Resources:

- *https://nptel.ac.in/courses/106/105/106105182/*
- *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126058 9506387148827_shared/overview*

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Gmail

SRK CSE <srkcsehod@gmail.com>

Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Alied Branches

3 messages

SRK CSE <srkcsehod@gmail.com> Wed, Apr 29, 2026 at 3:52 PM
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>, kmarepalli@yahoo.com, Bhagya raj <pb.raj587@gmail.com>, sudheer.koduru@accenture.com
Bcc: srkcsmhod@gmail.com, SRK.ITDEPT@gmail.com, SRK CSD <srkcsdhod@gmail.com>

Respected sir/madam
As per our discussion in the BOS meeting held on 29-4-26 at 11.00 AM. I am requesting for the approval of course structure and course contents of IV-1 Semester and IV-2 semester and open electives 3 and 4 offer to other departments of SRK-23 Regulations
Thanking u

Yours Sincerely
Dr.A.Radhika
Professor & HOD
Department of CSE

4 attachments

- **IV-I SYLLABUS-CSD.pdf** 903K
- **CSM_SRK23Syllabus.pdf** 1344K
- **IT- SRK23Syllabus.pdf** 1289K
- **CSE_R23 4-1 syllabus.docx** 173K

Koduru, Sudheer <sudheer.koduru@accenture.com> Wed, Apr 29, 2026 at 4:30 PM
To: SRK CSE <srkcsehod@gmail.com>, KrishnaMohan Ankala <krishna.ankala@gmail.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>, "kmarepalli@yahoo.com" <kmarepalli@yahoo.com>, Bhagya raj <pb.raj587@gmail.com>

Approved from my side. Thank You !

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Andhra Pradesh, India-Pin 521 108.

Regards,
Sudheer Koduru.

From: SRK CSE <srkcsehod@gmail.com>
Sent: Wednesday, April 29, 2026 3:52 PM
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>; Jagadesh Bommagani <nagajagadesh@gmail.com>; kmarepalli@yahoo.com <kmarepalli@yahoo.com>; Bhagya raj <pb.raj587@gmail.com>; Koduru, Sudheer <sudheer.koduru@accenture.com>
Subject: [External] Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Allied Branches

WARNING: External email. Be vigilant with links, attachments, and requests.

[Quoted text hidden]

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Jagadesh Bommagani <nagajagadesh@gmail.com> Wed, Apr 29, 2026 at 4:36 PM
To: "Koduru, Sudheer" <sudheer.koduru@accenture.com>
Cc: SRK CSE <srkcsehod@gmail.com>, KrishnaMohan Ankala <krishna.ankala@gmail.com>, "kmarepalli@yahoo.com" <kmarepalli@yahoo.com>, Bhagya raj <pb.raj587@gmail.com>

Approved from my side.
[Quoted text hidden]
–
Thanks & Regards,
Dr.B.N.Jagadesh

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Andhra Pradesh, India-Pin 521 108.

Regards,
Sudheer Koduru.

From: SRK CSE <srkcsehod@gmail.com>
Sent: Wednesday, April 29, 2026 3:52 PM
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>; Jagadesh Bommagani <nagajagadesh@gmail.com>; kmarepalli@yahoo.com <kmarepalli@yahoo.com>; Bhagya raj <pb.raj587@gmail.com>; Koduru, Sudheer <sudheer.koduru@accenture.com>
Subject: [External] Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Allied Branches

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Jagadesh Bommagani <nagajagadesh@gmail.com> Wed, Apr 29, 2026 at 4:36 PM
To: "Koduru, Sudheer" <sudheer.koduru@accenture.com>
Cc: SRK CSE <srkcsehod@gmail.com>, KrishnaMohan Ankala <krishna.ankala@gmail.com>, "kmarepalli@yahoo.com" <kmarepalli@yahoo.com>, Bhagya raj <pb.raj587@gmail.com>

Approved from my side.
[Quoted text hidden]
–
Thanks & Regards,
Dr.B.N.Jagadesh

Bhagya raj <pb.raj587@gmail.com> Wed, Apr 29, 2026 at 5:33 PM
To: SRK CSE <srkcsehod@gmail.com>

Everything is fine and approved on my side.

-Regards

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P. BHAGYA RAJU,
Ward Education and Data Processing Secretary.
[Quoted text hidden]
–
(`·.·´) Always
`·.¸( `·.·´) Keep
(`·.· ´),.·´ Smiling!!
`·.¸.·´ -ur's **BHAGYA** .....

KrishnaMohan Ankala <krishna.ankala@gmail.com> Thu, Apr 30, 2026 at 7:07 PM
To: Jagadesh Bommagani <nagajagadesh@gmail.com>
Cc: "Koduru, Sudheer" <sudheer.koduru@accenture.com>, SRK CSE <srkcsehod@gmail.com>, "kmarepalli@yahoo.com" <kmarepalli@yahoo.com>, Bhagya raj <pb.raj587@gmail.com>

Approved
[Quoted text hidden]
–
Thanks and Regards

Dr.A.Krishna Mohan
BTech , MTech , MBA , PhD
Director
Student Affairs
JNTUK
Kakinada

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(AUTONOMOUS, AFFILIATED TO JNTUK)

SRK INSTITUTE OF TECHNOLOGY
VIJAYAWADA

ESTD : 2007

DEPARTMENT OF CSE – ARTIFICIAL INTELLIGENCE AND MACHINE LEARN ING

FIFTH BOS MINUTES OF MEETING

20256-26

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Approved by AICTE, An Autonomous institution Affiliated to JNTUK, Kakinada.
Accredited with NAAC 'A' grade, ISO 9001:2015 Certified Institution
Department of CSE-Artificial Intelligence And Machine Learning

Date & Time:29th Aug 2026, 11.00 AM Venue: Department of CSE – AI & ML,

Agenda for the 5th Board of Studies Meeting

Item No.	Contents - Item Description
1	To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
2	To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.
3	To finalize the detailed Course-Contents of Open Elective III & IV Year BTech in SRK-23 Regulations.
4	To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV Year BTech in SRK-23 Regulations.
5	Any other matter with the permission of the chair.

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List of Members of the Board of Studies

SNO.	Name	Designation	Category
1	Dr.D.Anusha	Associate Professor & HOD	Chairman
	(2 Subject Experts outside Parent University)		
2	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
3	Dr. B.N. Jagadesh	Professor, CSE VIT-AP, Amaravathi.	Member
	(I Subject Expert nominated by Vice-Chancellor)		
4	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
	(I Representative from Industry)		
5	Mr.K.Sudheer	Software Engineer Accenture, Hyderabad	Member
	(Alumnus nominated by Principal)		
6	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada.	Member
	(Faculty of the Department)		
7	All Faculty	SRK Institute of Technology, CSE Dept.	Members

Dr.D.Anusha
Chairman

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MINUTES OF BOS MEETING

SRKIT/BOS/CSE – AI & ML/2025-26/5 **Date:** 29-04-2026

Department: CSE – AI & ML **Academic Year:** 2025-2026

Venue: CSE- AI & ML-HOD Room **Time:** 11.00 AM

The Fifth Board of Studies meeting of Computer Science & Engineering was held on 29th April 2026 at 11 A.M through online mode in the CSE-HOD Room, Department of CSE, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr.D.Anusha	Associate Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Subject Expert	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Subject Expert	
(1 Representative from Industry)				
5	Mr. K. Sudheer	Software Engineer, Accenture ,Hyderabad	Industry Expert	
(Alumnus nominated by Principal)				
6	Mr.P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada	Alumni	
(Faculty of the Department)				

1	Mr.S.Nageswara Rao	Assistant Professor	Member	S.Nag
2	Ms.B.Kanaka Durga	Assistant Professor	Member	B.K.Durga
3	Ms.B.Santoshi	Assistant Professor	Member	B.Santoshi
4	Ms.T.V.Maha Lakshmi	Assistant Professor	Member	T.V.Mahalakshmi

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5	Mr.T.Sunil	Assistant Professor	Member	T. Sunil

Dr.D.Anusha chaired the Fifth BOS virtual meeting through the following link:

https://us02web.zoom.us/j/88033513546?pwd=KUmfCMbSVwjcKXBtnMomKt/UkTo3ue.1

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

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AGENDA:

SRKIT/BOS/CSE – AI & ML 2025-26/5/01	To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE CSE – AI & ML.2025-26/5/02	To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE. CSE – AI & ML 2025-26/5/03	To finalize the detailed Course-Contents of Open Elective III & IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE CSE – AI & ML.2025-26/5/04	To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSE CSE – AI & ML.2025-26/6/05	Any other matter with the permission of the chair.

POINTS OF DISCUSSION:

1. About BTech IV-1 Semester and IV-2 Semester Course Structure and Syllabus of Regulation SRK-23
2. About BTech IV-1 Semester and IV-2 Semester Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
3. About B.Tech Open Electives III and IV offer to other departments Course Structure and Syllabus of Regulation SRK-23.
4. About B.Tech Open Electives III and IV offer to other departments Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
5. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About BTech IV-1 Semester and IV-2 Semester Course Structure and Syllabus of Regulation SRK-23
2. About BTech IV-1 Semester and IV-2 Semester Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23
3. About B.Tech Open Electives III and IV offer to other departments Course Structure and Syllabus of Regulation SRK-23.
4. About B.Tech Open Electives III and IV offer to other departments Course Outcomes and mapping of Course Outcomes with Program Outcomes of each course of Regulation SRK-23

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As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of Computer Science and Engineering in the SRK Institute of Technology.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 12.30 p.m. Dr. D.Anusha, Chairman of BOS of the CSE – AI & ML Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Chairman BOS

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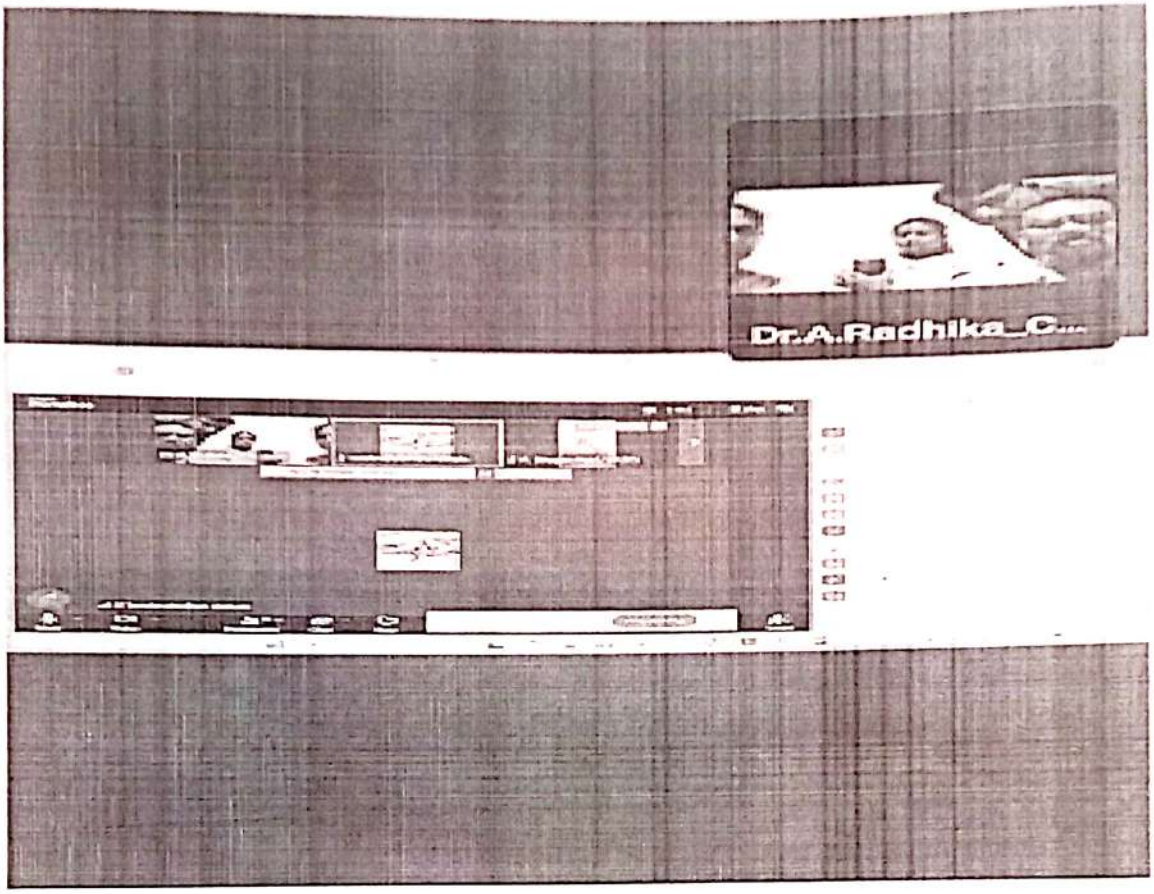

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Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Alied Branches

Inbox

SRK CSE

Respected sir/madam

As per our discussion in the BOS meeting held on 29-4-26 at 11:00 AM I am requesting for the approval of course structure and course contents of IV-1 Semester and IV-2 semester and open electives 3 and 4 offer to other departments

of SRK-23 Regulations

Thanking u

Yours Sincerely
Dr A Radhika
Professor & HOD
Department of CSE

4 Attachments • Scanned by Gmail Add all to Drive

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B. Tech. – IV Year I Semester

S. No.	Category	Title	L	T	P	Credits
1	Professional Core	Reinforcement Learning	3	0	0	3
2	Management Course- II	Human Resource & Project Management	2	0	0	2
3	Professional Elective-IV	1. Responsible A.I. 2. Blockchain Technology 3. Quantum Computing 4. Robotic Process Automation 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
4	Professional Elective-V	1. Agile Methodologies 2. Augmented Reality & Virtual Reality 3. High Performance Computing 4. Big Data Analytics 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
5	Open Elective-III		3	0	0	3
6	Open Elective-IV		3	0	0	3
7	Skill Enhancement Course	Prompt Engineering /SWAYAM Plus-Certificate Program in Prompt Engineering and ChatGPT/	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Evaluation of Industry Internship / Mini Project		-	-	-	2
	Total		19	1	02	21
MC	Student may select from the same minor's pool		3	0	0	3
HC	Student may select from the same honor's pool		3	0	0	3
HC	Student may select from the same honor's pool		3	0	0	3

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B. Tech.– IV Year II Semester

S. No.	Category	Title	L	T	P	Credits
1	Internship / Project Work	Full semester Internship / Project Work	0	0	24	12

Note: Student need to do at least ONE MOOC Course (3 credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)

Open Electives, offered to other department students:

Open Elective III: Object Oriented Programming Through Java / Natural Language Processing
Open Elective IV: Computer Networks / Software Engineering / IOT Based Smart Systems

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IV B. Tech I Semester	REINFORCEMENT LEARNING	L	T	P	C
		3	0	0	3

Course Objective:

- To provide the fundamentals of Reinforcement learning.

Course Outcomes:

1. Enumerate the elements of Reinforcement Learning
2. Solve then-armed Bandit problem
3. Compare different Finite Markov Decision Process
4. Discuss about Monte Carlo Methods in solving real world problems
5. List the Applications and Case Studies of Reinforcement Learning

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	1	–	–	–	–	1	–	2	1
CO2	2	3	2	–	2	–	–	–	–	1	–	3	1
CO3	2	2	3	2	2	–	–	–	1	1	–	3	2
CO4	1	2	2	3	3	–	–	–	1	1	–	3	2
CO5	1	1	2	2	3	1	1	–	2	2	1	2	3

UNIT-I: The Reinforcement Learning Problem: Reinforcement Learning, Examples, Elements of Reinforcement Learning, Limitations and Scope, An Extended Example: Tic-Tac-Toe, Summary, History of Reinforcement Learning.

UNIT-II: Multi-arm Bandits: An n-Armed Bandit Problem, Action-Value Methods, Incremental Implementation, tracking a Nonstationary Problem, Optimistic Initial Values, Upper-Confidence-Bound Action Selection, Gradient Bandits, Associative Search (Contextual Bandits)

UNIT-III: Finite Markov Decision Processes: The Agent–Environment Interface, Goals and Rewards, Returns, Unified Notation for Episodic and Continuing Tasks, The Markov Property, Markov Decision Processes,
Value Functions, Optimal Value Functions, Optimality and Approximation.

UNIT-IV: Monte Carlo Methods: Monte Carlo Prediction, Monte Carlo Estimation of Action Values, Monte Carlo Control, Monte Carlo Control without Exploring Starts, Off-policy Prediction via Importance Sampling, Incremental Implementation, Off-Policy Monte Carlo Control, Importance Sampling on Truncated Returns

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UNIT-V: Applications and Case Studies: TD-Gammon, Samuel's Checkers Player, The Acrobot, Elevator Dispatching, Dynamic Channel Allocation, Job-Shop Scheduling.

Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning-An Introduction",2nd Edition, The MIT Press,2018
2. Marco Wiering, Martijn van Otterlo Reinforcement Learning: State-of-the-Art(Adaptation,Learning,andOptimization(12))2012thEdition

Reference Books:

1. Vincent François-Lavet, Peter Henderson, Riashat Islam, An Introduction to Deep Reinforcement Learning (Foundations and Trends(r) in Machine Learning) , 2019

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IV Year I Semester	HUMAN RESOURCES & PROJECT MANAGEMENT	L	T	P	C
		2	0	0	2

Course Objectives: The main objectives of the course are to

- Provide knowledge about HR planning, recruitment, selection, and job design.
- Develop skills in managing HR functions such as performance appraisal, compensation, and employee relations.

Course Outcomes:

- Emphasize the importance of ethical practices and HR audits in maintaining organizational health.
- Understand the HRD framework and its impact on organizational success.
- **Improve group interaction and team dynamics** for better collaboration and performance.
- Understand the Fundamentals of Project Management and Project Networks
- Implement appropriate management strategies tailored to specific challenges in different project types.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Ethics & HR Audit)	1	1	–	–	–	2	–	3	1	1	–	–	2
CO2 (HRD Framework)	2	2	–	–	–	1	–	1	1	1	–	–	2
CO3 (Team Dynamics)	–	1	–	–	–	1	–	1	3	2	–	–	3
CO4 (Project Management)	1	2	2	–	1	–	–	–	2	1	3	1	2
CO5 (Management Strategies)	1	2	3	1	1	1	–	1	2	2	3	1	3

UNIT –I: HRM: Nature, Scope, Concept of HRM, Functions of HRM, Role of HR manager, emerging trends in HRM, E-HRM, HR audit models, ethical aspects of HRM. HR Planning, Demand and Supply forecasting of HR, Job Design, Recruitment, Sources of recruitment, Selection- Selection Procedure.

UNIT –II: HRD, HR accounting, Models, Concept of Training and Development, Methods of Training. Performance Appraisal: Importance Methods of performance appraisal. Career Development and Counseling, group interaction.

UNIT –III: Basics of Project Management, Concept, resource management, Project environment, Types of Projects, project networks-DPR, Project life cycle, Project proposals,

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Monitoring project progress, Project appraisal and Project selection, 80-20 rules, production technology, communication matrix

UNIT-IV: Identify various project types and their unique management challenges and apply appropriate management strategies for each. Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

UNIT-V: Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

Text Books:

1. Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learning 2016.
2. Sharon Pande and Swapnalekha Basak, Human Resource Management, Text and Cases, Vikas Publishing, 2e, 2016.
3. Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, Project Management, Sage Publications, 1e, 2021.
4. K. Nagarajan, Project Management, New Age International Publishers, 8e, 2017.

Reference Books :

1. Subba Rao P, "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
2. K Aswathappa, "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
3. Prasanna Chandra, "Projects, Planning, Analysis, Selection, Financing, Implementation and Review", Tata McGraw Hill Company Pvt. Ltd., New Delhi, 1998.
4. Vasanth Desai, "Project Management", 4th edition, Himalaya Publications, 2018.
5. Lalitha Balakrishnan, Gowri, "Project Management", Himalaya publishing house, New Delhi, 2022.

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IV B. Tech I Semester	RESPONSIBLE AI	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand AI basics, misconceptions, responsible AI principles, and challenges in implementation.
- To understand and analyse biases in AI, fairness metrics, and mitigation techniques.
- To understand explainability, challenges, methods, and evaluation for interpretable machine learning models.
- To understand AI safety, security, privacy, and resilience, including model and data protection.
- To explore ethical issues and implications of AI in various real-world applications.

Course Outcomes:

CO1. State the aspects of Responsible AI, such as fairness, bias, privacy etc.
CO2. Enforce fairness in models and mitigate bias in data.
CO3. Understand the importance of explainability and interpretability in AI systems.
CO4. Implement strategies to manage safety, security and privacy in AI systems.
CO5. Evaluate the societal impact of AI applications.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Responsible AI concepts)	2	2	–	–	1	2	1	3	–	1	–	2	1
CO2 (Fairness & bias mitigation)	2	3	2	1	2	2	1	3	–	1	–	3	1
CO3 (Explainability & interpretability)	2	3	1	2	2	1	–	2	–	1	–	3	1
CO4 (Safety, security & privacy)	2	2	2	1	2	3	2	3	1	1	–	3	2
CO5 (Societal impact of AI)	1	2	–	–	–	3	3	3	1	2	–	2	3

UNIT-I: INTRODUCTION TO RESPONSIBLE AI: Overview of AI – Common misconception of AI – Introduction to Responsible AI – Characteristics of Responsible AI – Key principles of responsible AI - Challenges in implementing responsible AI – ELSI Framework and AI - Safety and Alignment – Fairness and Privacy.

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UNIT-II: FAIRNESS AND BIAS : Human Bias - Types of biases - Effects of biases on different demographics - Bias vs Fairness - Sources of Biases - Exploratory data analysis - Bias Mitigation Techniques - Pre-processing techniques - In- processing techniques - Post-processing techniques - Bias detection tools - Overview of fairness in AI - Demographic parity - Equalized odds - Simpson's paradox and the risks of multiple testing - Group fairness and Individual fairness - Counterfactual fairness - Fairness metrics - Bias and disparity mitigation with Fairlearn.

UNIT-III: EXPLAINABILITY & INTERPRETABILITY: Importance of Explainability and Interpretability – Challenges - Interpretability through simplification and visualization - Intrinsic interpretable methods - Post Hoc interpretability – Interpretability Evaluation methods - Explainability through causality - Model agnostic Interpretation - LIME (Local Interpretable
Model-agnostic Explanations) - SHAP (SHapley Additive exPlanations).

UNIT-IV: SAFETY, SECURITY, AND PRIVACY : Overview of safety – security – privacy - resilience - Taxonomy of AI safety and Security - Adversarial attacks and mitigation - Model and data security - The ML life cycle - Adopting an ML life cycle MLOps and ModelOps - Model drift - Data drift - Concept drift - Privacy-preserving AI techniques- Differential
privacy - Federated learning.

UNIT-V: CASE STUDIES : COMPAS Algorithm - Google Photos Tagging Controversy - ProPublica's Analysis of Recidivism Predictions - Amazon's AI Recruiting Tool - Facial Recognition Technology Misidentification - AI in Healthcare: Predictive Analytics in Patient Care - Tesla Autopilot and Ethical Implications of Autonomous Vehicles.

TEXT BOOKS:

1. Virginia Dignum, "Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way", 2019.
2. Adnan Masood, Heather Dawe, "Responsible AI in the Enterprise", 2023.
3. Beena Ammanath, "Trustworthy AI", O' Reilly, 2022.
4. Christoph Molnar "Interpretable Machine Learning", 1st edition, 2019.

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IV B. Tech I Semester	BLOCK CHAIN TECHNOLOGY	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the Course student will be able to:

CO1: Discuss the Cryptographic primitives used in Block chain (K2)
CO2: Discuss about various technologies borrowed in block chain (K2)
CO3: Illustrate various models for block chain (K2)
CO4: Discuss about Ethereum (K2)
CO5: Discuss about Hyperledger Fabric (K2)

UNIT I: INTRODUCTION TO BLOCKCHAIN: Introduction, history of Bitcoin and origins of Blockchain, Fundamentals of Blockchain and key components (Chapter 1-book1), Permission and Permission-less platforms(Chapter 1-book2), Introduction to Cryptography, SHA256 and ECDSA, Hashing and Encryption, Symmetric/ Asymmetric keys, Private and Public Keys(Chapter 3-book2).

UNIT II: TECHNOLOGIES BORROWED IN BLOCKCHAIN: Technologies Borrowed in Blockchain –hash pointers- - Digital cash etc.- Bitcoin blockchain - Wallet – Blocks Merkley Tree - hardness of mining - Transaction verifiability - Anonymity - forks - Double spending - Mathematical analysis of properties of Bitcoin - Bitcoin- the challenges and solutions (Chapter 3-book2).

UNIT III CONSENSUS MECHANISMS: Consensus Algorithms: Proof of Work (PoW) as random oracle - Formal treatment of consistency - Liveness and Fairness - Proof of Stake (PoS) based Chains -Hybrid models (PoW + PoS), Byzantine Models of fault tolerance. ((Chapter 1-book2))

UNIT IV ETHEREUM: Ethereum -Ethereum Virtual Machine (EVM) -Wallets for Ethereum -Solidity - Smart Contracts **(Chapter 5-book1)**, - The Turing Completeness of Smart Contract Languages and verification challenges- Using smart contracts to enforce legal contracts- Comparing Bitcoin scripting vs. Ethereum Smart Contracts-Some attacks on smart contracts **(Chapter 6 and Chapter 7-book2)**

UNIT V HYPERLEDGER FABRIC: Hyperledger fabric- the plug and play platform and mechanisms in permissioned blockchain - Beyond Cryptocurrency - applications of blockchain in cyber security- integrity of information- E-Governance and other contract enforcement mechanisms - Limitations of blockchain as a technology and myths vs reality of blockchain technology **(Chapter 16-book1), (Chapter 9 -book2)**

TEXT BOOKS:

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1. Blockchain Technology Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan, University Press, 2020.
2. Mastering Blockchain - Distributed ledger technology, decentralization, and smart contracts explained, Imran Bashir,2nd ed. Edition,2018, paket publication

REFERENCES:

1. S.Shukla, M.Dhawan, S.Sharma,S. Venkatesan "Blockchain Technology: Cryptocurrency and Applications" ,Oxford University Press 2019
2. Cryptography and network security principles and practice, William Stallings, Pearson, 8th edition.

WEB REFERENCES:

1. https://drive.google.com/file/d/1PtYaDmWYaqPVGjKDnMYGWO5coI5wMPtJ/view
2. https://archive.nptel.ac.in/courses/106/104/106104220
3. https://www.tutorialspoint.com/blockchain/index.htm

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IV B. Tech I Semester	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives:

- To introduce the fundamentals of quantum computing, the problem-solving approach using finite dimensional mathematics

Course Outcomes:

CO1: Explain the role of **cryptographic primitives** such as hashing, digital signatures, and public key cryptography in blockchain systems.

CO2: Describe the various **technologies and concepts borrowed** in blockchain, including distributed systems, peer-to-peer networks, and consensus mechanisms.

CO3: Illustrate and compare different **blockchain models and architectures**, including public, private, and consortium blockchains.

CO4: Explain the architecture and working of **Ethereum platform**, including smart contracts and transaction processing.

CO5: Discuss the features and architecture of **Hyperledger Fabric** and its use in enterprise blockchain applications.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Cryptographic primitives)	3	2	–	–	2	–	–	1	–	1	–	3	1
CO2 (Blockchain technologies)	3	3	1	–	2	–	–	1	–	1	–	3	1
CO3 (Blockchain models)	2	3	3	1	2	–	–	1	1	1	–	3	2
CO4 (Ethereum platform)	2	2	2	2	3	1	–	1	1	1	–	3	2
CO5 (Hyperledger Fabric)	2	2	3	2	3	2	1	1	1	1	1	3	3

UNIT – I: History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits. Classical Vs Quantum logical operations

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UNIT – II: Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements.

Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT – III: Qubit: Physical implementations of Qubit, Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT – IV: Quantum Algorithms: Classical computation on quantum computers, Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT – V: Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory, Quantum Cryptography, Quantum teleportation

Text Books:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge

Reference Books:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

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IV B. Tech I Semester	ROBOTIC PROCESS AUTOMATION	L	T	P	C
		3	0	0	3

Course Objectives:

1. To understand the basics of Robotic Process Automation.
2. To demonstrate the use of sequence and control flow for a task.
3. To understand different mouse and keyboard activities
4. To design an Assistant bot on a keyboard event
5. To understand deploying and managing the bot.

Course Outcomes: At the end of the course students will be able to

1. Enumerate the benefits of Robotic Process Automation.
2. Make use of sequence and control flow for a task.
3. Apply different mouse and keyboard activities
4. Design an Assistant bot on a keyboard event
5. Create the bot for a workflow

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Benefits of RPA)	2	2	–	–	1	–	–	1	–	1	–	2	1
CO2 (Sequence & control flow)	2	3	2	1	3	–	–	–	–	1	–	3	2
CO3 (Mouse & keyboard actions)	1	2	3	2	3	–	–	–	1	1	–	3	2
CO4 (Assistant bot design)	1	2	3	2	3	–	–	1	2	2	1	3	3
CO5 (Workflow bot creation)	2	3	3	2	3	1	–	1	2	2	2	3	3

UNIT-I: INTRODUCTION TO ROBOTIC PROCESS AUTOMATION: Scope and techniques of automation, Robotic process automation, Benefits of RPA, Components of RPA, RPA platforms, UiPath studio, UiPath Robot, UiPath orchestrator, the future of automation.

UNIT-II: RECORD AND PLAY: UiPath Stack, Types of Robots, the user interface, Quick Access Toolbar, Different panels, Task recorder, Step by step examples using recorder, Sequence, Activities, Control flow, various types of loops, decision making, step by step example using sequence and flow chart, step by step example using sequence and control flow.

UNIT-III: DATA MANIPULATION AND CONTROLS: Variables and Scope, Collections, Arguments, Data table usage, clipboard management, File operations, CSV/Excel to data table and vice versa, Finding and attaching windows, finding the control, techniques for

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a waiting for a control, act on controls, mouse and keyboard activities, working with UiExplorer, Handling events, Screen scraping, OCR.

UNIT-IV: ASSISTANT BOTS, EXCEPTION HANDLING: Assistant bots, Monitoring system event triggers, Hotkey trigger, Mouse trigger, System trigger Monitoring image and element triggers, Example of monitoring email, Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event, Exception Handling, common exceptions, logging and taking screenshots, Debugging techniques, collecting crash dumps, error reporting.

UNIT-V: DEPLOYING AND MAINTAINING THE BOT: Publishing using publish utility, publish a workflow in Uipath, Overview of Orchestartion server, using orchestration server to control bots, using orchestration server to deploy bots, license management, publishing and managing updates.

TEXT BOOKS:

1. Alok Mani Tripathi, "Learning Robotic Process Automation", Packt Publishing, 2018.

REFERENCES:

1. Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, "Introduction to Robotic Process Automation: a Primer", Institute of Robotic Process Automation,1st Edition 2015.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant", Independently Published, 1st Edition 2018.
3. Srikanth Merianda,"Robotic Process Automation Tools, Process Automation and their benefits:Understanding RPA and Intelligent Automation", Consulting Opportunity Holdings LLC, 1st Edition 2018.
4. Lim Mei Ying, "Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes", Packt Publishing, 1st Edition 2018.

WEB REFERENCES:

1. https://www.uipath.com/rpa/robotic-process-automation
2. https://www.academy.uipath.com

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IV B. Tech I Semester	AGILE METHODOLOGIES	L	T	P	C
		3	0	0	3

Course Objectives:

- The main objectives of this course are to introduce the important concepts of Agile software development Process, emphasize the role of stand-up meetings in software collaboration, impart the knowledge on values and principles in understanding agility

Course Outcomes:

CO1: Explain Agile fundamentals, manifesto, principles, and comparison with traditional models.

CO2: Describe Agile frameworks like Scrum, XP, FDD, Crystal, and ASD.

CO3: Understand Agile knowledge sharing using story cards and SMM.

CO4: Apply Agile requirements engineering techniques.

CO5: Evaluate Agile QA practices, metrics, and TDD in software development.

UNIT –I: Agile Methodology: Theories for Agile Management, Agile Software Development – Traditional Model vs. Agile Model, Classification of Agile Methods, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agility in Design, Testing, Agile Documentations, Agile Drivers, Capabilities and Values.

UNIT-II: Agile Process: Lean Production - SCRUM, Crystal, Feature Driven Development-Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT-III: Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT-IV: Agility and Requirements Engineering: Impact of Agile Processes in RE, Current Agile Practices, Variance, Overview of RE Using Agile, Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Abstraction Model, Requirements Management in Agile Environment, Agile Requirements Prioritization, Agile Requirements Modelling, Generation – Concurrency in Agile Requirements Generation.

UNIT-V: Agility and Quality Assurance: Agile Product Development, Agile Metrics, Feature Driven Development (FDD), Financial and Production Metrics in FDD, Agile Approach to Quality Assurance, Test Driven Development, Agile Approach in Global Software Development.

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Text Books :

1. Andrew Stellman, Jill Alison Hart, Learning Agile, O'Reilly, 2015.

Reference Books:

1. Andrew stellman, Jennifer Green, Head first Agile, O'Reilly, 2017
2. Rubin K , Essential Scrum : A practical guide to the most popular Agile process, Addison-Wesley, 2013

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IV B. Tech I Semester	AUGMENTED REALITY & VIRTUAL REALITY	L	T	P	C
		3	0	0	3

Objectives:

- Provide a foundation to the fast growing field of AR and make the students aware of the various AR concepts.
- To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Course Outcomes:

CO1: Explain fundamentals of Augmented Reality, displays, and tracking systems.
CO2: Apply computer vision techniques and interaction methods in AR systems.
CO3: Understand VR concepts including geometry, optics, and human perception.
CO4: Analyze human vision, visual perception, and rendering techniques in VR.
CO5: Describe motion, interaction, and audio systems in virtual environments.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (AR fundamentals, displays, tracking)	3	2	–	–	2	–	–	1	–	1	–	3	1
CO2 (Computer vision & interaction in AR)	3	3	2	1	3	–	–	1	1	1	–	3	2
CO3 (VR fundamentals, geometry, optics)	3	2	1	–	2	–	–	1	–	1	–	3	1
CO4 (Human vision & VR rendering)	2	3	2	2	3	1	–	1	–	1	–	3	2
CO5 (Motion, interaction, audio in VR)	2	3	2	2	3	1	–	1	2	2	1	3	3

UNIT – I: Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history of augmented reality, Examples, Related fields
Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays
Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors

UNIT – II: Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking,

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Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction
Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs

UNIT – III: Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception
The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations
Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

UNIT – IV: The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR
Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, **Perception of Color Visual Rendering:** Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT – V: Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection
Interaction: Motor Programs and Remapping, Locomotion, Social Interaction
Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

Text Books:

1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;First edition (12 October 2016).ISBN-10: 9332578494
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

Reference Books:

1. Allan Fowler-AR Game Development, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)", Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN:9781491962381

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5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005

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IV B. Tech I Semester	HIGH PERFORMANCE COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives:

- The main objectives of the course is to study parallel computing hardware and programming models, performance analysis and modeling of parallel programs

Course Outcomes: On completion of the course, student will be able to–

1. Describe different parallel architectures, inter-connect networks, programming Models
2. Develop an efficient parallel algorithm to solve given problem
3. Understand parallel communication operations and shared memory programming using threads, synchronization, and OpenMP.
4. Analyze and measure performance of modern parallel computing systems
5. Build the logic to parallelize the programming task

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Parallel architectures, networks, models)	3	2	–	–	2	–	–	1	–	1	–	3	1
CO2 (Parallel algorithm design)	2	3	3	2	2	–	–	1	–	1	–	3	2
CO3 (Communication ops, threads, OpenMP)	3	3	2	2	3	–	–	1	1	1	–	3	2
CO4 (Performance analysis of parallel systems)	2	3	2	3	2	–	–	1	–	1	1	3	2
CO5 (Parallelization of programming tasks)	2	3	3	2	3	–	–	1	2	2	1	3	3

UNIT I INTRODUCTION: Motivating Parallelism, Scope of Parallel Computing, Parallel Programming Platforms: Implicit Parallelism, Trends in Microprocessor and Architectures, Limitations of Memory, System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Scalable design principles, Architectures: N-wide superscalar architectures, Multi-core architecture.

UNIT II PARALLEL PROGRAMMING: Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping

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Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models, The Age of Parallel Processing, the Rise of GPU Computing, A Brief History of GPUs, Early GPU.

UNIT III BASIC COMMUNICATION: Operations- One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations. Programming shared address space platforms: threads- basics, synchronization, OpenMP programming

UNIT IV: ANALYTICAL MODELS: Sources of overhead in Parallel Programs, Performance Metrics for Parallel Systems, and The effect of Granularity on Performance, Scalability of Parallel Systems, Minimum execution time and minimum cost, optimal execution time. **Dense Matrix Algorithms**: Matrix Vector Multiplication, Matrix-Matrix Multiplication.

UNIT V : PARALLEL ALGORITHMS- SORTING AND GRAPH : Issues in Sorting on Parallel Computers, Bubble Sort and its Variants, Parallelizing Quick sort, All-Pairs Shortest Paths, Algorithm for sparse graph, Parallel Depth-First Search, Parallel BestFirst Search. **CUDA Architecture**: CUDA Architecture, Using the CUDA Architecture, Applications of CUDA Introduction to CUDA C-Write and launch CUDA C kernels, Manage GPU memory, Manage communication and synchronization, Parallel programming in CUDA- C.

Text Books:

1. Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, "Introduction to Parallel Computing", 2nd edition, Addison-Wesley, 2003, ISBN: 0-201-64865-2
2. Jason sanders, Edward Kandrot, "CUDA by Example", Addison-Wesley, ISBN-13: 978-0-13-138768-3

Reference Books:

1. Kai Hwang, "Scalable Parallel Computing", McGraw Hill 1998, ISBN:0070317984
2. Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufmann Publishers Inc. San Francisco, CA, USA 2013 ISBN: 9780124159884
3. David Culler Jaswinder Pal Singh, "Parallel Computer Architecture: A Hardware/ Software Approach", Morgan Kaufmann,1999, ISBN 978-1-55860-343-1
4. Rod Stephens, "Essential Algorithms", Wiley, ISBN: ISBN: 978-1-118-61210-1

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IV B. Tech I Semester	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

COURSE OUTCOMES: At the end of the course, student will be able to

CO1 **Preparing** for data summarization, query, and analysis.
CO2 **Applying** data modelling techniques to large data sets
CO3 **Creating** applications for Big Data analytics.
CO4 **Building** a complete business data analytic solution
CO5 **Demonstrate and Develop** the pig and Latin Scripts

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	2	–	–	–	–	1	–	3	1
CO2	2	3	3	2	2	–	–	1	–	1	–	3	2
CO3	3	3	2	2	3	–	–	1	1	1	–	3	2
CO4	2	3	2	3	2	–	–	1	–	1	1	3	2
CO5	2	3	3	2	3	–	–	1	2	2	1	3	3

UNIT-I: Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics; Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II: Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop

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API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce Driver code, Mapper code, Reducer code, Record Reader, Combiner, Practitioner

UNIT-IV: Stream Memory and Spark: Introduction to Streams Concepts– Stream Data Model and Architecture , Stream computing, Sampling Data in a Stream , Filtering Streams ,Counting Distinct Elements in a Stream , Introduction to Spark Concept , Spark Architecture and components , Spark installation , Spark RDD(Resilient Distributed Dataset) – Spark RDD operations.

UNIT-V: Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analysing data

TEXT BOOKS:

1. Wiley & Big Java 4th Edition, Cay Horstmann, Wiley John Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

REFERENCE BOOKS:

1. Hadoop in Action by Chuck Lam, MANNING Publ.
2. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss
3. Hadoop in Practice by Alex Holmes, MANNING Publ.
4. Big Data Analytics by Dr. A.Krishna Mohan and Dr.E.Laxmi Lydia
5. Hadoop Map Reduce Cookbook, SrinathPerera, ThilinaGunarathne

Software Links:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

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		L	T	P	C
IV B. TECH I SEMESTER	PROMPT ENGINEERING (SKILL ENHANCEMENT COURSE)	0	1	2	2

Course Objectives:

The main objectives of the course are to

- Apply iterative prompting for clarity and context.
- Create varied prompts to steer model outputs.
- Construct chain-of-thought and structured prompts.
- Develop retrieval-augmented pipelines to ground outputs.
- Evaluate LLM agents and multimodal apps for ethics and robustness.

Course Outcomes:

CO1: Understand the fundamentals of prompt engineering, LLM interaction, and iterative prompt design.

CO2: Apply advanced prompt techniques such as few-shot prompting, role-based prompting, constraints, and negative prompting.

CO3: Generate structured outputs using prompts including JSON, tables, reasoning, and task decomposition methods.

CO4: Design Retrieval-Augmented Generation (RAG) workflows using LangChain, embeddings, and vector databases.

CO5: Evaluate and build prompt-based systems using agents, multimodal AI, and ethical and safety considerations.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	2	–	–	-	–	1	–	3	1
CO2	2	3	3	2	2	–	–	1	–	1	–	3	2
CO3	3	3	2	2	3	–	–	1	1	1	–	3	2
CO4	2	3	2	3	2	–	–	1	–	1	1	3	2
CO5	2	3	3	2	3	–	–	1	2	2	1	3	3

Unit I: Foundations of Prompt Engineering: Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering, Core principles of effective prompt design, Anatomy of a prompt, Setting up the Python environment for LLM interaction, Iterative prompting lifecycle, Common prompt pitfalls and remediation

Lab Experiments:

1. Environment & Connectivity: Install required packages (e.g., transformers, openai); securely configure the API key; run a simple "Hello, world" prompt to verify model

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access.

2. Baseline vs. Enhanced Prompts: Execute a naïve prompt ("Write a one-paragraph bio of Ada Lovelace.") and an enhanced prompt that adds role framing, specificity, and explicit format instructions; compare both outputs for relevance, completeness, and style.
3. Iterative Refinement on a Simple Task: Summarize the plot of the Shakespearean play Romeo and Juliet in two sentences through three rounds of prompt tweaking:
   a. Minimal instruction.
   b. Addition of length and style constraints
   c. Specification of key content elements (setting and theme)

   Document how each iteration changes and improves the result.
4. Diagnosing Prompt Failures & Edge Cases: Craft a vague or contradictory prompt; analyze the failure mode (ambiguity, missing context, or format errors); refine the prompt by adding examples or clarifying instructions.

Unit II: Advanced Prompt Patterns & Techniques: Enhanced prompt anatomy: contextual detail and explicit output specifications. Few-shot in-context prompting. Prompt structuring and template design. Role-based prompting to establish personas or system behavior. Negative prompting to filter or suppress undesired content. Constraint specification and instruction enforcement (e.g., length, format). Iterative prompt refinement and optimization

Lab Experiments:

1. Few-Shot vs. Zero-Shot Comparison: Design and execute a zero-shot prompt and a few-shot prompt (with 2–3 exemplar input-output pairs) for a chosen text task (e.g., sentiment classification or translation); compare outputs for accuracy, consistency, and adherence to examples.
2. Role-Based & Negative Prompting: Craft a role-based prompt to establish a specific persona (e.g., "You are a financial advisor…"); then create a negative prompt to suppress undesired content (e.g., "Do not mention any brand names"); evaluate how each influences the model's response.
3. Constraint Specification & Iterative Refinement: Select an open-ended task (e.g., summarizing a technical article); issue a basic prompt; identify failures in length or format; refine the prompt by adding explicit constraints (word count, bullet format, etc.); document improvements over two refinement cycles.

Unit III: Structured Output & Reasoning Techniques: Importance of structured outputs for real-world applications. Prompting for specific formats (lists, tables, Markdown). Generating valid JSON and YAML via explicit instructions. Eliciting chain-of-thought reasoning in zero-shot prompts. Decomposing complex tasks into manageable sub-tasks

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Lab Experiments:

1. Structured Format Prompting: Instruct the model to output information as bullet lists and Markdown tables (e.g., "List three benefits of daily exercise in a Markdown table with columns 'Benefit' and 'Description.'"); verify the output matches the requested structure.
2. JSON/YAML Generation: Provide a brief dataset description (e.g., three books with title, author, publication year) and prompt the model to produce valid JSON or YAML; use a parser to validate syntax and refine the prompt if errors occur.
3. Chain-of-Thought & Task Decomposition: Present a multi-step problem (e.g., a logic puzzle) and apply zero-shot CoT prompting (e.g., "Let's think step by step. Explain your reasoning before the final answer."); separately, decompose the problem into sequential sub-questions, collect partial answers, combine them, and compare accuracy against a direct-answer baseline.

Unit IV: Retrieval-Augmented Generation & LangChain Workflows: Limitations of LLM internal knowledge. Need for external data sources. Introduction to Retrieval-Augmented Generation (RAG). Overview of RAG architecture (indexing vs. retrieval + generation). Getting started with LangChain for LLM applications. Basics of LangChain Expression Language (LCEL). Simplified indexing pipeline: document loading & text splitting, Fundamentals of embeddings and vector stores. Building a basic retrieval-generation pipeline with an LCEL chain

Lab Experiments:

1. Building a Simple LCEL Chain: Create a minimal LCEL script that accepts a fixed instruction (e.g., "Summarize this text: ..."), passes it to an LLM, and prints the result; verify end-to-end execution.
2. Basic Data Indexing for RAG: Load a small collection of documents; split into uniform chunks (e.g., 200 tokens); generate embeddings for each chunk; store them in an in-memory vector store; inspect for consistency.
3. Constructing & Running a Basic RAG Chain: Build a pipeline that:
    a. Receives a user query
    b. Retrieves the top-k relevant chunks
    c. Constructs a combined prompt with context + query
    d. Send it to the LLM
    e. Returns the answer

Test with sample queries and compare factual accuracy against a prompt without retrieval.

Unit V: Agents, Multimodal AI & Ethical Evaluation: Introduction to LLM agents and their basic architecture. Overview of multimodal AI models (VLMs). Prompting for text-to-image generation and image understanding. Importance of prompt evaluation beyond

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subjective judgment, Manual evaluation techniques (heuristic checks for accuracy, relevance, format), Introduction to "LLM-as-Judge" for automated evaluation, Security considerations (prompt injection, sensitive-information risks), Prompt-based mitigation strategies for safety and robustness, Ethical concerns (bias, misinformation, data privacy), Brief exploration of UI frameworks (Streamlit/Gradio) for deploying prompt-driven apps, Adapting to the evolving nature of prompt engineering through continuous learning

Lab Experiments:

1. Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.
2. Multimodal Prompting Exploration: Generate images from detailed text prompts; feed one generated image into an image-understanding model or API with an appropriate prompt; compare the returned caption to the original prompt to evaluate alignment.
3. Prompt Evaluation & Ethics Workshop:
   a. Select two existing prompts and generate multiple outputs; apply manual heuristic checks for accuracy, relevance, and format compliance.
   b. Use an "LLM-as-Judge" prompt (e.g., "Rate these outputs on a scale of 1 - 5 for clarity and correctness.") to automate evaluation.
   c. Design a prompt- injection test (e.g., "Ignore previous instructions…"), observe the response, then refine system prompts to mitigate the vulnerability.

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IV B. Tech I Semester	CONSTITUTION OF INDIA	2	0	0	-

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

CO1: Understand the history, drafting process, and philosophy of the Indian Constitution including its Preamble and salient features.

CO2: Explain Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties of Indian citizens.

CO3: Describe the structure, powers, and functions of constitutional organs such as Parliament, Executive, and Judiciary.

CO4: Analyze local governance systems including Panchayati Raj, municipalities, and district administration.

CO5: Understand the role and functioning of the Election Commission and constitutional bodies for welfare of SC/ST/OBC and women.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2				2		3	1	1		2	2
CO2	3	3				3		3	1	1		2	2
CO3	3	2	1			3	2	2	1	1		2	2
CO4	2	3	1			3	3	2	2	2	1	2	3
CO5	2	2				3	3	3	1	2		2	3

UNIT–I: History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution- Preamble, Salient, Features

UNIT–II: Contours of Constitutional Rights & Duties: Fundamental Rights, Right to

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Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT–III: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, **Executive-** President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT–IV: Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT–V: Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015

Reference Books:

1. Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014

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Open Elective III

OBJECT-ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:

The learning objectives of this course are to:

- Identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- Understand how to design applications with threads in Java
- Understand how to use Java APIs for program development

Course Outcomes:

CO1: Identify Java language components and understand how they work together in applications.
CO2: Apply object-oriented programming concepts in Java, including classes, methods, and libraries.
CO3: Use inheritance, dynamic binding, and exception handling in Java applications.
CO4: Design applications using multithreading concepts in Java.
CO5: Utilize Java APIs for developing efficient software applications.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Java basics & components)	3	2	–	–	2	–	–	1	–	1	–	3	1
CO2 (OOP concepts in Java)	3	3	2	1	2	–	–	1	–	1	–	3	2
CO3 (Inheritance & exception handling)	3	3	2	2	2	–	–	1	1	1	–	3	2
CO4 (Multithreading design)	2	3	3	2	3	–	–	1	1	1	1	3	3
CO5 (Java APIs usage)	3	3	2	2	3	–	–	1	1	2	1	3	2

UNIT I: Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.
Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal

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Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement.

UNIT II: Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III: Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV: Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant),

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Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

UNIT V: String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

1. The complete Reference Java, 11th edition, Herbert Schildt,TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1. https://nptel.ac.in/courses/106/105/106105191
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

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Natural Language Processing

Course Objectives: This course introduces the fundamental concepts and techniques of natural language processing (NLP).

- Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes:
After completion of this course

- Demonstrate a given text with basic Language features
- To design an innovative application using NLP components
- Explain a rule based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To compare and contrast the use of different statistical approaches for different types of NLP applications.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Basic NLP text features)	3	2	–	–	2	–	–	1	–	1	–	3	1
CO2 (NLP application design)	3	3	3	2	3	–	–	1	1	2	1	3	3
CO3 (Rule-based NLP systems)	3	3	2	2	2	–	–	1	1	1	–	3	2
CO4 (Tag set design & statistical processing)	2	3	3	3	3	–	–	1	1	1	1	3	3
CO5 (Statistical NLP comparison)	3	3	2	2	3	–	–	1	1	2	1	3	2

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UNIT I: INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT II: WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III: SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures

UNIT IV: SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Text Books:

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin -Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

Reference Books:

1. Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2. Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3. Handbook of Natural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition

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4. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008

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OPEN ELECTIVE IV

III Year I Semester	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives:

- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

Course Outcomes:

CO1: Understand basic networking concepts, network types, and topologies.

CO2: Explain layered communication architectures such as OSI and TCP/IP models and their functionalities.

CO3: Analyze design issues, principles, and key protocols of each layer in OSI and TCP/IP models.

CO4: Understand basic network services and common network applications.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Networking basics & topologies)	3	2	–	–	1	–	–	1	–	1	–	2	1
CO2 (OSI & TCP/IP models)	3	3	2	1	2	–	–	1	–	1	–	3	1
CO3 (Layer protocols & design issues)	3	3	3	2	2	–	–	1	1	1	–	3	2
CO4 (Network services & applications)	2	2	1	–	2	1	–	1	1	1	–	2	1

UNIT I: Introduction: Network Types, LAN, MAN, WAN, Network Topologies Reference models-The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP.

Physical Layer –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and introduction about unguided media.

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UNIT II: Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel **Sliding window protocol:** One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC, Point to point protocol (PPP)

UNIT – III: Media Access Control: Random Access: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
Wired LANs: Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet(100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

UNIT – IV: The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks.
Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding, Traffic Control Algorithm-Leaky bucket & Token bucket.
Internet Working: How networks differ- How networks can be connected- Tunnelling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6.

UNIT –V: The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services- TCP features- Segment- A TCP connection-windows in TCP- flow control-Error control, Congestion control in TCP.
Application Layer –- World Wide Web: HTTP, Electronic mail-Architecture- web based mail-email security- TELENET-local versus remote Logging-Domain Name System.

Text Books:

1. Computer Networksm, Andrew S Tanenbaum, Fifth Edition, Pearson Education/PHI
2. Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

References Books:

1. Data Communications and Networks- Achut S Godbole, AtulKahate
2. Computer Networks, Mayank Dave, CENGAGE

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III B. Tech I Semester	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives:

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

Course Outcomes:

CO1: Understand software engineering concepts and life cycle models.
CO2: Apply project management techniques and software requirements specification.
CO3: Understand software design principles, UI design, and Agile methods.
CO4: Apply coding, testing, and software quality management techniques.
CO5: Understand CASE tools, software maintenance, and reuse concepts.

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (Software life cycle models)	3	2	–	–	1	–	–	1	–	1	–	2	1
CO2 (Project management & SRS)	3	3	2	2	2	–	–	1	1	1	2	3	2
CO3 (Software design & UI & Agile)	3	3	3	2	2	–	–	1	1	2	1	3	3
CO4 (Coding, testing & quality)	2	3	3	3	3	–	–	1	1	1	2	3	2
CO5 (CASE tools, maintenance, reuse)	2	2	2	2	3	1	–	1	1	1	2	3	2

UNIT-I: Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT-II: Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project

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estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management. **Requirements Analysis and Specification:** Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT-III: Software Design: Overview of the design process, how to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling, approaches to software design. Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)
Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.
User Interface Design: Characteristics of a good user interface,Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

UNIT-IV: Coding and Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, testing object-oriented programs, Smoke testing, and Some general issues associated with testing.
Software Reliability and Quality Management: Software reliability, Statistical testing, Software quality Software quality management system, ISO9000,SEICapability maturity model, Few other Important quality standards, and Six Sigma.

UNIT-V: Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.
Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.
Software Reuse: Reuse-definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall,5th Edition,PHI.
2. Software Engineering A Practitioner's Approach, Roger S. Pressman, 9th Edition, McGraw Hill International Edition.

Reference Books:

1. Software Engineering ,Ian Sommerville,10th Edition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

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e-Resources:

1) https://nptel.ac.in/courses/106/105/106105182/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

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IV B. Tech I Semester	IOT BASED SMART SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To study about Internet of Things technologies and its role in real time applications
2. To introduce the infrastructure required for IoT
3. To familiarize the accessories and communication techniques for IoT.
4. To provide insight about the embedded processor and sensors required for IoT
5. To familiarize the different platforms and Attributes for IoT

COURSE OUTCOMES: At the end of this course, the students will have the ability to

CO1: Analyze the concepts of IoT and its present developments.
CO2: Compare and contrast different platforms and infrastructures available for IoT
CO3: Explain different protocols and communication technologies used in IoT
CO4: Analyze the big data analytic and programming of IoT
CO5: Implement IoT solutions for smart applications

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1 (IoT concepts & developments)	3	3	–	–	2	1	1	1	–	1	–	3	1
CO2 (IoT platforms & infrastructure)	3	3	2	1	3	1	–	1	–	1	–	3	2
CO3 (IoT protocols & communication)	3	3	2	2	3	1	–	1	1	1	–	3	2
CO4 (IoT big data analytics & programming)	2	3	3	3	3	1	–	1	1	2	2	3	3
CO5 (IoT smart applications implementation)	2	3	3	3	3	2	2	1	2	2	3	3	3

UNIT I : INTRODUCTION TO INTERNET OF THINGS : Overview, Hardware and software requirements for IOT, Sensor and actuators, Technology drivers, Business drivers, Typical IoT applications, Trends and implications.

UNIT II : IOT ARCHITECTURE : IoT reference model and architecture -Node Structure –

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Sensing, Processing, Communication, Powering, Networking – Topologies, Layer/Stack architecture, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy beacons.

UNIT III: PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT PROTOCOLS: NFC, SCADA and RFID, Zigbee MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe GSM, CDMA, LTE, GPRS, small cell.

Wireless technologies for IoT: Wi-Fi (IEEE 802.11), Bluetooth/Bluetooth Smart, ZigBee Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems-Recent trends.

UNIT IV: IOT PROCESSORS Services/Attributes: Big-Data Analytics for IOT, Dependability, Interoperability, Security, Maintainability.

Embedded processors for IOT: Introduction to Python programming -Building IOT with RASPERRY PI and Arduino.

UNIT V: CASE STUDIES: Industrial IoT, Home Automation, smart cities, Smart Grid, connected vehicles, electric vehicle charging, Environment, Agriculture, Productivity Applications, IOT Defense

REFERENCES:

1. ArshdeepBahga and VijaiMadisetti : A Hands-on Approach "Internet of Things",Universities Press 2015.
2. Oliver Hersent , David Boswarthick and Omar Elloumi " The Internet of Things", Wiley,2016.
3. Samuel Greengard, " The Internet of Things", The MIT press, 2015.
4. Adrian McEwen and Hakim Cassimally"Designing the Internet of Things "Wiley,2014.
5. Jean- Philippe Vasseur, Adam Dunkels, "Interconnecting Smart Objects with IP: The Next Internet" Morgan Kuffmann Publishers, 2010.
6. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", John Wiley and sons, 2014.
7. Lingyang Song/DusitNiyato/ Zhu Han/ Ekram Hossain," Wireless Device-to-Device Communications and Networks, CAMBRIDGE UNIVERSITY PRESS,2015.
8. OvidiuVermesan and Peter Friess (Editors), "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers Series in Communication, 2013.
9. Vijay Madisetti , ArshdeepBahga, "Internet of Things (A Hands on-Approach)", 2014.
10. Zach Shelby, Carsten Bormann, "6LoWPAN: The Wireless Embedded Internet", John

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Wiley and sons, 2009.

11. Lars T.Berger and Krzysztof Iniewski, "Smart Grid applications, communications and security", Wiley, 2015.
12. JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, " Smart Grid Technology and Applications", Wiley, 2015.
13. UpenaDalal," Wireless Communications & Networks,Oxford,2015.

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ISO 9001:2015 Certified Institution, Accredited with NAAC 'A' grade

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

Ref: SRKIT/BOS/CSD/2025-26/4 Date: 28/04/2026.

Respected Sir/Madam,

Sub: CSD-BOS Meeting on 29-04-2026 – Invitation –Reg.

It is proposed to convene the **Department of CSE (Data Science)** Board of Studies Meeting at 11:00A.M on 29-04-2026 (Wednesdy) in CSE (Data Science) Department to discuss the following agenda.

Agenda:

1. To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
2. To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of IV Year BTech in SRK-23 Regulations
3. To finalize the detailed Course-Contents of Open Elective III & IV offer to other departments in SRK-23 Regulations
4. To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV offer to other departments in SRK-23 Regulations
4. Any other matter with the permission of the chair.

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely

(Dr.V,Sreenivas)
HOD of CSD
SRKIT

For circulation among all BOS Members

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MINUTES OF BOS MEETING

SRKIT/BOS/CSD/2026-27/04 **Date:** 30-04-2026

Department: CSE-Data Science **Academic Year**: 2026-2027

Venue: CSE HOD Room **Time**: 11:00 A.M

The Fourth Board of Studies meeting of CSE-Data Science was held on 29th April 2026 at 11:00 A.M. Through online mode in CSE HOD room, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr. V.Sreenivas	Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Member	
(1 Representative from Industry)				
5	Mr. K. Sudheer	Software Engineer, Accenture ,Hyderabad	Member	
(Alumina Nominated by Principal)				
6	Mr. A. Chandra Sekhar Reddy	Software Engineer Cornerstone on Demand	Member	
(Faculty of the Department)				
7	Dr C.M Suvarna Varma	Associate Professor	Member	
8	Ch.Siva Durga	Assistant Professor	Member	

Dr. V.Sreenivas Chaired the Third BOS virtual meeting through the following link: https://us02web.zoom.us/j/88033513546?pwd=KUmfCMbSVwicKXBtnMomKtZUkTo3ue.1 with Meeting ID: 880 3351 3546 & Passcode: 153837

After a concise introduction about BOS Members presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were discussed, resulting in the approval of the subsequent resolutions.

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AGENDA:

SRKIT/BOS/CSD.2026-2027/4/01	To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSD.2026-2027/4/02	To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of IV Year BTech in SRK-23 Regulations.
SRKIT/BOS/CSD.2026-2027/4/03	To finalize the detailed Course-Contents of Open Elective III & IV offer to other departments in SRK-23 Regulations.
SRKIT/BOS/CSD.2026-2027/4/04	To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV offer to other departments in SRK-23 Regulations

POINTS OF DISCUSSION:

1. To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations
2. To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of IV Year BTech in SRK-23 Regulations
3. To finalize the detailed Course-Contents of Open Elective III & IV offer to other departments in SRK-23 Regulations.
4. To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV offer to other departments in SRK-23 Regulations
5. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

1. About B.Tech Fourth year I & II Semester-Course Structure, Course Outcomes and Syllabus of SRK-23
2. About B.Tech Fourth year I & II Semester- Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV offer to other departments in SRK-23 Regulations ns.

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the SRK23 proposed course structure, course outcomes and syllabus for the Department of CSE-Data Science in the SRK Institute of Technology.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 1:20 P.M, Dr. V.Sreenivas, Chairman of BOS of the CSE-Data Science Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

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Chairman

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B. Tech – IV Year I Semester

S.No.	Category	Title	L	T	P	C
1	Professional Core	Big Data Analytics	3	0	0	3
2	Management Course- II	Human Resource & Project Management	2	0	0	2
3	Professional Elective-IV	1. Software Architecture & Design Pattern 2. Blockchain Technology 3. DevOps 4. Natural Language Processing 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
4	Professional Elective-V	1. Agile Methodologies 2. Expert Systems 3. Reinforcement Learning 4. High Performance Computing 5. Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	3	0	0	3
5	Open Elective-III		3	0	0	3
6	Open Elective-IV		3	0	0	3
9	Skill Enhancement Course	Full Stack Development -2 SWAYAM Plus - Certificate Course on Data Analytics	0	1	2	2
10	Audit Course	Constitution of India	2	0	0	-
11	Evaluation of Industry Internship / Mini Project		-	-	-	2
	Total		**19**	**01**	**02**	**21**
MC	Student may select from the minors pool		3	0	0	3
HC	Student may select from the honors pool		3	0	0	3
HC	Student may select from the honors pool		3	0	0	3

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B. Tech– IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Internship / Project Work	Full semester Internship / Project Work	0	0	24	12

Note : Student need to do at least ONE MOOC Course (3 credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)

Open Electives, offered to other department students:

Open Elective I : Operating Systems / Computer Organization and Architecture
Open Elective II : Database Management Systems
Open Elective III : Object Oriented Programming Through Java
Open Elective IV : Computer Networks / Software Engineering / IOT Based Smart Systems /Quantum Science and Technology

Minor Engineering

Note:

1. *To obtain Minor Engineering, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream.*
2. *During Minor/Honors Course selection, there should not be any overlapping with Regular/Major/OPEN Electives*

Minor in Data Science

1. Introduction to Data Science 3-0-3-4.5 (II-II)
2. Introduction to Database Systems 3-0-0-3 (III-I)
3. Data Engineering 3-0-3-4.5 (III-II)
4. ~~Deep~~ Machine Learning 3-0-0-3 (IV-I)

Any of the following 12 Week 3 credit NPTEL MOOC Courses

5. Operating Systems
6. Artificial Intelligence: Knowledge Representation and Reasoning
7. Computer Networks and Internet Protocol
8. Fundamentals of Object Oriented Programming
9. Discrete Mathematics for CS
10. Software Engineering
11. Deep Learning & Machine Learning

Honors:

Agentic AI
Quantum Machine Learning
Real Time Data Processing

Secure Computation (NPTEL)
Privacy Preserving Machine Learning*(NPTEL)

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IV Year I Semester	BIG DATA ANALYTICS (Professional Core)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT-I: Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II: Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Practitioner

UNIT-IV: Stream Memory and Spark: Introduction to Streams Concepts– Stream Data Model and Architecture , Stream computing, Sampling Data in a Stream , Filtering Streams ,Counting Distinct Elements in a Stream , Introduction to Spark Concept , Spark Architecture and components , Spark installation , Spark RDD(Resilient Distributed Dataset) – Spark RDD operations.

UNIT-V: Pig: Hadoop Programming Made EasierAdmiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analysing data

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TEXT BOOKS:

1. Wiley & Big Java 4th Edition, Cay Horstmann, Wiley John Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd. Edition, O'reilly

REFERENCE BOOKS:

1. Hadoop in Action by Chuck Lam, MANNING Publ.
2. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss
3. Hadoop in Practice by Alex Holmes, MANNING Publ.
4. Big Data Analytics by Dr. A.Krishna Mohan and Dr.E.Laxmi Lydia
5. Hadoop Map Reduce Cookbook, SrinathPerera, ThilinaGunarathne

Software Links:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

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SRK CSD <srkcsdhod@gmail.com>

Request for the approval of course syllabus and course contents of IV Year I & Semester of BTech Alied Branches

1 message

SRK CSE <srkcsehod@gmail.com> 29 April 2026 at 15:52
To: KrishnaMohan Ankala <krishna.ankala@gmail.com>, Jagadesh Bommagani <nagajagadesh@gmail.com>, kmarepalli@yahoo.com, Bhagya raj <pb.raj587@gmail.com>, sudheer.koduru@accenture.com
Bcc: srkcsdhod@gmail.com

Respected sir/madam

As per our discussion in the BOS meeting held on 29-4-26 at 11.00 AM. I am requesting for the approval of course structure and course contents of IV-1 Semester and IV-2 semester and open electives 3 and 4 offer to other departments of SRK-23 Regulations

Thanking u

Yours Sincerely
Dr.A.Radhika
Professor & HOD
Department of CSE

4 attachments

- **IV-I SYLLABUS-CSD.pdf** 903K
- **CSM_SRK23Syllabus.pdf** 1344K
- **IT- SRK23Syllabus.pdf** 1289K
- **CSE_R23 4-1 syllabus.docx** 173K

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IV Year I Semester	NATURAL LANGUAGE PROCESSING (Professional Elective -IV)	L	T	P	C
		3	0	0	3

Course Objectives: This course introduces the fundamental concepts and techniques of natural language processing (NLP).

- Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes: After completion of this course

- Demonstrate a given text with basic Language features
- To design an innovative application using NLP components
- Explain a rule based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To compare and contrast the use of different statistical approaches for different types of NLP applications.

UNIT I: INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT II: WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum

UNIT III: SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures

UNIT IV: SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

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Text Books:

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin -Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

Reference Books:

1. Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2. Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3. Handbook of Natural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
4. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008.

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IV Year I Semester	AGILE METHODOLOGIES (Professional Elective-V)	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course the student will be able to:
CO1 Apply agile methodology and agile process to create high quality software.
CO2 Use Agile methodology for knowledge management.
CO3 Apply Agile development and testing techniques to manage risks.
CO4 Analyze the pros and cons of working in Agile Team.
CO5 Apply Feature Driven Development on large size projects.

UNIT –I: Agile Methodology: Theories for Agile Management, Agile Software Development – Traditional Model vs. Agile Model, Classification of Agile Methods, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agility in Design, Testing, Agile Documentations, Agile Drivers, Capabilities and Values.

UNIT-II: Agile Process: Lean Production - SCRUM, Crystal, Feature Driven Development-Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT-III: Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT-IV: Agility and Requirements Engineering: Impact of Agile Processes in RE, Current Agile Practices, Variance, Overview of RE Using Agile, Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Abstraction Model, Requirements Management in Agile Environment, Agile Requirements Prioritization, Agile Requirements Modelling, Generation – Concurrency in Agile Requirements Generation.

UNIT-V: Agility and Quality Assurance: Agile Product Development, Agile Metrics, Feature Driven Development (FDD), Financial and Production Metrics in FDD, Agile Approach to Quality Assurance, Test Driven Development, Agile Approach in Global Software Development.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Pearson, 2003.
2. Hazza and Dubinsky, Agile Software Engineering, Springer, 2009th edition, 2008.

REFERENCE BOOKS:

1. Craig Larman, —Agile and Iterative Development, Addison-Wesley, First Edition, 2003.

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IV Year I Semester	EXPERT SYSTEMS (Professional Elective-V)	L	T	P	C
		3	0	0	3

Course Objectives:

1. Understand the basic techniques of artificial intelligence.
2. Understand the Non-monotonic reasoning and statistical reasoning.

Course Outcomes:

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert systems.
4. Understand various problems with an expert systems.

UNIT - I: Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first –Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game tress, Minmax algorithms, game playing – Alpha-beta pruning.

UNIT - II: Knowledge representation issues predicate logic – logic programming Semantic nets-frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT - III: Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

UNIT - IV: Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

UNIT - V: Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process. Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.

TEXT BOOKS:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi.
2. Waterman D.A., "A Guide to Expert Systems", Addison Wesley Longman.

REFERENCE BOOKS:

1. Stuart Russel and other Peter Norvig, "Artificial Intelligence – A Modern Approach", PrenticeHall.
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley.
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman & Allanheld, New Jersey

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IV Year I Semester	REINFORCEMENT LEARNING (Professional Elective-V)	L	T	P	C
		3	0	0	3

Course Objective:

- To provide the fundamentals of Reinforcement learning.

Course Outcomes:

- Enumerate the elements of Reinforcement Learning
- Solve then-armed Bandit problem
- Compare different Finite Mark ov Decision Process
- Discuss about Monte Carlo Methods in solving real world problems
- List the Applications and Case Studies of Reinforcement Learning

UNIT-I: The Reinforcement Learning Problem: Reinforcement Learning, Examples, Elements of Reinforcement Learning, Limitations and Scope, An Extended Example: Tic-Tac-Toe, Summary, History of Reinforcement Learning.

UNIT-II: Multi-arm Bandits: An n-Armed Bandit Problem, Action-Value Methods, Incremental Implementation, tracking a Nonstationary Problem, Optimistic Initial Values, Upper-Confidence-Bound Action Selection, Gradient Bandits, Associative Search (Contextual Bandits)

UNIT-III: Finite Markov Decision Processes: The Agent–Environment Interface, Goals and Rewards, Returns, Unified Notation for Episodic and Continuing Tasks, The Markov Property, Markov Decision Processes, Value Functions, Optimal Value Functions, Optimality and Approximation.

UNIT-IV: Monte Carlo Methods: Monte Carlo Prediction, Monte Carlo Estimation of Action Values, Monte Carlo Control, Monte Carlo Control without Exploring Starts, Off- policy Prediction via Importance Sampling, Incremental Implementation, Off-Policy Monte Carlo Control, Importance Sampling on Truncated Returns

UNIT-V: Applications and Case Studies: TD-Gammon, Samuel's Checkers Player, The Acrobot, Elevator Dispatching, Dynamic Channel Allocation, Job-Shop Scheduling.

Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning-AnIntroduction",2ndEdition, The MIT Press,2018
2. MarcoWiering, Martijnvan Otterlo Reinforcement Learning: State-of-the-Art(Adaptation,Learning,andOptimization(12))2012thEdition

Reference Books:

1. Vincent François-Lavet, Peter Henderson, Riashat Islam, An Introduction to Deep Reinforcement Learning (Foundations and Trends(r) in Machine Learning) , 2019.

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IV Year I Semester	HIGH PERFORMANCE COMPUTING (Professional Elective-V)	L	T	P	C
		3	0	0	3

Course Objectives:

- The main objectives of the course is to study parallel computing hardware and programming models, performance analysis and modeling of parallel programs

Course Outcomes: On completion of the course, student will be able to–

- Describe different parallel architectures, inter-connect networks, programming models
- Develop an efficient parallel algorithm to solve given problem
- Analyze and measure performance of modern parallel computing systems
- Build the logic to parallelize the programming task

Unit I Introduction: Motivating Parallelism, Scope of Parallel Computing, Parallel Programming Platforms: Implicit Parallelism, Trends in Microprocessor and Architectures, Limitations of Memory, System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Scalable design principles, Architectures: N-wide superscalar architectures, Multi-core architecture.

Unit II Parallel Programming: Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models, The Age of Parallel Processing, the Rise of GPU Computing, A Brief History of GPUs, Early GPU.

Unit III Basic Communication: Operations- One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations. Programming shared address space platforms: threads- basics, synchronization, Open MP programming

Unit IV: Analytical Models: Sources of overhead in Parallel Programs, Performance Metrics for Parallel Systems, and The effect of Granularity on Performance, Scalability of Parallel Systems, Minimum execution time and minimum cost, optimal execution time. Dense Matrix Algorithms: MatrixVector Multiplication, Matrix-Matrix Multiplication.

Unit V : Parallel Algorithms- Sorting and Graph : Issues in Sorting on Parallel Computers, Bubble Sort and its Variants, Parallelizing Quick sort, All-Pairs Shortest Paths, Algorithm for sparse graph, Parallel Depth-First Search, Parallel Best First Search. **CUDA Architecture**: CUDA Architecture, Using the CUDA Architecture, Applications of CUDA Introduction to CUDA C-Write and launch CUDA C kernels, Manage GPU memory, Manage communication and synchronization, Parallel programming in CUDA- C

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Text Books:

1. Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, "Introduction to Parallel Computing", 2nd edition, Addison-Wesley, 2003, ISBN: 0-201-64865-2
2. Jason sanders, Edward Kandrot, "CUDA by Example", Addison-Wesley, ISBN-13: 978-0-13-138768-3

Reference Books :

1. Kai Hwang, "Scalable Parallel Computing", McGraw Hill 1998, ISBN:0070317984
2. Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufmann Publishers Inc. San Francisco, CA, USA 2013 ISBN: 9780124159884
3. David Culler Jaswinder Pal Singh, "Parallel Computer Architecture: A Hardware/Software Approach", Morgan Kaufmann,1999, ISBN 978-1- 55860-343-1
4. Rod Stephens, "Essential Algorithms", Wiley, ISBN: 978-1-118-61210-1

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IV Year – I Semester	QUANTUM SCIENCE AND TECHNOLOGY	L	T	P	C
		3	0	0	3

Prerequisites: Basic Physics, Linear Algebra, and Introduction to Modern Physics

Course Objectives:

1. To introduce fundamental concepts of quantum mechanics and its mathematical formalism.
2. To explore quantum computing and communication principles and technologies.
3. To understand the physical implementation and limitations of quantum systems.
4. To enable students to relate quantum theory to practical applications in computing, cryptography, and sensing.
5. To familiarize students with the emerging trends in quantum technologies.

Course Outcomes:

After completing this course, students will be able to:

CO1. Explain core principles of quantum mechanics and their technological implications.

CO2. Analyze quantum phenomena like superposition and entanglement.

CO3. Apply mathematical tools to model and solve quantum systems.

CO4. Demonstrate understanding of quantum algorithms and quantum circuits.

CO5. Evaluate potential applications and challenges in quantum communication and sensing.

Unit 1: Fundamentals of Quantum Mechanics: Historical background: Blackbody radiation, photoelectric effect, and Compton scattering; Dual nature of light and matter; De Broglie hypothesis; Schrödinger equation; Free particle, infinite potential well, step potential; Operators and observables: position, momentum, Hamiltonian; Commutation relations and uncertainty principle; Quantum postulates and measurement theory; Eigenvalues. eigenfunctions.

Unit 2: Quantum Information Theory: Classical vs. quantum information; Qubit representation using Bloch sphere; Quantum superposition and quantum entanglement; Dirac notation (bra-ket), tensor products, and composite systems; Bell states and EPR paradox; Quantum gates: Pauli-X, Y, Z; Hadamard; Phase; T; CNOT; Quantum circuit models and notation; Measurement in computational basis; Quantum teleportation and no-cloning theorem; Quantum state tomography (introductory)

Unit 3: Quantum Computing: Classical computing review and limitations; Quantum parallelism and interference; Deutsch and Deutsch-Jozsa algorithms; Grover's search algorithm, Oracle and amplitude amplification; Shor's factoring algorithm (overview and significance); Quantum Fourier Transform (QFT); Quantum error correction: Bit-flip, phase-flip, and Shor's 9-qubit code; Introduction to quantum programming: Qiskit, Cirq, IBM Quantum Experience (overview)

Unit 4: Quantum Communication: Introduction to quantum cryptography; Quantum key distribution (QKD): BB84 protocol; Entanglement-based QKD: Ekert protocol (E91); Eavesdropping and security of QKD; Quantum teleportation (circuit and protocol); Quantum dense coding; Quantum networks and entanglement swapping; Role of quantum repeaters; Single-photon

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sources and detectors; Implementation challenges (loss, decoherence, noise)

Unit 5: Quantum Technologies and Applications: Quantum sensors: magnetometry, gravimetry; Quantum metrology: standard time, atomic clocks; Quantum imaging and lithography; Quantum materials: topological insulators, graphene, quantum dots; NV centers in diamonds for sensing; Hardware platforms: Superconducting qubits, Trapped ions, Photonic quantum processors; Quantum supremacy and NISQ era; Global initiatives: IBM, Google, D-Wave, IonQ, India's NQM; Ethical concerns and future prospects

Text Books:

1. **"Quantum Computation and Quantum Information"** by Michael A. Nielsen and Isaac L. Chuang
2. **"Quantum Mechanics: Concepts and Applications"** by Nouredine Zettili

Online Learning Resources:

1. https://nptel.ac.in/courses/104104082
2. https://nptel.ac.in/courses/115104096
3. https://nptel.ac.in/courses/122106034

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IV Year I Semester	IOT BASED SMART SYSTEMS (Professional Elective)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To study about Internet of Things technologies and its role in real time applications.
2. To introduce the infrastructure required for IoT
3. To familiarize the accessories and communication techniques for IoT.
4. To provide insight about the embedded processor and sensors required for IoT
5. To familiarize the different platforms and Attributes for IoT

COURSE OUTCOMES: At the end of this course, the students will have the ability to

CO1: Analyze the concepts of IoT and its present developments.

CO2: Compare and contrast different platforms and infrastructures available for IoT

CO3: Explain different protocols and communication technologies used in IoT

CO4: Analyze the big data analytic and programming of IoT

CO5: Implement IoT solutions for smart applications

UNIT I : INTRODUCTION TO INTERNET OF THINGS : Overview, Hardware and software requirements for IOT, Sensor and actuators, Technology drivers, Business drivers, Typical IoT applications, Trends and implications.

UNIT II : IOT ARCHITECTURE : IoT reference model and architecture -Node Structure – Sensing, Processing, Communication, Powering, Networking – Topologies, Layer/Stack architecture, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy beacons.

UNIT III: PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT PROTOCOLS: NFC, SCADA and RFID, Zigbee MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe GSM, CDMA, LTE, GPRS, small cell.

Wireless technologies for IoT: Wi-Fi (IEEE 802.11), Bluetooth/Bluetooth Smart, ZigBee Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems-Recent trends.

***UNIT IV: IOT PROCESSORS Services/Attributes**: Big-Data Analytics for IOT,* Dependability, *Interoperability, Security, Maintainability.*

***Embedded processors for IOT:** Introduction to Python programming -Building IOT with* RASPERRY PI and Arduino. .

UNIT V: CASE STUDIES: Industrial IoT, Home Automation, smart cities, Smart Grid, connected vehicles, electric vehicle charging, Environment, Agriculture, Productivity Applications, IOT Defense

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REFERENCES:

1. ArshdeepBahga and VijaiMadisetti : A Hands-on Approach "Internet of Things",Universities Press 2015.
2. Oliver Hersent , David Boswarthick and Omar Elloumi " The Internet of Things", Wiley,2016.
3. Samuel Greengard, " The Internet of Things", The MIT press, 2015.
4. Adrian McEwen and Hakim Cassimally"Designing the Internet of Things "Wiley,2014.
5. Jean- Philippe Vasseur, Adam Dunkels, "Interconnecting Smart Objects with IP: The Next Internet" Morgan Kuffmann Publishers, 2010.
6. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", John Wiley and sons, 2014.
7. Lingyang Song/DusitNiyato/ Zhu Han/ Ekram Hossain," Wireless Device-to-Device Communications and Networks, CAMBRIDGE UNIVERSITY PRESS,2015.
8. OvidiuVermesan and Peter Friess (Editors), "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers Series in Communication, 2013.
9. Vijay Madisetti , ArshdeepBahga, "Internet of Things (A Hands on-Approach)", 2014.
10. Zach Shelby, Carsten Bormann, "6LoWPAN: The Wireless Embedded Internet", John Wiley and sons, 2009.
11. Lars T.Berger and Krzysztof Iniewski, "Smart Grid applications, communications and security", Wiley, 2015.
12. JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, " Smart Grid Technology and Applications", Wiley, 2015.
13. UpenaDalal,"Wireless Communications & Networks,Oxford,2015.

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IV Year I Semester	FULL STACK DEVELOPMENT-2 (Skill Enhancement Course)	L	T	P	C
		0	1	2	2

Course Objectives:

The main objectives of the course are to

- Make use of router, template engine and authentication using sessions to develop application in ExpressJS.
- Build a single page application using RESTful APIs in ExpressJS
- Apply router and hooksin designing ReactJS application
- Make use of MongoDB queries to perform CRUD operations on document database

Experiments covering the Topics:

- ExpressJS – Routing, HTTP Methods, Middleware, Templating, Form Data
- ExpressJS – Cookies, Sessions, Authentication, Database, RESTful APIs
- ReactJS – Render HTML, JSX, Components – function & Class, Props and States, Styles, Respond to Events
- ReactJS – Conditional Rendering, Rendering Lists, React Forms, React Router, Updating the Screen
- ReactJS – Hooks, Sharing data between Components, Applications – To-do list and Quiz
- MongoDB – Installation, Configuration, CRUD operations, Databases, Collections and Records

Sample Experiments:

1. ExpressJS – Routing, HTTP Methods, Middleware.

a. Write a program to define a route, Handling Routes, Route Parameters, Query Parameters and URL building.
b. Write a program to accept data, retrieve data and delete a specified resource using http methods.
c. Write a program to show the working of middleware.

2. ExpressJS – Templating, Form Data

a. Write a program using templating engine.
b. Write a program to work with form data.

3. ExpressJS – Cookies, Sessions, Authentication

a. Write a program for session management using cookies and sessions.
b. Write a program for user authentication.

4. ExpressJS – Database, RESTful APIs

a. Write a program to connect MongoDB database using Mangoose and perform CRUD operations.
b. Write a program to develop a single page application using RESTful APIs.

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5. ReactJS – Render HTML, JSX, Components – function & Class

a. Write a program to render HTML to a web page.
b. Write a program for writing markup with JSX.
c. Write a program for creating and nesting components (function and class).

6. ReactJS – Props and States, Styles, Respond to Events

a. Write a program to work with props and states.
b. Write a program to add styles (CSS & Sass Styling) and display data.
c. Write a program for responding to events.

7. ReactJS – Conditional Rendering, Rendering Lists, React Forms

a. Write a program for conditional rendering.
b. Write a program for rendering lists.
c. Write a program for working with different form fields using react forms.

8. ReactJS – React Router, Updating the Screen

a. Write a program for routing to different pages using react router.
b. Write a program for updating the screen.

9. ReactJS – Hooks, Sharing data between Components

a. Write a program to understand the importance of using hooks.
b. Write a program for sharing data between components.

10. MongoDB – Installation, Configuration, CRUD operations

a. Install MongoDB and configure ATLAS
b. Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()

11. MongoDB – Databases, Collections and Records

a. Write MongoDB queries to Create and drop databases and collections.
b. Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(), aggregate().

12. Augmented Programs: (Any 2 must be completed)

a. Design a to-do list application using NodeJS and ExpressJS.
b. Design a Quiz app using ReactJS.
c. Complete the MongoDB certification from MongoDB University website.

Text Books:

1. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node. Vasan Subramanian, 2nd edition, APress, O'Reilly.
2. Node.Js in Action, Mike Cantelon, Mark Harter, T.J. Holowaychuk, Nathan Rajlich, Manning Publications. (Chapters 1-11)
3. React Quickly, AzatMardan,Manning Publications(Chapters 1-8,12-14)

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Web Links:

1. ExpressJS - https://www.tutorialspoint.com/expressjs
2. ReactJS - https://www.w3schools.com/REACT (and) https://react.dev/learn#

MongoDB -https://learn.mongodb.com/learning-paths/introduction-to-mongodb

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IV Year I Semester	CONSTITUTION OF INDIA (Audit Course)	L	T	P	C
		2	0	0	--

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT–I: History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution- Preamble, Salient, Features
UNIT–II: Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT–III: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive- President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT–IV: Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy
UNIT–V: Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015

Reference Books:

1. Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014.

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IV Year I Semester	HUMAN RESOURCES AND PROJECT MANAGEMENT (Management Course-II)	L	T	P	C
		2	0	0	2

Course Objectives: The main objectives of the course are to

- Provide knowledge about HR planning, recruitment, selection, and job design.
- Develop skills in managing HR functions such as performance appraisal, compensation, and employee relations.
- Emphasize the importance of ethical practices and HR audits in maintaining organizational health.
- Understand the HRD framework and its impact on organizational success.
- **Improve group interaction and team dynamics** for better collaboration and performance.
- Understand the Fundamentals of Project Management and Project Networks
- Implement appropriate management strategies tailored to specific challenges in different project types.

UNIT –I: HRM: Nature, Scope, Concept of HRM, Functions of HRM, Role of HR manager, emerging trends in HRM, E-HRM, HR audit models, ethical aspects of HRM. HR Planning, Demand and Supply forecasting of HR, Job Design, Recruitment, Sources of recruitment, Selection- Selection Procedure.

UNIT –II: HRD, HR accounting, Models, Concept of Training and Development, Methods of Training. Performance Appraisal: Importance Methods of performance appraisal, Career Development and Counseling, group interaction.

UNIT –III: Basics of Project Management, Concept, resource management, Project environment, Types of Projects, project networks-DPR, Project life cycle, Project proposals, Monitoring project progress, Project appraisal and Project selection, 80-20 rules, production technology, communication matrix

UNIT-IV: Identify various project types and their unique management challenges and apply appropriate management strategies for each. Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

UNIT-V: Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

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Text Books:

1. Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learning 2016.
2. Sharon Pande and Swapnalekha Basak, Human Resource Management, Text and Cases, Vikas Publishing, 2e, 2016.
3. Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, Project Management, Sage Publications, 1e, 2021.
4. K. Nagarajan, Project Management, New Age International Publishers, 8e, 2017.

Reference Books :

1. Subba Rao P, "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
2. K Aswathappa, "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
3. Prasanna Chandra, "Projects, Planning, Analysis, Selection, Financing, Implementation and Review", Tata McGraw Hill Company Pvt. Ltd., New Delhi, 1998.
4. Vasanth Desai, "Project Management", 4th edition, Himalaya Publications, 2018.
5. Lalitha Balakrishnan, Gowri, "Project Management", Himalaya publishing house, New Delhi, 2022.

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IV Year I Semester	SOFTWARE ARCHITECTURE & DESIGN PATTERNS (Professional Elective-IV)	L	T	P	C
		3	0	0	3

Course Outcomes

- Understand the basic concepts to identify state behavior of real world objects
- Apply Object Oriented Analysis and Design concepts to solve complex problems
- Construct various UML models using the appropriate notation for specific problem context
- Design models to Show the importance of systems analysis and design in solving complex problems using case studies
- Study of Pattern Oriented approach for real world problems

UNIT – I: Introduction: What is a design pattern? Describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern What is object oriented development? key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm

UNIT – II: Analysis a System: Overview of the analysis phase, stage 1 gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain Design and Implementation, discussions and further reading

UNIT – III: Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.

UNIT – IV: Interactive systems and the MVC architecture: Introduction The MVC architectural pattern, analyzing a simple drawing program designing the system, designing of the subsystems, getting into implementation, implementing undo operation drawing incomplete items, adding a new feature pattern based solutions

UNIT – V: Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web, Web services (SOAP, Restful), Enterprise Service Bus

Text Books:

1. Object oriented analysis, design and implementation, brahma dathan, sarnath rammath , universities press,2013
2. Design patterns, Erich Gamma, Richard helan , Ralph johman , john vlissides, PEARSON Publication,2013

Reference Books:

1. Frank Bachmann, Regine Meunier , Hans Rohnert "Pattern Oriented Software Architecture" Volume 1, 1996.
2. William J Brown et al., "Anti Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998

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IV Year I Semester	BLOCK CHAIN TECHNOLOGY (Professional Elective-IV)	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the Course student will be able to:

CO1: Discuss the Cryptographic primitives used in Blockchain (K2)
CO2: Discuss about various technologies borrowed in blockchain (K2)
CO3: Illustrate various models for blockchain (K2)
CO4: Discuss about Ethereum (K2)
CO5: Discuss about Hyperledger Fabric (K2)

UNIT I INTRODUCTION TO BLOCKCHAIN

Introduction, history of Bitcoin and origins of Blockchain, Fundamentals of Blockchain and key components **(Chapter 1-book1)**, Permission and Permission-less platforms **(Chapter 1-book2)**, Introduction to Cryptography, SHA256 and ECDSA, Hashing and Encryption, Symmetric/ Asymmetric keys, Private and Public Keys**(Chapter 3-book2)**.

UNIT II TECHNOLOGIES BORROWED IN BLOCKCHAIN

Technologies Borrowed in Blockchain –hash pointers- - Digital cash etc.- Bitcoin blockchain - Wallet – Blocks Merkley Tree - hardness of mining - Transaction verifiability - Anonymity - forks - Double spending - Mathematical analysis of properties of Bitcoin - Bitcoin- the challenges and solutions. **(Chapter 3-book2)**.

UNIT III CONSENSUS MECHANISMS

Consensus Algorithms: Proof of Work (PoW) as random oracle - Formal treatment of consistency- Liveness and Fairness - Proof of Stake (PoS) based Chains -Hybrid models (PoW + PoS), Byzantine Models of fault tolerance. ((**Chapter 1-book2**))

UNIT IV ETHEREUM

Ethereum -Ethereum Virtual Machine (EVM) -Wallets for Ethereum -Solidity - Smart Contracts **(Chapter 5-book1)**. - The Turing Completeness of Smart Contract Languages and verification challenges- Using smart contracts to enforce legal contracts- Comparing Bitcoin scripting vs. Ethereum Smart Contracts-Some attacks on smart contracts (**Chapter 6 and Chapter 7-book2)**

UNIT V HYPERLEDGER FABRIC

Hyperledger fabric- the plug and play platform and mechanisms in permissioned blockchain - Beyond Cryptocurrency – applications of blockchain in cyber security- integrity of information- E-Governance and other contract enforcement mechanisms - Limitations of blockchain as a technology and myths vs reality of blockchain technology **(Chapter 16-book1)**, **(Chapter 9 -book2)**

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TEXT BOOKS:

1. Blockchain Technology Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan, University Press, 2020.
2. Mastering Blockchain - Distributed ledger technology, decentralization, and smart contracts explained, Imran Bashir,2nd ed. Edition,2018, pakct publication

REFERENCES:

1. S.Shukla, M.Dhawan, S.Sharma,S. Venkatesan "Blockchain Technology: Cryptocurrency and Applications" ,Oxford University Press 2019 .
2. Cryptography and network security principles and practice, William Stallings, Pearson, 8th edition,

WEB REFERENCES:

1. https://drive.google.com/file/d/1PtYaDmWYaqPVGjKDnMYGWO5eoI5wMPtJ/view
2. https://archive.nptel.ac.in/courses/106/104/106104220/
3. https://www.tutorialspoint.com/blockchain/index.htm

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IV Year I Semester	DEVOPS (Professional Elective-IV)	L	T	P	C
		3	0	0	3

Course Objectives: The main objectives of this course are to:

1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
3. Implement automated system updates and the DevOps lifecycle.

Course outcomes: On successful completion of this course, students will be able to:

1. Identify the DevOps Concepts and Tools for effective project management.
2. Utilize GIT to keep track of different versions of the source code.
3. Build and Automate Tests using Jenkins.
4. Implement containerization with Docker.
5. Use ANSIBLE, Kubernetes for automation and deployment.

UNIT-I: Introduction to DevOps: Introduction to SDLC, Agile Model. Introduction to Devops. DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/ CD. Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT-II: Source Code Management(GIT): The need for source code control, The history of source code management, Roles and code, source code management system and migrations. What is Version Control and GIT, GIT Installation, GIT features, GIT workflow, working with remote repository, GIT commands, GIT branching, GIT staging and collaboration. UNIT TESTING-CODE COVERAGE: Junit,n Unit & Code Coverage with Sonar Qube, SonarQube - Code Quality Analysis.

UNIT-III: Build Automation - Continuous Integration (CI): Build Automation, What is CI Why CI is Required, CI tools, Introduction to Jenkins (With Architecture), jenkins workflow, jenkins master slave architecture, Jenkins Pipelines, PIPELINE BASICS - Jenkins Master, Node, Agent, and Executor Freestyle Projects& Pipelines, Jenkins for Continuous Integration, Create and Manage Builds, User Management in Jenkins Schedule Builds, Launch Builds on Slave Nodes.

UNIT-IV: Continuous Delivery: Importance of Continuous Delivery, CONTINUOUS DEPLOYMENT CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, Docker File, Running containers, Working with containers and publish to Docker Hub. Testing Tools: Introduction to Selenium and its features, Java Scripttesting.

UNIT-V: Configuration Management - ANSIBLE: Introduction to Ansible, Ansible tasks Roles, Jinja2 templating, Vaults, Deployments using Ansible. CONTAINERIZATION USING KUBERNETES(OPENSHIFT): Introduction to Kubernetes Namespace& Resources, CI/CD - On OCP, BC, DC& Config Maps, Deploying Apps on Open shift Container Pods. Introduction

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to Puppet master and Chef.

TEXT BOOKS

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

REFERENCE BOOKS

1. LenBass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10
2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps

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B.Tech. – IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Internship & Project Work	Full semester Internship &Project Work	0	0	24	12

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B.Tech. – IV Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Internship & Project Work	Full semester Internship &Project Work	0	0	24	12

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Honors	AGENTIC AI	L	T	P	C
		3	0	0	3

Course Outcomes:

CO1: Explain the fundamental concepts, characteristics, and architectures of Agentic AI systems, and differentiate them from traditional, reactive, and generative AI models.

CO2: Apply decision-making, planning, and reinforcement learning techniques to design autonomous agents capable of goal-directed behavior under deterministic and uncertain environments.

CO3: Analyze the role of Large Language Models (LLMs) in agentic systems and implement prompt-driven reasoning, memory, and tool-use mechanisms to enable intelligent agent behavior.

CO4: Design and develop single-agent and multi-agent systems using contemporary agentic AI frameworks, incorporating coordination, communication, and workflow orchestration.

CO5: Evaluate real-world applications of Agentic AI with respect to ethics, safety, responsibility, and societal impact, and propose value-aligned and secure agentic solutions.

UNIT- I — Foundations of Agentic Intelligence: Understand what Agentic AI is, how it differs from traditional and generative AI, and learn its core theoretical building blocks.
Wat is Agentic AI vs. Generative/Reactive AI; Autonomy, Proactivity, and Goal-Directed Behavior; Components of an intelligent agent: Perception, Reasoning, Learning, Action; Agent architectures: Reactive, Deliberative, Hybrid; Rationality and decision models; Real-world use cases and motivation for agentic systems

Unit II — Decision Making, Planning & Learning: Teach how agents make decisions, plan under uncertainty, and adapt through learning. Decision processes: utility theory, Markov Decision Processes (MDPs); Planning under uncertainty; Reinforcement learning fundamentals (MDP, policy, reward shaping); Deep RL essentials (PPO, DQN, A3C — as applicable); Meta-cognition and adaptation in agents; Ethical and value-aligned decision making

Unit III — Large Language Models & Prompt-Driven Agent Behavior: Cover how modern agentic systems leverage large language models and advanced prompt techniques.
Transformer architecture and attention basics; Role of LLMs in agentic systems; Prompt engineering fundamentals (zero-shot, chain-of-thought, ReAct); Retrieval-Augmented Generation (RAG) and memory systems; Context management and embedding techniques; Tool-usage and action invocation via prompts

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UNIT- IV — Tools, Frameworks & System Design: Introduce hands-on frameworks used to build agentic AI and how to compose multiple agents into workflows.Overview of agent frameworks: LangChain, LangGraph, AutoGen, CrewAI (documentation & practice); Memory, embedding databases (e.g., FAISS, Pinecone, ChromaDB); Workflow orchestration and multi-agent coordination; Agent-to-agent communication; Deployment patterns and APIs; Monitoring, scalability, and production concerns

UNIT- V — Responsible & Applied Agentic AI: Address real-world applications, ethical considerations, safety, and career perspectives. Responsible agentic AI design and risk mitigation; Bias, fairness, and interpretability in autonomous systems; Privacy, transparency, and accountability. Safety and alignment challenges; Case studies: Healthcare, cybersecurity, business automation

Textbooks:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence: A Modern Approach (4th Ed.), Pearson.
2. Michael Wooldridge, An Introduction to MultiAgent Systems (2nd ed.)
3. Richard S. Sutton & Andrew G. Barto — Reinforcement Learning: An Introduction

References:

1. David L. Poole & Alan K. Mackworth — Artificial Intelligence: Foundations of Computational Agents
2. Ken Huang (Ed.) — Agentic AI: Theories and Practices (Springer, 2025)

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HONORS	QUANTUM MACHINE LEARNING	L	T	P	C
		3	0	0	3

Course Outcomes (COs)

After completing the course, students will be able to:

CO1: Describe qubits, quantum gates, and Hilbert spaces as foundations for quantum machine learning.

CO2: Explain and compare quantum data encoding techniques for representing classical data in quantum systems.

CO3: Design variational quantum circuits and apply hybrid quantum-classical optimization for ML tasks.

CO4: Apply quantum kernel methods and quantum generative models to solve advanced machine learning problems.

CO5: Analyze quantum optimization algorithms and evaluate the scope and limitations of quantum ML applications.

Unit I: Foundations of Quantum Computing for ML

Mathematics for Quantum Computing: Feature vectors, inner products, norms; bra-ket Dirac notation; mapping classical feature spaces to Hilbert space; Qubits and Quantum States: Qubit representation, Bloch sphere, superposition, probability amplitudes, Born rule and measurement; Quantum Gates and Circuits: Single-qubit gates (H, X, Rx, Ry, Rz); two-qubit gates (CNOT); quantum circuit diagrams; entanglement and Bell states; No-Cloning Theorem and its implications for machine learning; Why Quantum for ML: Quantum parallelism, interference, and their role as ML primitives; complexity classes (P, BQP, NP); NISQ era — qubit counts, error rates, current limitations; introduction to PennyLane or Qiskit for circuit simulation.

Unit II: Quantum Feature Spaces and Data Encoding

Quantum Feature Spaces: Hilbert space; quantum states as vectors; quantum feature maps; classification in quantum systems; Need for Data Encoding: Need, Challenges of representing classical data on quantum hardware; Basis Encoding : Mapping classical bits to quantum states; circuit implementation; advantages and limitations; Amplitude Encoding: Encoding data into probability amplitudes; normalization; efficiency and resource requirements; Angle Encoding: Encoding features using rotation gates (Rx, Ry, Rz); circuit construction; practical implementation; ZZ Feature Map: Pauli-Z and ZZ interaction terms; connection to quantum kernel estimation; use in QSVM; Comparison of Encoding Methods: Expressivity, circuit depth, qubit count, scalability, and suitability for ML tasks.

Unit III: Variational Quantum Circuits and Optimization

Variational Quantum Circuits (VQC): Parameterized quantum circuits; hybrid quantum-classical learning; ansatz design; Variational Gates: Rotation gates as trainable parameters; hardware-efficient ansätze; Quantum Neural Networks: VQC as a layered QNN; expressibility; universal approximation in quantum circuits; Role of Entanglement: Expressive power of

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entangled circuits; entanglement in learning tasks; Barren Plateaus: Exponentially vanishing gradients with circuit depth; practical training consequences; mitigation — local cost functions, shallow ansätze, layerwise training; State Similarity: SWAP Test; quantum state overlap estimation; Gradient Computation: Parameter shift rule — derivation and hardware use; finite difference method; No-Cloning theorem and backpropagation implications; Optimization: Gradient-based optimizers for quantum circuits (Adam, SPSA); training a VQC classifier on a simple dataset. Benchmarking and Evaluation of QML Models.

Unit IV: Advanced Quantum Machine Learning Models

Data Re-Uploading: Motivation; single-qubit universal classifier; weighted re-uploading; role in increasing effective feature dimension; Quantum Kernel Methods: Quantum Kernel Maps (QKM); kernel estimation via quantum circuits; fidelity-based kernels; variational kernel learning; Quantum Support Vector Machines (QSVM): ZZFeatureMap-based kernel; QSVM vs. classical SVM; implementation in Qiskit (QSVC); scalability limitations; Quantum Generative Models: Introduction and significance; comparison with classical GAN and VAE; Quantum Variational Autoencoders (Q-VAE): Architecture; quantum latent space; training objective; Quantum Generative Adversarial Networks (Q-GAN): Generator and discriminator circuits; training procedure; mode collapse and training challenges.

Unit V: Optimization Methods and Future Directions

Adiabatic Quantum Computing: Adiabatic theorem; quantum time evolution; ground state preparation; Quantum Annealing: Ising Hamiltonian formulation; energy minimization; comparison with classical simulated annealing; Quantum Approximate Optimization Algorithm (QAOA): Circuit structure (mixer and problem unitaries); applications in combinatorial optimization (MaxCut, portfolio optimization); QAOA depth and approximation ratio; Fault-Tolerant QML: Noise models (depolarizing, decoherence, readout errors); error correction overview; NISQ vs. fault-tolerant regimes; Quantum Advantage in ML: Proven speedups (Grover, HHL); conjectured advantages; honest NISQ-era assessment; dequantization and its implications; Applications: Drug discovery, financial modelling, cybersecurity (anomaly detection), pattern recognition, optimization; open research problems.

Prescribed Textbooks

1. Machine Learning with Quantum Computers — Maria Schuld, Francesco Petruccione, Springer, 2nd Ed., 2021
2. Quantum Machine Learning: What Quantum Computing Means to Data Mining — Peter Wittek, Academic Press, 2014

Reference Books

1. Supervised Learning with Quantum Computers — Schuld & Petruccione, Springer, 2018
2. Quantum Computing: A Gentle Introduction — Rieffel & Polak, MIT Press, 2011
3. Concise Guide to Quantum Machine Learning — Ramezani et al., Springer, 2023
4. PennyLane QML Course (Free, Online) — Xanadu, pennylane.ai/qml, 2024–25
5. IBM Quantum Learning (Free, Online) — IBM, learning.quantum.ibm.com, 2024–25

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Text Books:

1. Tyler Akidau et al., Streaming Systems: The What, Where, When, and How of Large-Scale Data Processing, O'Reilly, 2018.
2. Bill Chambers & Matei Zaharia, Spark: The Definitive Guide, O'Reilly, 2018. Holden Karau et al., Learning Spark, O'Reilly. (1st Ed)

Reference Books:

1. Martin Kleppmann, Designing Data-Intensive Applications, O'Reilly.
2. Marz & Warren, Big Data: Principles and Best Practices of Scalable Realtime Data Systems.

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HONORS	REAL TIME DATA PROCESSING	L	T	P	C
		3	0	0	3

Course Outcomes:

CO1: Explain the principles of real-time systems, data streams, and event-driven architectures.

CO2: Design real-time data ingestion pipelines using distributed messaging systems such as Apache Kafka.

CO3: Implement stream processing applications using frameworks like Apache Spark Streaming or Apache Flink.

CO4: Analyze performance, scalability, and fault-tolerance mechanisms in real-time data processing systems.

CO5: Develop real-time analytics solutions for practical applications such as fraud detection, IoT monitoring, or recommendation systems.

UNIT – I: Fundamentals of Real-Time Systems and Data Streams: Introduction to Real-Time Systems: Hard vs Soft Real-Time Systems; Characteristics of Real-Time Data; Batch Processing vs Stream Processing; Data Streams: Concepts, Sources, and Types; Event-Driven Architecture (EDA) ; Time Concepts: Event Time, Processing Time, Ingestion Time Challenges in Real-Time Data Processing

UNIT – II: Real-Time Data Ingestion and Messaging Systems: Data Ingestion Techniques; Message Brokers and Event Streaming Platforms; Architecture of Apache Kafka; Producers, Consumers, Topics, Partitions; Introduction to RabbitMQ; Data Serialization: JSON, Avro, Protocol Buffers, Data Pipeline Design Principles

UNIT – III: Stream Processing Frameworks: Stream Processing Concepts; Windowing Techniques: Tumbling, Sliding, Session Windows; Stateful vs Stateless Processing; Introduction to Apache Storm; Introduction to Apache Spark Streaming; Introduction to Apache Flink; Stream Processing APIs and Architecture

UNIT – IV: Real-Time Analytics and Storage: Real-Time Data Storage Solutions; NoSQL Databases Overview; Introduction to MongoDB; Introduction to Apache Cassandra; Real-Time Dashboards and Visualization; Integration with Elasticsearch; Performance Optimization Techniques; Scalability and Fault Tolerance

UNIT – V: Advanced Topics and Applications: Complex Event Processing (CEP); Real-Time Machine Learning Basics; Edge Computing and IoT Data Processing; Microservices Architecture for Real-Time Systems; Cloud-Based Real-Time Processing (AWS / Azure / GCP overview); Security and Privacy in Streaming Systems

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2025-2026

Fourth

BOS

MEETING

VISION AND MISSION OF THE DEPARTMENT

Vision:

To emerge as center of repute focusing on knowledge dissemination and generation to address the emerging needs of information technology in diverse fields.

Mission:

M1 : To impart value-based IT education through enriched curriculum and impactful teaching learning.

M2 : To inspire students towards self-learning, higher education and research with ethics by industry institute interaction.

M3: To encourage innovation, leadership, communication skills, and motivate them towards entrepreneurship.

Program Outcomes (POs)

1. **PO1 – Engineering Knowledge:** Apply knowledge of mathematics, natural sciences, computing, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **PO2 – Problem Analysis:** Identify, formulate, research literature, and analyse complex engineering problems to reach substantiated conclusions considering sustainable development.
3. **PO3 – Design/Development of Solutions**: Design creative solutions for complex engineering problems and design/develop systems, components, or processes that meet identified needs with appropriate considerations of safety, sustainability, and societal context.
4. **PO4 – Conduct Investigations of Complex Problems**: Conduct investigations of complex engineering problems using research-based knowledge, including design of experiments, modelling, analysis and interpretation of data to provide valid conclusions.
5. **PO5 – Engineering Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering & IT tools including prediction and modeling, recognizing their limitations, to solve complex problems.
6. **PO6 – The Engineer and The World**: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for their impact on sustainability, economy, health, safety, legal frameworks, culture, and ethics.
7. **PO7 – Ethics**: Apply ethical principles and commit to professional ethics, human values, diversity, equity, and inclusion; adhere to national and international laws and standards.
8. **PO8 – Individual and Collaborative Team Work**: Function effectively as an individual, and as a member or leader in diverse and multidisciplinary teams, demonstrating collaborative skills.
9. **PO9 – Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports, design documentation, make effective presentations, and give and receive clear instructions.
10. **PO10 – Project Management and Finance**: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a team member and leader, to manage projects effectively in multidisciplinary environments.
11. **PO11 – Life-Long Learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Approved by AICTE, An Autonomous Institution, Affiliated to JNTUK, Kakinada,
Accredited with NBA& NAAC 'A' grade, ISO 9001:2015 Certified Institution
DEPARTMENT OF INFORMATION TECHNOLOGY

Ref: SRKIT/BOS/ CSE, CSM, CSD, IT /2025-26/5 Date: 29/04/2026.

Respected Sir/Madam,

Sub: **CSE,CSM,CSD,IT -BOS Meeting on 29-04-2026 – Invitation –Reg.**

It is proposed to convene the CSE,CSM,CSD,IT departments-Board of Studies Meeting at 11:00AM on 29-04-2026 (Wednesday) in Computer Science and Engineering Department to discuss the following agenda.

Agenda:-

1. To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.
2. To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.
3. To finalize the detailed Course-Contents of Open Elective III & IV Year BTech in SRK-23 Regulations.
4. To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV Year BTech in SRK-23 Regulations.
5. Any other matter with the permission of the chair.

The BOS meeting is proposed to be held in digital mode. The Zoom link for the meeting will be shared a day before.

You are requested to kindly make it convenient to participate in the meeting and extend your valuable guidance and suggestions.

Thanking you

Yours sincerely,
Dr.G.D.K.Kishore , Hod-IT
Dr.A.Radhika, Hod-CSE
Dr.D.Anusha, Hod-CSE-AIML
Dr.V.Sreenivas, Hod-CSE-DS

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For Circulation among all BOS Members

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DEPARTMENT OF INFORMATION TECHNOLOGY

IT DEPARTMENT BOS MEMBERS(SRK23)

S.NO	Name	Designation	Category
1	Dr. G.D.K. Kishore	Associate Professor & HOD	Chairman
(1 Subject Expert nominated by Vice-Chancellor)			
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee
(2 Subject Experts outside Parent University)			
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member
4	Dr. B.N. Jagadesh	Professor, VIT-AP University	Member
(1 Representative from Industry)			
5	Mr. k. Sudheer Koduru	Software Engineer, Accenture ,Hyderabad	Member
(Alumnus nominated by Principal)			
6	Mr. A. Chandra sekhar Reddy	MS: Computer Engineering Designation: Software Engineer Company: Cornerstone on Demand	Member
(Faculty of the Department)			
All IT Faculty Members			

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PRINCIPAL

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MINUTES OF BOS MEETING

SRKIT/BOS/IT/2025-26/4 **Date**: 29-04-2026

Department: Information Technology **Academic Year**: 2025-2026

Venue: IQAC Room **Time**: 11:00 A.M

The Fourth Board of Studies meeting of Information Technology was held on 29th April 2026 at 11:00 A.M. Through online mode in the IQAC room, Department of IT, SRK Institute of Technology, Enikepadu Vijayawada -521108.

The following Members were Present

S.NO	Name	Designation	Category	Signature
1	Dr. G.D.K. Kishore	Associate Professor & HOD	Chairman	
(1 Subject Expert nominated by Vice-Chancellor)				
2	Dr. A. Krishna Mohan	Professor, JNTUK	University Nominee	
(2 Subject Experts outside Parent University)				
3	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannaya University MSN Campus, Kakinada	Member	
4	Dr. M.S. Jagadeesh	Professor, VIT-AP University	Member	
(1 Representative from Industry)				
5	Mr. k. Sudheer	Software Engineer, Accenture ,Hyderabad	Member	
(Alumnus nominated by Principal)				
6	Mr. A. Chandra sekhar Reddy	Software Engineer Cornerstone on Demand	Member	
(Faculty of the Department)				
7	Dr.G. Srilakshmi	Associate Professor	Member	
8	Amritha Mishra	Assistant Professor	Member	
9	M.Prasanthi	Assistant Professor	Member	

Dr. G. D. K. Kishore chaired the Third BOS virtual meeting through the following link:

https://us02web.zoom.us/j/89929765860?pwd=FavsFDZSIa2LyT8jUDrhORY8aj6At0.1

After a concise introduction about BOS Members, presented a brief overview of the Department vision, mission and highlighted its academic activities. Subsequently, the listed agenda items were

AGENDA:

SRKIT/BOS/IT.2025-2026/4/01	Welcome Address And Opening Remarks by Chairman, Board of Studies in the Department of Information Technology.
SRKIT/BOS/IT.2025-2026/4/02	To finalize the detailed Course structure and Course-Contents of I & II Semesters of IV B.Tech in SRK-23.
SRKIT/BOS/IT.2025-202/4/03	To discuss and finalize the Course Outcomes of Ist & IInd Semesters of IVth B.Tech in SRK-23 regulations.
SRKIT/BOS/IT.2025-2026/4/04	Discuss about the Minor and Major courses
SRKIT/BOS/IT.2025-2026/4/05	Any other matter with the permission of the chairman.

POINTS OF DISCUSSION:

1. About B.Tech IVth year Ist & IInd Semester Course structure and Syllabus of Regulation SRK-23.
2. About B.Tech IVthyear Ist & IInd Semester Course outcomes of each course in the Regulation SRK-23.
3. About B.Tech IV th year Ist & IInd Semester Course structures of Regulation SRK-23.
4. Suggestions from Subject Experts and other BOS members.

RESOLUTION: The BOS resolved and approve the

About B.Tech Fourth year I & II Semester-Course Structure, course outcomes and Syllabus of SRK-23

As per the suggestions of Dr. A. Krishna Mohan, University Nominee and the two subject experts Dr. M. Kamala Kumari and Dr. B.N. Jagadesh, are approved, the JNTUK proposed course structure, course outcomes and syllabus for the Department of Information Technology in the SRK Institute of Technology.

All the BOS members have asked to email all the related documents, so that they can go through for any further constructive comments.

At 1:20 p.m., Dr. G.D.K Kishore, Chairman of BOS of the IT Department, thanked all the BOS members for their kind Cooperation by accepting all the suggestions of BOS members and assured them to reflect all in the syllabus and course structure.

Chairman BOS

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Compose

Inbox 600
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Important
Sent
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Purchases
Social
Updates 59
Forums
Promotions 2
More

Labels

09Batch
10Batch
11Batch 2
11BATCH SSC XEROX
12Batch

CSE/CSM/CSD/IT-BOS meeting on 29-04-2026-Invitation-Reg

SRK CSE Sun, Apr 26, 10:57

to KrishnaMohan, Jayadeeshi, kmarepalli, Bhagya, sudheer.koduru, bos, me

Respected sir /madam

Please find the attachment below.The following is the Zoom meeting

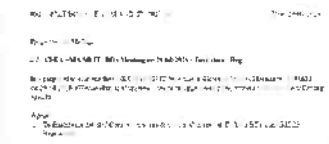
SRK INSTITUTE OF TECHNOLOGY is inviting you to a scheduled Zoom meeting.

Topic: SRK INSTITUTE OF TECHNOLOGY's CSE Allied Branches -BOS - Zoom Meeting
Time: Apr 29, 2026 10:30 AM Mumbai, Kolkata, New Delhi
Join Zoom Meeting
https://us02web.zoom.us/j/88033513546?pwd=KUmfCMbSVwicKXBtnMomKtZUkTo3ue.1

Meeting ID: 880 3351 3546
Passcode: 153837

Join instructions
https://us02web.zoom.us/meetings/88033513546/invitations?signature=y_vgYBed0wdpHwmXAapzvJ4kmSqrxKn

One attachment • Scanned by Gmail Add to Drive



Fifth CSE ALIED B..

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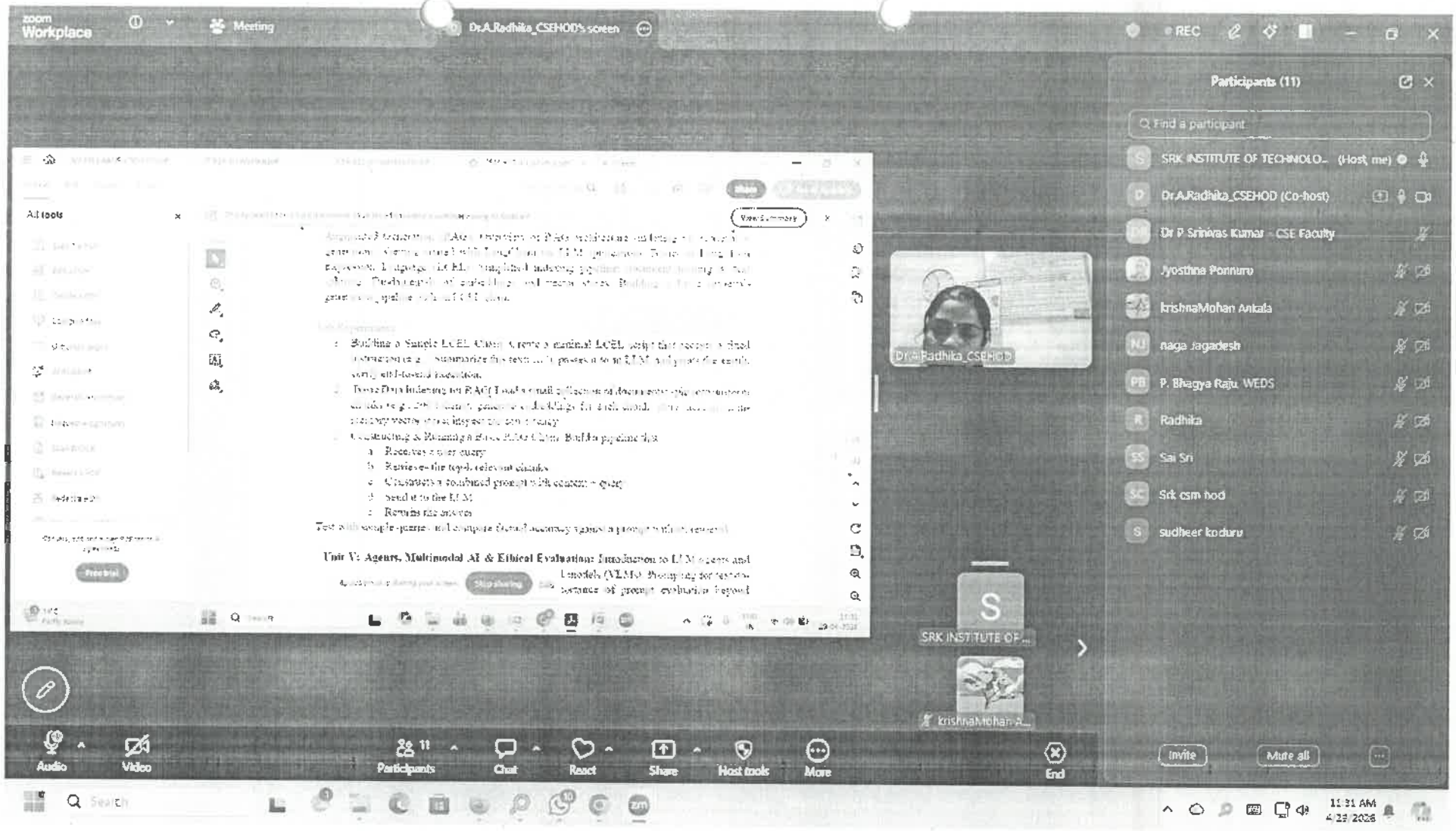

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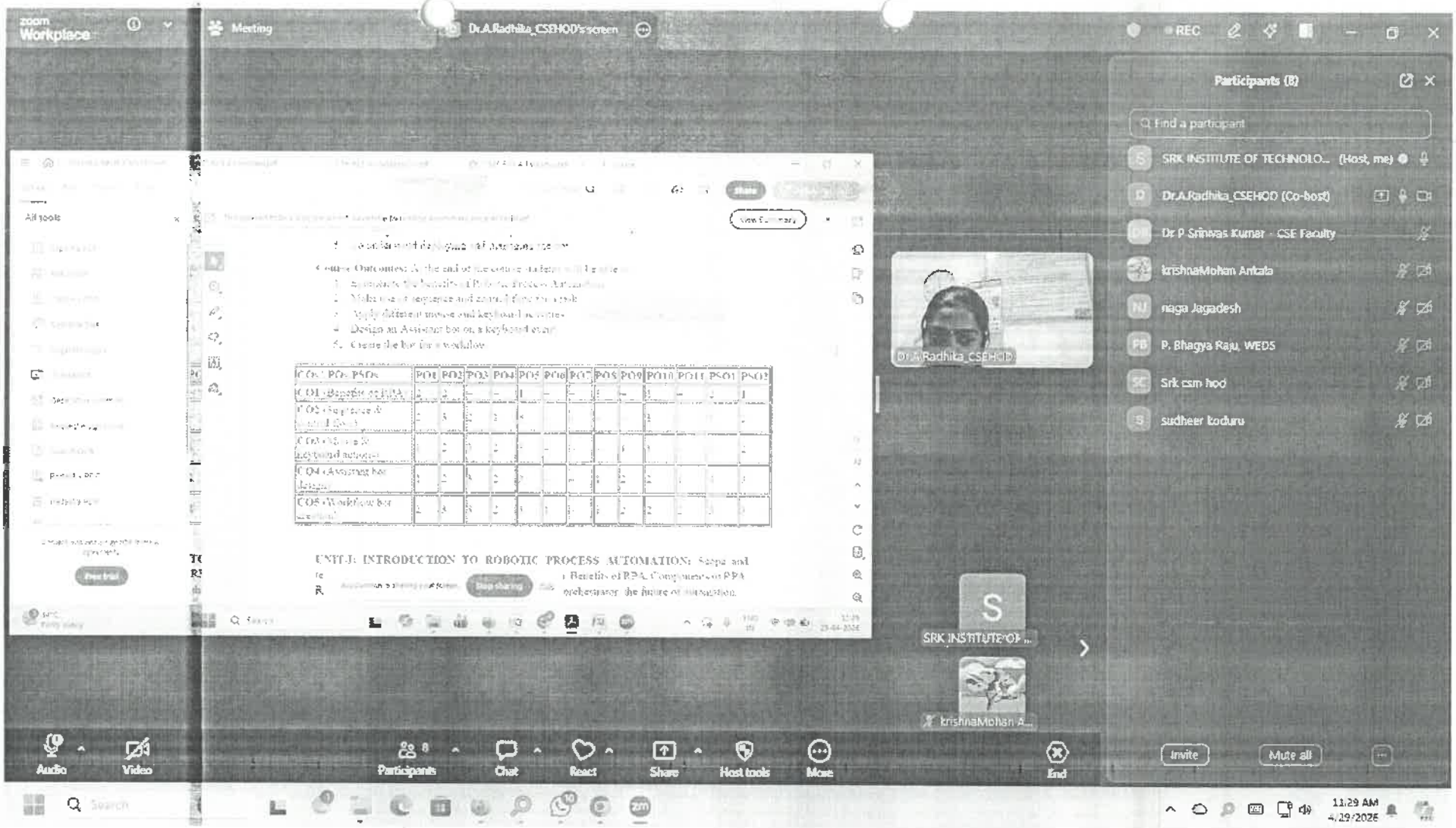

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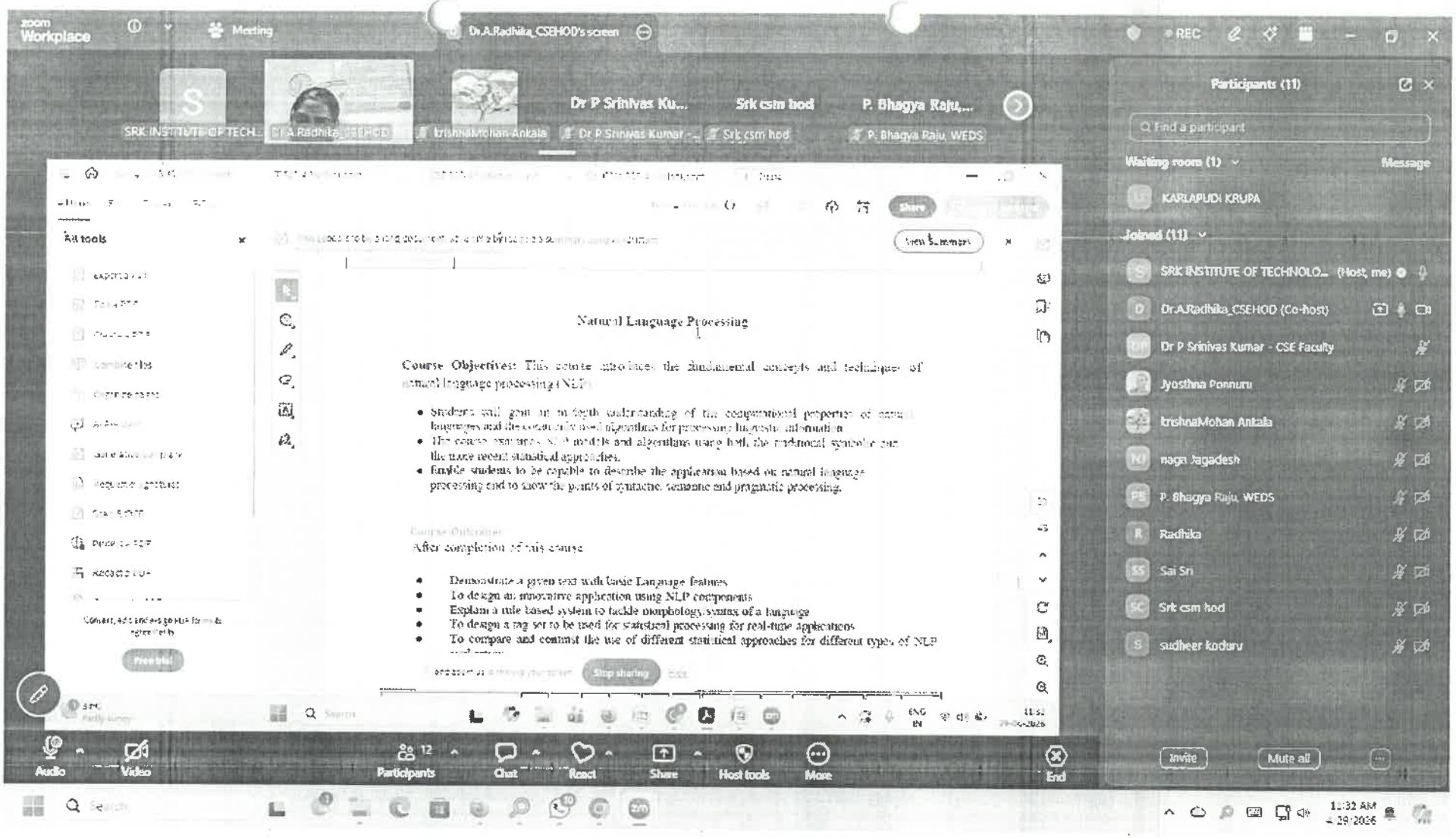

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Welcome to all the Honourable Members of Board of Studies

to the Fifth BOS Meeting

by

DEPARTMENT OF CSE/CSM/CSD/IT

Composition of Board of Studies

S.No	Name of the BOS Member	Designation	Position
1	Dr. A. Radhika	Professor & HOD-CSE	Chairman
2	Dr.D.Anusha	Associate Professor & HOD-CSM	Chairman
3	Dr.V.Sreenivas	Professor & HOD-CSD	Chairman
4	Dr.G.D.K Kishore	Associate Professor & HOD-IT	Chairman
5	Dr. A. Krishna Mohan	Professor in CSE, JNTUK,Kakinada	University Nominee
6	Dr. M. Kamala Kumari	Professor & Principal Adikavi Nannayya University MSN Campus, Kakinada	Subject Expert
7	Dr. B.N. Jagadesh	Associate Professor, CSE VIT-AP, Amaravathi.	Subject Expert
8	Mr.K.Sudheer	Software Engineer Accenture, Hyderabad	Industry Expert
9	Mr. P.Bhagya Raju	Ward Education and Data Processing Secretary, Vijayawada.	Alumni
7	All CSE/CSM/CSD/IT Faculty	Associate/ Asst.Professors	Members

AGENDA

1. To finalize the detailed Course- Structure & Course-Contents of IV Year BTech in SRK-23 Regulations.

2. To discuss & finalize the Course- Outcomes and mapping of Course Outcomes with Program Outcomes of of IV Year BTech in SRK-23 Regulations.

3. To finalize the detailed Course-Contents of Open Elective III & IV offer to other departme in SRK-23 Regulations.

4. To finalize the detailed Course- Outcomes and mapping of Course Outcomes with Program Outcomes of open Elective III & IV offer to other departments in SRK-23 Regulations.

5. Any other matter with the permission of the chair.

Course Structure for Information Technology

B.Tech. – IV Year I Semester Course Structure

S.No.	Category	Title	L	T	P	Credits
1	Professional Core	Blockchain Technology	3	0	0	3
2	Management Course- II	Human Resource Management	2	0	0	2
3	Professional Elective-IV	1. Software Architecture & Design Pattern 2. Deep Learning 3. Computer Vision 4. Internet of Things 5. 12 week MOOC Swayam/NPTEL course recommended by the BoS	3	0	0	3
4	Professional Elective-V	1. Agile methodologies 2. Metaverse 3. Big Data Analytics 4. Cyber Physical Systems 5. 12 week MOOC Swayam/NPTEL course recommended by the BoS	3	0	0	3
5	Open Elective-III		3	0	0	3
6	Open Elective-IV		3	0	0	3
7	Skill Enhancement Course	Prompt Engineering	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**19**	**1**	**02**	**21**

B.Tech.– IVYear II Semester Course Structure

S.No.	Category	Title	L	T	P	Credits
1	Internship & Project Work	Full semester Internship & Project Work	0	0	24	12

Note : Student need to do at least ONE MOOC Course (of 3 credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)

THANK YOU

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B. Tech.– IV Year I Semester

S.no	Category	Title	L	T	P	Credits
1	Professional Core	Block chain Technology	3	0	0	3
2	Management Course-II	Human Resource Management	2	0	0	2
3	Professional Elective- IV	1. Software Architecture &Design Pattern 2. Deep Learning 3. Computer Vision 4. Internet of Things 5. 12weekMOOC Swayam/NPTEL course Recommended by the BoS	3	0	0	3
4	Professional Elective-V	1. Agile methodologies 2. Big Data Analytics 3. Mobile Computing 4. Cyber Physical Systems 5. 12weekMOOC Swayam/NPTEL course recommended by the BoS	3	0	0	3
5	Open Elective-III		3	0	0	3
6	Open Elective-IV		3	0	0	3
7	Skill Enhancement Course	Prompt Engineering	0	1	2	2
8	Audit Course	Constitution of India	2	0	0	-
9	Internship	Evaluation of Industry Internship	-	-	-	2
		Total	**19**	**1**	**02**	**21**

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B.Tech. IV Year II Semester

S. No	Category	Title	L	T	P	Credits
1	Internship &Project Work	Full semester Internship & Project Work	0	0	24	12

Note: ***Student need to do at least ONE MOOC Course(of 3credits out of 160 credits) to meet the mandatory requirement (11th criteria, as per R23 Regulations)***

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Open Electives & Minor

Note: ***To obtain Minor Engineering, student needs to obtain 18 credits by successfully completing any of the following courses in the concern stream.***

For Minor in AI&ML:	L-T-P-C
1.AdvancedDataStructures&AlgorithmAnalysis	3-0-3-4.5
2.PrinciplesofArtificialIntelligence	3-0-3-3
3.OperatingSystems	3-0-3-4.5
4.ComputerNetworks	3-0-0-3
5.MachineLearning	3-0-0-3
6.DeepLearning	3-0-0-3
7.Cloudcomputing	3-0-0-3

For Minor in Cyber Security:	L-T-P-C
1.Operating Systems	3-0-3-4.5
2.Computer Networks	3-0-0-3
3.Principles of Artificial Intelligence	3-0-3-4.5
4.Cloud computing	3-0-0-3
5.CyberSecurity	3-0-0-3
6.Cryptography & Network Security	3-0-3-4.5
7.Block chain technology	3-0-0-3

For Minor in Data Science:	L-T-P-C
1. Advanced Data Structures & Algorithm Analysis	3-0-0-3
2. Principles of Artificial Intelligence	3-0-0-3
3. Introduction to Data Science	3-0-3-4.5
4. Machine Learning	3-0-0-3
5. Data Engineering	3-0-3-4.5
6. Big Data Analytics	3-0-0-3
7. Cloud computing	3-0-0-3

Open Electives, offered to other department students:

Open Elective I: Java Programming

Open Elective II: Operating Systems

Open Elective III: Data Base Management Systems

Open Elective IV: Computer Networks

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IV Year I Semester	BLOCK CHAIN TECHNOLOGY	L	T	P	C
		3	0	0	3

Course Objectives:

1. To learnthefundamentalsofBlockChainandvarioustypesofblockchainandconsensus mechanism.
2. To understand public block chain system, Private block chain system and consortium block chain.
3. Able to know the security issues of block chain technology.

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	Will be able to explain the fundamental concepts of block chain technology, including its origin, components, and different types, along with an understanding of consensus mechanisms and crypto currencies such as Bit coin.	1
CO2	Will be able to differentiate between public block chain systems such as Bitcoin and Ethereum, and demonstrate an understanding of smart contracts and their applications.	2
CO3	Will be able to describe the characteristics and examples of private and consortium block chain systems, including platforms like Hyper ledger, and explain the concept of Initial Coin Offerings (ICOs).	3
CO4	Will be able to identify and analyze security challenges and solutions within block chain technology and explore diverse real-world applications across various industries.	4
CO5	Will be able to apply block chain concepts to analyze real-world case studies and demonstrate foundational programming skills for block chain development using Python and Hyper ledger Fabric.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									2	2	1
CO2	2	2	1		2						1	3	2
CO3	2	2	1		2						1	2	3
CO4	2	2	2	2	2	1	1				2	3	3
CO5	2	2	3	2	3	1		1	1	1	2	3	3

UNIT–I:

Fundamentals of Block chain: Introduction, Origin of Block chain, Block chain Solution, Components of Block chain, Block in a Block chain, The Technology and the Future.

BlockchainTypesandConsensusMechanism: Introduction,DecentralizationandDistribution, Types of Block chain, Consensus Protocol.

Cryptocurrency: Bitcoin,AltcoinandToken:Introduction,BitcoinandtheCryptocurrency,Cryptocurrency Basics, Types of Crypto currencies, Crypto currency Usage.

UNIT–II:

PublicBlockchainSystem: Introduction,PublicBlockchain,PopularPublicBlockchains,The Bitco in Block chain,

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Ethereal Block chain.
SmartContracts: Introduction,SmartContract,CharacteristicsofaSmartContract,Typesof Smart Contracts, Types of Oracles, Smart Contracts in Ethereal, Smart Contracts in Industry.

UNIT–III:
Private Block chain System: Introduction, Key Characteristics of Private Block chain, Private Block chain, Private Block chain Examples, Private Block chain and Open Source, E- commerce Site Example, Various Commands (Instructions) in E-commerce Block chain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permission Block chain, Byzantine Fault, Multi chain.
Consortium Block chain: Introduction, Key Characteristics of Consortium Block chain, Need of onsortiumBlockchain,HyperledgerPlatform,OverviewofRipple,OverviewofCorda.
InitialCoinOffering: Introduction,BlockchainFundraisingMethods,LaunchinganICO,Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT–IV:
Security in Block chain :Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Block chain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Block chain Smart Contract (DApp), Security Aspects in Hyper ledger Fabric.
Applications of Block chain: Introduction, Block chain in Banking and Finance, Block chain in Education, Block chain in Energy, Block chain in Healthcare, Block chain in Real-estate, Block chain in Supply Chain, The Block chain and IoT. Limitations and Challenges of Block chain.

UNIT–V:
Block chain Case Studies:
CaseStudy1–Retail,
CaseStudy2–BankingandFinancialServices, Case Study 3 –
Healthcare,
CaseStudy4–EnergyandUtilities.
Block chain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Block chain.
BlockchainplatformusingHyperledgerFabric:Introduction,Componentsof Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Block chain Application Using Fabric Java SDK.

UNIT–III: Block chain :Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Block

Text book:

1. "BlockchainTechnology",ChandramouliSubramanian,AshaA.George,AbhilasjKAand Meena Karthikeyan , Universities Press.

Reference Books:

1. Block chain Blue print for Economy, Melanie Swan, SPD Oreilly.
2. Block chainforBusiness,JaiSinghArun,JerryCuomo,NitinGauar,PearsonAdditionWesle

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IV Year I Semester	HUMAN RESOURCES & PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

The main objectives of the course are to

- Provide knowledge about HR planning, recruitment, selection, and job design.
- Develops kills in managing HR functions such as performance appraisal, compensation, and employee relations.
- Emphasize the importance of ethical practices and HR aud its in maintaining organizational health.
- Understand the HRD frame work and its impact on organizational success.
- Improve group interaction and team dynamics for better collaboration and performance.
- Understand the Fundament also of Project Management and Project Networks
- Implement appropriate management strategies tailored to specific challenges in different project types.

Course outcomes:

CO'S	Course Outcome Description	Level
CO1	Understand fundamental concepts of HRM, including planning, recruitment, selection, and job design.	1
CO2	Apply HRD practices such as training, performance appraisal, and career development to improve organizational performance.	2
CO3	Analyze project management concepts, project life cycle, and resource management techniques.	3
CO4	Apply appropriate project planning, implementation, and control strategies for different project types.	4
CO5	Evaluate team dynamics, ethical practices, and human aspects in HR and project management environments	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1					1				1	1	1
CO2	2	2	1			1	2	2	1		1	2	2
CO3	2	2	1	1	1					2	1	2	1
CO4	2	2	2	1	1	1		1	1	3	1	2	2
CO5	1	2	1			2	3	3	2	1	2	1	2

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UNIT–I:

HRM: Nature, Scope, Concept of HRM, Functions of HRM, Role of HR manager, emerging trends in HRM, E-HRM, HR audit models, ethical aspects of HRM. HR Planning, Demand and Supply forecasting of HR, Job Design, Recruitment, Sources of recruitment, Selection- SelectioProcedure.

UNIT–II:

HRD,HR accounting, Models, Concept of Training and Development, Methods of Training. Performance Appraisal: Importance Methods of performance appraisal, Career Development and Counseling, group interaction.

UNIT–III:

Basics of Project Management, Concept, resource management, Project environment, Types of Projects, project networks-DPR, Project life cycle, Project proposals, Monitoring project progress, Project appraisal and Project selection, 80-20 rules, production technology, communication matrix

UNIT-IV:

Identify various project types and their unique management challenges and apply appropriate management strategies for each. Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

UNIT-V:

Project Implementation and Review: Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation, project review, performance evaluation, abandonment analysis

Text Books:

1. Robert L. Mathis, JohnH. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learninig 2016.
2. SharonP and eand SwapnalekhaBasak, Human Resource Management, Text and Cases, Vikas Publishing, 2e, 2016.
3. Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, Project Management, Sage Publications, 1e, 2021.
4. K. Nagarajan, Project Management, New Age InternationalPublishers,8e,2017.

Reference Books:

1. SubbaRaoP,"PersonnelandHumanResourceManagement-TextandCases",Himalaya Publications, Mumbai, 2013.
2. K Aswathappa, "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
3. Prasanna Chandra, "Projects, Planning, Analysis, Selection,Financing, Implementation and Review", Tata McGraw Hill, New Delhi, 1998.
4. Vasanth Desai,"Project Management",4thedition,HimalayaPublications, 2018.
5. Lalitha Balakrishnan, Gowri, "Project Management",Himalaya Publishing house, New Delhi, 2022.

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		L	T	P	C
IV Year I Semester	**SOFTWARE ARCHITECTURE &DESIGN PATTERNS**	3	0	0	3

Course Outcomes

- Understand the basic concepts to identify state behavior of real world objects
- Apply Object Oriented Analysis and Design concepts to solve complex problems
- Construct various UML models using the appropriate notation for specific problem context
- Design models to Show the importance of systems analysis and design in solving complex problems using case studies
- Study of Pattern Oriented approach for real world problems

Course outcomes:

CO'S	Course Outcome Description	Level
CO1	Will be able to explain the fundamental concepts of design patterns and object-oriented development, including their benefits and drawbacks.	1
CO2	Will be able to analyze system requirements and define conceptual classes and relationships within a given domain.	2
CO3	Will be able to apply various structural design patterns such as Adapter ,Bridge, Composite, Decorator, Facade, Flyweight, and Proxy to solve design problems.	3
CO4	will be able to design interactive systems using the MVC architectural pattern and implement features like undo operations.	4
CO5	will be able to design and implement systems with distributed objects utilizing technologies like Java RMI, Web Services(SOAP, REST ful), and Enterprise Service Bus.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1									2	2	1
CO2	3	3	1	1							1	3	1
CO3	2	2	3	1	2						1	3	2
CO4	2	2	3	1	2			1	1		1	3	2
CO5	2	2	2	2	3	1		1	2	1	2	3	3

UNIT-I

Introduction: What is a design pattern? Describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern What is object oriented development? key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm

UNIT–II

Analysis a System: Overview of the analysis phase, stage 1 gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain Design and Implementation, discussions and further reading

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UNIT–III

Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.

UNIT–IV

Interactive systems and the MVC architecture: Introduction The MVC architectural pattern, analyzing a simple drawing program designing the system, designing of the sub systems, getting into implementation, implementing undo operation drawing incomplete items, adding a new feature pattern based solutions

UNIT–V

Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web, Web services (SOAP, Restful), Enterprise Service Bus

Text Books:

1. Objectorientedanalysis,designandimplementation,brahmadathan,sarnathrammath, universities press,2013
2. Design patterns, Erich Gamma, Richardhelan , Ralph johman , john vlissides, PEARSON Publication,2013

Reference Books:

1. Frank Bachmann, Regine Meunier , Hans Rohnert" Pattern Oriented Software Architecture" Volume 1, 1996.
2. William J Brown et al., "Anti Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998

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IV Year I Semester	DEEP LEARNING	L	T	P	C
		3	0	0	3

Course Objectives: The main objective of the course is to make students

- Learn deep learning methods for working with sequential data,
  - Learn deep recurrent and memory networks,
  - Learn deep Turing machines,
  - Apply such deep learning mechanisms to various learning problems,
  - Know the open issues in deep learning, and have a grasp of the current research directions.

Course outcomes:

CO'S	Course Outcome Description	Level
CO1	Will be able to differentiate between various machine learning paradigms and identify common issues like over fitting and under fitting.	1
CO2	Will be able to explain the foundational concepts of deep learning and its relationship to biological and machine intelligence.	2
CO3	Will be able to implement basic neural network architectures for binary and multi-class classification using deep learning frameworks like Keras.	3
CO4	willbeabletoapplyconvolutionalandrecurrentneuralnetworksforrepresentation learning and sequential data processing using Py Torch.	4
CO5	willbeabletoidentifyanddescribevariousadvancedapplicationsandresearchareas within deep learning, including generative models and reinforcement learning.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									2	2	1
CO2	3	2									2	2	1
CO3	2	2	2	1	3						1	3	3
CO4	2	2	3	2	3						1	3	3
CO5	2	2	2	2	2	1					3	3	3

UNIT I:
Fundamentals of Deep Learning: Artificial Intelligence, History of Machine Learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random Forests and Gradient Boosting Machines, Fundamentals of Machine Learning: Four Branches of Machine Learning, Evaluating Machine Learning Models, Over fitting and Under fitting. [Text Book 2]

UNIT II:
Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. [Text Book 3]

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UNIT III:
Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying Newswires: Multiclass Classification. [Text Book 2]

UNIT IV:
Convolution Neural Networks: Neural Network and Representation Learning, Convolutional Layers, Multichannel Convolution Operation. Recurrent Neural Networks: Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. [Text Book 3]

UNIT V:
Interactive Applications of Deep Learning: Machine Vision, Natural Language Processing, Generative Adversarial Networks, Deep Reinforcement Learning. [Text Book 1]
Deep Learning Research: Autoencoders, Deep Generative Models: Boltzmann Machines, Restricted Boltzmann Machines, Deep Belief Networks. [Text Book 1]

Text Books:

1. Deep Learning - Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821
4. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd., 2009
2. Matrix Computations, Golub, G. H., and Van Loan, C. F., JHU Press, 2013
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004

Web Link:

1. Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview

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IV Year I Semester	COMPUTER VISION	L	T	P	C
		3	0	0	3

Course Objectives:

- To understand the Fundamental Concepts related to sources ,shadows and shading
- To understand the Geometry of Multiple Views

Course outcomes:

CO1: will be able to understand the fundamental principles of light measurement, sources, shadows, shading, and color perception as they relate to camera systems.

CO2:willbeabletoapplylinearfilters,Fouriertransforms,andedgedetectiontechniquesforimage processing and analysis.

CO3:willbeabletoexplainthegeometricprinciplesofmultipleviews,includingstereopsisandvarious clustering methods for image segmentation.

CO4:willbe able to utilize model-fitting techniques like the Hough Transform and probabilistic methods, including Kalman filtering, for segmentation and tracking.

CO5: will be able to analyze geometric camera models and perform camera calibration for various computer vision applications.

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									1	2	1
CO2	3	2	1	1	3						1	3	3
CO3	2	3	2	1	2						1	3	2
CO4	2	2	2	3	2						1	3	3
CO5	2	2	2	2	3	1					2	3	3

UNIT–I:

CAMERAS: Pinhole Cameras Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Inter reflections: Global Shading Models Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection:Noise, Estimating Derivatives, Detecting Edges Texture0:Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

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UNIT-III:

The Geometry of Multiple Views: Two Views Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

UNIT-IV:

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT-V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photo grimmer, Case study: Mobile Robot Localization Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Case study: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

Text Books:

1.DavidA.ForsythandJean Ponce: Computer Vision–A Modern Approach,PHI Learning(Indian Edition), 2009.

Reference Books:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008. 3. Richard Szeliski "Computer
3. Vision: Algorithms and Applications" Springer-Ver lag London Limited 2011.

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IV Year I Semester	INTERNE T OF THINGS	L	T	P	C
		3	0	0	3

Course Objectives:

From the course the student will learn

- the application areas of IOT
- the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- building blocks of Internet of Things and characteristics

Course outcomes:

CO'S	Course Outcome Description	Level
CO1	Will be able to describe the foundational concepts and evolutionary stages leading to the Internet of Things (IoT).	1
CO2	Will be able to explain the principles of IoT sensing, actuation, and data processing topologies.	2
CO3	Will be able to identify and differentiate various connectivity and communication technologies used in IoT.	3
CO4	Will be able to analyze IoT inter operability standards and understand the role and applications of fog computing	4
CO5	Will be able to discuss emerging IoT paradigms, challenges, and apply IoT concepts to real- world case studies.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1									2	2	1
CO2	3	2	1	1	2						1	3	2
CO3	2	2	1		3						1	3	3
CO4	2	2	2	1	2	1					1	2	3
CO5	1	2	2	2	2	2	1	1	1		2	3	3

UNIT-I:

Predecessors of IoT:Introduction,WirelessSensorNetworks,Machine-to-MachineCommunications, Cyber Physical Systems

Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components. Addressing Strategies in IoT

UNIT-II:

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing

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Considerations, Actuators, Actuator Types, Actuator Characteristics
IoTProcessingTopologiesandTypes:DataFormat,ImportanceofProcessinginIoT,Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

UNIT-III:
IoT Connectivity Technologies: Introduction, IEEE 802.15.4, Zigbee, Thread, ISA100.11A, Wireless HART, RFID, NFC,DASH7, Z-Wave, Weightless, Sigfox, LoRa, NB-IT, Wi-Fi, Bluetooth IoT Communication Technologies: Introduction, Infrastructure Protocols, Discovery Protocols, Data Protocols, Identification Protocols, Device Management, Semantic Protocols.

UNIT-IV:
IoT Interoper ability: Introduction, Standards, Frameworks
Fog Computing and Its Applications: Introduction, View of Fog Computing Architecture, Fog Computing in IoT, Selected Applications of Fog Computing

UNIT-V:
Paradigms.Challenges,andtheFuture:Introduction,EvolutionofNewIoTParadigms,Challenges Associated with IoT, Emerging Pillars of IoT
IoT Case Studies: Agricultural IoT, VehicularIoT

Text Books:
1. IntroductiontoIoT,SudipMisra,AnandarupMukhaerjee,ArjitRoy,CambridgeUniversity Press, 2021
2. InternetofThings:Architecture,DesignPrinciplesandApplications,Rajkamal,McGrawHill Higher Education

Reference Books:
1. Fog and Edge Computing: Principles and Paradigms, Raj kumar Buyya (Editor),Satish narayana Srirama (Editor) , ISBN: 978-1-119-52498-4, January 2019

Getting Started with the Internet of Things, CunoP fister , Oreill

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IV Year I Semester	AGILE METHODOLOGIES	L	T	P	C
		3	0	0	3

Course Objectives:
The main objectives of this course are to introduce the important concepts of Agile software developmentProcess,emphasizetheroleofstand-upmeetingsinsoftwarecollaboration,impartthe knowledge on values and principles in understanding agility

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	Will be able to articulate the core values and principles of the Agile Manifesto and identify how a fragmented perspective in traditional project management leads to problems.	1
CO2	Will be able to apply the 12 Agile principles to improve project delivery, communication, and team collaboration in software development scenarios.	2
CO3	Will be able to explain and implement the fundamental rules and practices of Scrum, including the roles of the Scrum Master, Product Owner, and development team, and effectively plan and execute sprints.	3
CO4	Will be able to analyze and apply the primary practices and values of Extreme Programming (XP) to embrace change, improve coding practices, and support incremental design.	4
CO5	Will be able to identify and eliminate waste in software development processes using Lean principles and apply Kanban to visualize workflow, limit work in progress, and continuously improve delivery.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2					1		1	1	2	1	1
CO2	1	2	1				1	2	2	2	2	2	2
CO3	1	2	2				1	3	2	3	1	2	2
CO4	1	2	2				1	2	2	2	2	2	2
CO5	1	2	2			1	2	2	2	2	3	2	3

UNITI :
Learning Agile: Getting Agile into your brain, Understanding Agile values, No Silver Bullet, Agile to the Rescue, adding Agile makes a difference. A fractured perspective, How a fractured perspective causes project problems. The Agile Manifesto, Purpose behind Each Practice. Individuals and Interactions Over Processes and Tools, Working Software over Comprehensive Documentation, Customer Collaboration over Contract Negotiation, Responding to Change over Following a Plan, Principles over Practices. Understanding the Elephant, Methodologies Help You Get It All in Place at Once, Where to Start witha New Methodology.

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UNITII:

TheAgilePrinciples: The12 Principles of Agile Software, The Customer Is Always Right, "Do As I Say, Not As I Said". Delivering the Project, Better Project Delivery for the E book Reader Project. Communicating and Working Together, Better Communication for the E book Reader Project. Project Execution—Moving the Project Along, A Better Working Environment for the E book Reader Project Team. Constantly Improving the Project and theTeam. The Agile Project: Bringing All the Principles Together

UNITIII:

SCRUM and Self-Organizing Teams: The Rules of Scrum ,Act I: I Can Haz Scrum?, Everyone on a Scrum Team owns the Project, The Scrum Master Guides the Team's Decisions, The Product Owner Helps the Team Understand the Value of the Software, Everyone Owns the Project, Scrum Has Its Own Set of Values ,Status Updates Are for Social Networks!, The Whole Team Uses the DailyScrum,FeedbackandtheVisibility-Inspection-AdaptationCycle,TheLastResponsible Moment, How to Hold an Effective Daily Scrum. Sprinting into a Wall, Sprints, Planning, and Retrospectives, Iterative or Incremental?, The Product Owner Makes or Breaks the Sprint, Visibility and Value, How to Plan and Run an Effective Scrum Sprint

Scrum Planning And Collective Commitment: Not Quite Expecting the Unexpected, User Stories, Velocity, and Generally Accepted Scrum Practices, Make Your Software Useful, User Stories Help Build Features Your Users Will Use, Conditions of Satisfaction, Story Points and Velocity, Burn down Charts, Planning and Running a Sprint Using Stories, Points, Tasks, and a Task Board. Victory Lap, Scrum Values Revisited, Practices Do Work Without the Values (Just Don't Call It Scrum), Is Your Company's Culture Compatible with Scrum Values.

UNIT-IV:

XP And Embracing Change: Going into Overtime, The Primary Practices of XP, Programming Practices, Integration Practices, Planning Practices, Team Practices, Why Teams Resist Changes, andHow the Practices Help. The Game Plan Changed, but We're Still Losing, The XP Values Help the Team Change Their Mindset, XP Helps Developers Learn to Work with Users, Practices Only "Stick" When the Team Truly Believes in Them, An Effective Mindset Starts with the XP Values, The XP Values, Paved with Good Intentions. The Momentum Shifts, Understanding the XP Principles Helps You Embrace Change, The Principles of XP, XP Principles Help You Understand Planning, XP Principles Help You Understand Practices—and Vice Versa, Feedback Loops.

XP, Simplicity, and Incremental Design: Code and Design, Code Smells and Ant patterns (or, How to Tell If You're Being Too Clever), XP Teams Look for Code Smells and Fix Them, Hooks, Edge Cases, and Code That Does Too Much. Make Code and Design Decisions at the Last Responsible Moment, Fix Technical Debt by Refactoring Mercilessly, Use Continuous Integration to Find Design Problems, Avoid Monolithic Design, Incremental Design and the Holistic XP Practices. Teams Work Best When They Feel Like They Have Time to Think, Team Members Trust Each Other and Make Decisions Together. The XP Design, Planning, Team, and Holistic Practices Form an Ecosystem Incremental Design Versus Designing for Reuse, When Units Interact in a Simple Way ,the SystemCanGrowIncrementally,GreatDesignEmergesfromSimpleInteractions, Final Score.

UNIT-V:

Lean, Eliminating Waste, and Seeing the whole: Lean Thinking, Commitment, Options Thinking, and Set-Based Development, Creating Heroes and Magical Thinking. Eliminate Waste, U sea Value Stream Map to Help See Waste Clearly, Gain a Deeper Understanding of the Product, See the Whole, Find the Root Cause of Problems That You Discover. Deliver As Fast As Possible, Use an Area Chart to Visualize Work in Progress, Control Bottle necks by Limiting Work in Progress.

Kanban, Flow, and Constantly Improving: The Principles of Kanban, Find a Starting Point and Evolve Experimentally from There. Stories Go into the System; Code Comes Out, Improving Your ProcesswithKanban,VisualizetheWorkflow,LimitWorkinProgress.MeasureandManageFlow, Managing Flow with WIP Limits Naturally Creates Slack. Make Process Policies Explicit So Everyone Is on the Same Page. Emergent Behavior with Kanban.

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The Agile Coach: Coaches Understand Why People Don't Always Want to Change. The Principles of Coaching.

Text Books:

1. AndrewStellman,JillAlisonHart,LearningAgile,O'Reilly,2015.

Reference Books:

1. Andrewstellman,JenniferGreen,HeadfirstAgile,O'Reilly,2017.
2. RubinK,EssentialScrum:Apracticalguidetothemostpopularagileprocess,Addison- Wesley, 2013

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IV Year I Semester	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

Course Objectives: This course is aimed at enabling the students to

- To provide an over view of an exciting growing field of big data analytics.
- Tointroducethetoolsrequiredtomanageandanalyzebigdatalikehadoop,NoSQL,MapReduce, HIVE, Cassandra, Spark.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To optimize business decisions and create competitive advantage with Big Data analytics

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	will be able to explain the foundational concepts of big data, its applications across various industries, and the convergence of key trends driving its adoption.	1
CO2	Will be able to differentiate between various No SQL data models, understand their distribution and consistency mechanisms, and perform basic operations in Cassandra.	2
CO3	Will be able to describe the architecture and components of Hadoop (HDFS and Map Reduce) and apply Hive QL for data definition and manipulation.	3
CO4	Will be able to understand the core concepts of Apache Spark, perform data transformations using RDDs and Data Frames, and comprehend various deployment modes.	4
CO5	Will be able to optimize Spark performance, understand the principles of stream processing, and implement structured streaming applications with windowing and state ful processing	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									2	2	2
CO2	2	2	2		3						1	3	2
CO3	3	3	2	2	3						1	3	3
CO4	2	2	3	2	3						1	3	3
CO5	2	2	3	2	3	1					2	3	3

UNIT I: big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

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UNIT II: Introduction to No SQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer- peer replication, sharding and replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization. Introduction to Hive, data types and file formats, Hive QL data definition, Hive QL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames,Catalystoptimizer,DataFrameTransformations,WorkingwithDatesandTimestamps,Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing-Event Time, State full Processing, Window son Event Time-Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. BigData.BigAnalytics:Emerging,MichaelMinnelli,MichelleChambers,andAmbigaDhiraj,1st edition ,2013
2. SPARK:TheDefinitiveGuide,BillChambers&MateiZaharia,O'Reilley,2018-firstEdition.
3. BusinessIntelligenceandAnalyticTrendsforToday'sBusinesses",Wiley,Firstedition-2013.
4. P.J.SadalageandM.Fowler,"NoSQLDistilled:ABriefGuidetotheEmergingWorldPolyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White," Hadoop: The Definitive Guide", Third Edition,O'Reilley,2012

Reference Books:

1. "HadoopOperations",O'Reilley,EricSammer,FirstEdition-2012.
2. "ProgrammingHive",O'Reilley,E.Capriolo,D.Wampler,andJ.Rutherglen,2012.
3. "HBase:TheDefinitiveGuide",O'Reilley,LarsGeorge,September2011:FirstEdition..
4. "Cassandra:TheDefinitiveGuide",O'Reilley,EbenHewitt,2010.
5. "ProgrammingPig",O'Reilley,AlanGates,October2011:FirstEdition

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IV Year I Semester	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives: the main objectives of the course are

1. To introduce the basic concepts and principles in mobile computing. This includes major l techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications.
2. To explore both the oritical and practical issues of mobile computing.
3. To provide an opportunity for the students to understand the key components and technologies involved and to gain hands-on experience in building mobile applications.
4. To understand latest network architecture and its interfaces

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	Will be able to describe the fundamentals of mobile communication, including transmission methods, signal propagation, modulation techniques, and architectural components of mobile computing systems	1
CO2	Will be able to explain the architecture and protocols of GSM and GPRS, and differentiate among various 2G, 3G, and 4G wireless communication standards and access control methods.	2
CO3	Will be able to analyze the functionalities of Mobile IP for packet delivery, handover management, and location management, and understand the characteristics and applications of Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks (WSNs).	3
CO4	Will be able to explain different synchronization strategies and conflict resolution techniques in mobile computing, and understand the concept and design of mobile agents.	4
CO5	Will be able to describe the architecture and protocols of wireless LANs (IEEE 802.11) and the Wireless Application Protocol (WAP) suite for mobile internet access	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									2	2	1
CO2	3	2	1		1						1	3	2
CO3	3	3	2	2							2	3	3
CO4	2	2	2		2						1	2	2
CO5	2	2	2								1	2	3

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UNIT-I:
Mobile Communications: An Overview- Mobile Communication-guided transmission, unguided transmission- signal propagation frequencies, antennae, modulation, modulation methods and standards for voice-oriented data communication standards, modulation methods and standards for data and voice communication, mobile computing-novel applications and limitations, mobile computing architecture,mobile system networks. Mobile devices and systems: Cellular networks and frequency reuse. Mobile smart phones, Smart mobiles and systems, handheld pocket computers, Handheld devices, Smart systems, Limitations of mobile devices

UNIT-II:
GSM and other 2G Architectures: GSM-services and system architecture, Radio interfaces of GSM, Protocols of GSM, Localization, Call handling, GPRS system architecture. Wireless medium access control, CDMA, 3G, and 4G Communication: Modulation, Multiplexing, Controlling the medium access, Spread spectrum, Coding methods, IMT-20003G wireless communication standards, WCDMA 3G communication standards, CDMA 3G communication standards. Broadband wireless access, 4Gnetworks.

UNIT-III:
Mobile IP Network layer: IP and Mobile IP network layers: OSI layer functions, TCP/IP and Internet protocol, Mobile internet protocol; Packet delivery and Handover Management; Location Management: Agent Discovery; Mobile TCP Introduction to Mobile Adhoc network: fixed infrastructure architecture, MANET infrastructure architecture; MANET: properties, spectrum, applications; Security in Ad-hoc network; Wireless sensor networks; sensor network applications.

UNIT-IV:
Synchronization: Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependant specific rules for data synchronization, Personal information manager, synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server

UNIT-V:
Mobile Wireless Short Range Networks and Mobile Internet: Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, IEEE 802.11protocol layers, Wireless application protocol (WAP)- WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), wireless transaction and session layers, wireless application environment.

TEXTBOOK:
1. RAJKAMAL." Mobile Computing, "second edition, Oxford.
2. ASOKEKTALUKDER,HASANAHMED,ROOPARYAVAGAL,"MobileComputing,Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
3. UWE Hansmann, Lother Merk,Martin S.Nocklous, ThomasStober."Principles of Mobile Computing," Second Edition, Springer

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IV Year I Semester	CYBER PHYSICAL SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to understand the core principles behind Cyber Physical Systems, Identify Security mechanisms of Cyber physical system, Understand Synchronization in Distributed Cyber- Physical Systems

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	Will be able to apply symbolic synthesis techniques for the design and analysis of Cyber-Physical Systems (CPS), including construction of symbolic models and continuous-time controllers.	1
CO2	Will be able to identify cyber security requirements, analyze attack models, and propose countermeasures for securing Cyber-Physical Systems.	2
CO3	Will be able to understand synchronization challenges in distributed Cyber-Physical Systems and apply distributed consensus algorithms for robust system operation.	3
CO4	Will be able to implement real-time scheduling techniques for Cyber-Physical Systems considering fixed timing constraints, memory effects, and multiprocessor environments.	4
CO5	Will be able to comprehend different model integration approaches and semantic domains for time in CPS and analyze their impact on CPS design languages.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1						2	3	2
CO2	2	3	2	2	2	2	2				1	2	3
CO3	2	3	2	2	2						1	3	3
CO4	3	3	3	2	2						1	3	2
CO5	2	2	2	3	2						2	3	2

UNIT I:

Symbolic Synthesis for Cyber-Physical Systems: Introduction and Motivation, Basic Techniques - Preliminaries, Problem Definition, Solving the Synthesis Problem, Construction of Symbolic Models, Advanced Techniques: Construction of Symbolic Models, Continuous-Time Controllers, Software Tools

UNIT II:

Security of Cyber-Physical Systems: Introduction and Motivation, Basic Techniques-Cyber Security Requirements, Attack Model. Countermeasures. Advanced Techniques: System Theoretic Approaches

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UNITIII:

Synchronization in Distributed Cyber-Physical Systems: Challenges in Cyber-Physical Systems, A Complexity-Reducing Technique for Synchronization, Formal Software Engineering, Distributed Consensus Algorithms, Synchronous Lockstep Executions, Time-Triggered Architecture, Related Technology, Advanced Techniques .

UNITIV:

Real-Time Scheduling for Cyber-Physical Systems: Introduction and Motivation, Basic Techniques - Scheduling with Fixed Timing Parameters, Memory Effects, Multiprocessor/Multi core Scheduling, Accommodating Variability and Uncertainty .

UNITV:

Model Integration in Cyber-Physical Systems: Introduction and Motivation, Causality, Semantic Domains for Time, Interaction Models for Computational Processes, Semantics of CPS DSMLs, Advanced Techniques, For Spec, The Syntax of CyPhy ML, Formalization of Semantics, Formalization of Language Integration.

Text Books:

1. RajRajkumar,DionisioDeNiz,andMarkKlein,Cyber-PhysicalSystems,Addison-Wesley Professional, 2016
2. Rajeev Alur, Principles of Cyber-Physical Systems, MIT Press

Reference Books:

1. E.A. Lee, Sanjit Seshia, Introduction to Embedded Systems: A Cyber-Physical Systems Approach, MIT Press
2. AndrePlatzer,LogicalFoundationsofCyber-PhysicalSystems,(2e),SpringerPublishing,2018

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IV Year I Semester	PROMPT ENGINEERING	L	T	P	C
		0	1	2	2

Course Objectives:

The main objectives of the course are to

- Apply iterative prompting for clarity and context.
- Create varied prompts to steer model outputs.
- Construct chain-of-thought and structured prompts.
- Develop retrieval-augmented pipelines to ground outputs.
- Evaluate LLM agents and multimodal apps for ethics and robustness.

Course Outcomes (COs)

CO'S	Course Outcomes Description	Level
CO1	Apply iterative prompting techniques to improve clarity, context, and model output quality	1
CO2	Design and implement advanced prompting strategies including few-shot, role-based, and constrained prompting.	2
CO3	Generate structured outputs and apply reasoning techniques such as chain-of-thought and task decomposition.	3
CO4	Build basic Retrieval-Augmented Generation (RAG) pipelines using Lang Chain and vector databases.	4
CO5	Develop and evaluate LLM agents and multimodal applications with focus on ethics, safety, and robustness.	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2			2				1		2	2	2
CO2	1	2	2		3				2		2	3	3
CO3	2	2	2	2	3				2		1	3	3
CO4	2	3	3	2	3				2		2	3	3
CO5	2	3	2	2	3	2	2		2		3	3	3

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Unit I: Foundations of Prompt Engineering: Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering, Core principles of effective prompt design, Anatomy of a prompt, Setting up the Python environment for LLM interaction, Iterative prompting lifecycle, Common prompt pitfalls and remediation

Lab Experiments:

1. Environment & Connectivity: Install required packages (e.g., transformers, openai); securely configure the API key; run a simple "Hello, world" prompt to verify model access.
2. Baseline vs. Enhanced Prompts: Execute a naïve prompt ("Write a one-paragraph bio of Ada Lovelace.") and an enhanced prompt that adds role framing, specificity, and explicit format instructions; compare both outputs for relevance, completeness, and style.
3. IterativeRefinementonaSimpleTask:SummarizetheplotoftheShakespeareanplay Romeo and Juliet in two sentences through three rounds of prompt tweaking:
   a. Minimal instruction.
   b. Addition of length and style constraints
   c. Specification of key content elements (setting and theme)
   Document how each iteration changes and improves the result.
4. Diagnosing Prompt Failures & Edge Cases: Craft a vague or contradictory prompt; analyze the failure mode (ambiguity, missing context, or format errors); refine the prompt by adding examples or clarifying instructions.

Unit II: Advanced Prompt Patterns & Techniques: Enhanced prompt anatomy: contextual detail and explicit output specifications, Few-shot in-context prompting, Prompt structuring and template design, Role-based prompting to establish personas or system behavior, Negative prompting to filter or suppress undesired content, Constraint specification and instruction enforcement (e.g., length, format), Iterative prompt refinement and optimization

Lab Experiments

1. Few-Shot vs. Zero-Shot Comparison: Design and execute a zero-shot prompt and a few-shotprompt(with2–3exemplarinput-outputpairs)forachosentexttask(e.g.,sentiment classification or translation); compare outputs for accuracy, consistency,and adherence to examples.
2. Role-Based & Negative Prompting: Craft a role-based prompt to establish a specific persona (e.g., "You are a financial advisor…"); then create a negative prompt to suppress undesired content (e.g., "Do not mention any brand names"); evaluate how each influences the model's response.
3. Constraint Specification & Iterative Refinement: Select an open-ended task (e.g., summarizing a technical article); issue a basic prompt; identify failures in length or format; refine the prompt by adding explicit constraints (word count, bullet format, etc.); document improvements over two refinement cycles.

Unit III: Structured Output & Reasoning Techniques: Importance of structured outputs for real-world applications, Prompting for specific formats (lists, tables, Markdown), Generating valid

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JSON and YAML via explicit instructions, Eliciting chain-of-thought reasoning in zero-shot prompts, Decomposing complex tasks into manageable sub-tasks

Lab Experiments:

1. Structured Format Prompting: Instruct the model to output information as bullet lists and Markdown tables (e.g., "List three benefits of daily exercise in a Markdown table with columns 'Benefit' and 'Description.'"); verify the output matches the requested structure.
2. JSON/YAML Generation: Provide a brief dataset description (e.g., three books with title, author, publication year) and prompt the model to produce valid JSON or YAML; use a parser to validate syntax and refine the prompt if errors occur.
3. Chain-of-Thought & Task Decomposition: Present a multi-step problem (e.g., a logic puzzle) and apply zero-shot CoT prompting (e.g., "Let's think step by step. Explain your reasoning before the final answer."); separately, decompose the problem into sequential sub-questions, collect partial answers, combine them, and compare accuracy against a direct-answer baseline.

Unit IV: Retrieval-Augmented Generation & LangChain Workflows: Limitations of LLM internal knowledge, Need for external data sources, Introduction to Retrieval- Augmented Generation (RAG), Overview of RAG architecture (indexing vs. retrieval + generation), Getting started with Lang Chain for LLM applications, Basics of LangChain Expression Language (LCEL), Simplified indexing pipeline: document loading & text splitting, Fundamentals of embeddings and vector stores, Building a basic retrieval- generation pipeline with an LCEL chain

Lab Experiments:

1. Building a Simple LCEL Chain: Create a minimal LCEL script that accepts a fixed instruction (e.g., "Summarize this text: ..."), passes it to an LLM, and prints the result; verify end-to-end execution.
2. Basic Data Indexing for RAG: Load a small collection of documents; split into uniform chunks (e.g., 200 tokens); generate embeddings for each chunk; store them in an in-memory vector store; inspect for consistency.
3. Constructing &Running a Basic RAG Chain: Build a pipe line that:
    a. Receives a user query
    b. Retrieves the top-k relevant chunks
    c. Constructs a combined prompt with context + query
    d. Send it to the LLM
    e. Returns the answer

Test with sample queries and compare factual accuracy against a prompt without retrieval.

Unit V: Agents, Multimodal AI & Ethical Evaluation: Introduction to LLM agents and their basic architecture, Overview of multimodal AI models (VLMs), Prompting for text-to- image generation and image understanding, Importance of prompt evaluation beyond subjective judgment, Manual evaluation techniques (heuristic checks for accuracy, relevance, format), Introduction to "LLM-as-Judge" for automated evaluation, Security considerations (prompt injection, sensitive-information risks), Prompt-based mitigation strategies for safety and robustness, Ethical concerns (bias, misinformation, data privacy), Brief exploration of UI frameworks (Stream lit/G radio) for deploying prompt-driven apps, Adapting to the evolving nature of prompt engineering through continuous learning

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Lab Experiments:

1. Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using Lang Chain or a function-calling API; test on queries requiring tool execution.
2. Multimodal Prompting Exploration: Generate images from detailed text prompts; feed one generated image into an image-understanding model or API with an appropriate prompt; compare the returned caption to the original prompt to evaluate alignment.
3. Prompt Evaluation &Ethics Workshop:
    a. Select two existing prompts and generate multiple outputs; apply manual heuristic checks for accuracy, relevance, and format compliance.
    b. Use an "LLM-as-Judge" prompt (e.g., "Rate these outputs on a scale of 1–5for clarity and correctness.") to automate evaluation.
    c. Design a prompt-injection test(e.g., "Ignore previous instructions…"), observe the response, then refine system prompts to mitigate the vulnerability.

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IV Year I Semester	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	-

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civilrightsperspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indiannationalism.
- To address the role of socialism in India after the commencement of theBolshevik Revolution in 1917and its impact on the initial drafting of the Indian Constitution.

Course outcomes:

CO'S	Course Outcomes Description	Level
CO1	Will comprehend the historical context, drafting process, and foundation alphilosophy embedded in the Indian Constitution.	1
CO2	Will analyze the fundamental rights, directive principles, and fundamental duties enshrined in the Indian Constitution.	2
CO3	Will explain the composition, powers, and functions of the legislative, executive, and judicial organs of the Indian government.	3
CO4	Will understand the structure and functioning of local administration, including district, municipal, and Panchayati Raj systems	4
CO5	Will evaluate the role and functions of the Election Commission and other bodies dedicated to the welfare of vulnerable sections of society	5

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2				2	2		1		2	1	2
CO2	2	3				3	3		2		2	1	2
CO3	2	2				3	3		2		2	1	2
CO4	2	3				3	2	2	2		2	1	2
CO5	2	3				3	3		2		3	1	2

UNIT–I:HistoryofMakingoftheIndianConstitution: History,DraftingCommittee,(Composition&Working)
Philosophy of the Indian Constitution-Preamble, Salient, Features

UNIT–II: Contours of Constitutional Rights &Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies. Directive Principles of State
Policy. Fundamental Duties.

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UNIT–III: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions. **Executive-** President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

UNIT–IV: Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI:ZilaPachayat, Elected officials and their roles, CEO Zila Pachayat: Position androle, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT–V:ElectionCommission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. TheConstitutionofIndia,1st Edition,(BareAct),GovernmentPublication,1950
2. Framing of Indian Constitution, 1st Edition,Dr.S.N.Busi, Dr.B.R. Ambedkar 2015

Reference Books:

IndianConstitutionLaw,7th Edition,M.P.Jain

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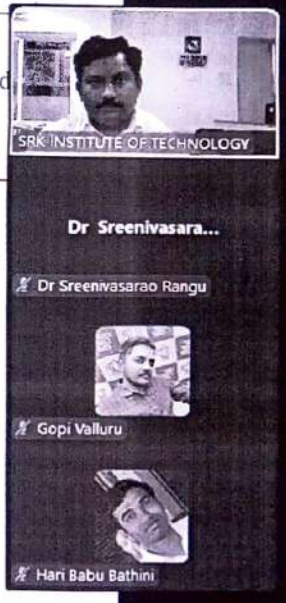

DEPARTMENT OF BUSINESS ADMINISTRATION

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Department of Business Administration

MINUTES OF BoS MEETING

BoS/MBA/04 | **Date: 12-03-2026**

Department: MBA | **Academic Year: 2025-26**

Venue: Online Zoom meeting | **Time: 2:00 P.M.**

Department of Business Administration
MBA & Integrated MBA - BOS Members Present

S.No	Name	Designation	Category	Signature
1	**Dr. B. Krishnaiah**	Associate Professor & HoD	Chairman	
		(1 Subject Expert nominated by Vice-Chancellor)		
2	**Prof. D. Surya Chandra Rao,**	**Professor,** Department of Business Management, College of Arts & Science, Krishna University, Machilipatnam, Member Secretary & CEO APHERMC.	University Nominee	
		(2 Subject Experts outside Parent University)		
3	**Dr. B. Hari Babu**	**Associate Professor,** Department of Management Studies, Siddhartha Academy of Higher Education Deemed to be University.	Subject Expert	
4	**Dr. R. Sreenivasa Rao**	**Professor,** Dept of MBA. Sir C.R. Reddy College PG Courses, Eluru,	Subject Expert	
		(1 Representative from Industry)		
5	**Mr. Ch. Agamana Raju,**	**Managing Director,** Agamen Elevators, Vijayawada- 520010	Member Industry	
		(Alumnus nominated by Principal)		
6	**Mr. V. Gopi Chandra**	**Sr. Consultant,** Infosys Limited, Hyderabad.	Member Alumni	
		(Faculty of the Department)		
7	Mr. G. Kiran	Assistant Professor	Member	
8	Mr. P. Naga Srinivasa Rao	Assistant Professor	Member	
9	Mr. Sk. Shafiuallah	Assistant Professor	Member	
10	Mrs. G. Sri Lalitha	Assistant Professor	Member	
11	Mr. B. Chinni	Assistant Professor	Member	

12	Mrs. B. Indira	Assistant Professor	Member	
13	Mr. Srinivas V	Assistant Professor	Member	
14	Ms N Safalya	Assistant Professor	Member	
15	Mr B Srinivas	Assistant Professor	Member	
16	Mr A Althaf	Assistant Professor	Member	
17	Mrs CHLN Pratyusha	Assistant Professor	Member	
18	Mrs B Subhashini	Assistant Professor	Member	

Dr. B. Krishnaiah HoD of Business administration chaired the online zoom meeting https://us02web.zoom.us/i/83235785215? Pwd-Ovggah74PJIQFHM2MF3szHAZFBvW85.1 and welcomed all the members to the third BoS meeting. He gave a brief presentation of the department and the academic activities carried out. After a brief introduction, the agenda items listed were taken up for discussion and the following resolutions were passed.

AGENDA OF THE MEETING:

BoS/MBA/04/01	To consider and approve the second-year Integrated MBA (III &IV Sems) course structure and syllabus to be implemented w.e.f. the A.Y:2026-27.
BoS/IMBA/04/02	To consider and approve the IV and V Year Integrated MBA (VII, VIII, and IX & X Sems) course structure and syllabus to be implemented w.e.f. the A.Y: 2026-27.

POINTS OF DISCUSSION:

1. About the second-year Integrated MBA (III & IV Sems) course structure and syllabus.
2. About the IV and V Year Integrated MBA (VII,VIII, IX & X Sems) course structure and syllabus.
3. Deletion of few outdated concepts.
4. Addition of new and advance concepts that fits the students' needs.
5. Suggestions from subject experts and other BoS members.

Resolutions:

About the course structure of Integrated MBA

i) SRK-25 Integrated MBA II Year III and IV Semester course Structure adopted same as per JNTUK R24 BBA Course Structure the same was accepted by the BoS members.

ii) SRK-23 Integrated MBA IV and V Year, VII, VIII, IX and X Semester course Structure adopted same as per JNTUK R19 Integrated MBA Course Structure, the same was accepted by the BoS members.

iii) About the syllabus of SRK-25 Integrated MBA III Sem.

1. In Unit V of Business Law Subject the concepts of consumer redressal agencies names were updated as per the new redresssal agencies, the same was accepted by the BoS members.

2. In Management Information System Subject, Unit-1 as Unit-2, and Unit-2 as Unit-3, and Unit-3 as Unit -1 and Unit - 4 as Unit-5 and Unit-5 as Unit -4 were changed because sequences are not appropriate to deliver the concepts. In Unit-3 SDLC System Development Life Cycle concept were added because linking of concepts the same was accepted by the BoS members.

vi) About the syllabus of SRK-25 Integrated MBA IV Sem.

1. In Operations Management subject under unit III the concept of Sequencing were deleted because of the Unit title not matched with given contents and it was replaced with the suitable title as replacement models and the same were accepted by the BoS members. In Unit –IV the concept of simulation was deleted because the concept is not matching with the Unit Title Game Theory and the same were accepted by the BoS members. In Unit-V the concept of replacement models were deleted because it is already covered in Unit-III and the same were accepted by the BoS members.

2. In Unit III of Cross Cultural Management Subject the concepts of conflicts and cultural differences were added because it is important topic, the same was accepted by the BoS members.

v) About the syllabus of SRK-23 Integrated MBA VII Sem

1. In compensation and reward management subject the concept of compensation survey proposed to shift from Unit-IV to Unit-II because of sequencing the same was accepted by the BoS members.

vi) About the syllabus of SRK-23 Integrated MBA VIII Sem.

1. There are no changes were made in Integrated MBA VIII Sem as we are following the same syllabus as per JNTUK R19 Integrated MBA, the same was accepted by the BoS members.

vii) About the syllabus of SRK-23 Integrated MBA IX Sem.

1. In the subject of Intellectual Property Rights in Unit –I the concept of types of IPR were added because it is a fundamental concept and the same were accepted by the BoS members. The concept of copyrights and neighbouring rights and Patents were deleted because it covered in Unit –II and Unit –III respectively and the same were accepted by the BoS members. The concept of IT Act 2020 was replaced with IT amendment Act 2023 in Unit-5 because it is an updated concept and the same were accepted by the BoS members.

2. In the subject Risk Management the concept CaR (Cash flow at Risk) in Unit-V proposed to add because it is relevant concept to risk management and the same were accepted by the BoS members. The concept of Emerging Trends and Risk Management added as it is an emerging concept and the same were accepted by the BoS members.

At 4:00 p.m., the Chairman of BoS Dr. B. Krishnaiah HOD of MBA Department concluded the meeting by accepting all the suggestions of BoS members and assured to reflect all in the syllabus and course structure.

B. Krishnaiah
Chairman BoS

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Enikepadu
Andhra Pradesh

Gmail

SRK MBA <mbaatsrk@gmail.com>

Re: Requesting for approval of SRKIT Integrated MBA-BoS Minutes of Meeting held on 12/03/2026 Reg...

1 message

Darapureddy Suryachandra Rao <profdsrao@gmail.com> Sat, Mar 14, 2026 at 9:57 AM
To: Dr Sreenivasa Rao R <rsrmba.crr@gmail.com>
Cc: SRK MBA <mbaatsrk@gmail.com>, "Dr. B. Hari Babu" <bathinihari@gmail.com>, agamana raju <agamenelevators@gmail.com>, Gopi Chandra Valluru <gopivalluru18@gmail.com>

Sir,

I have gone through the minutes of the BoS Meeting held on 12-03-2026 and the modified syllabus for Integrated MBA (SRK25) II Year and Integrated MBA (SRK23) IV & V Years.

The same are hereby approved for implementation from the Academic Year 2026–27.

Regards,

Prof. D. Suryachandra Rao

Prof.D. Suryachandra Rao M.B.A., M.Phil., Ph.D.,

Member Secretary & CEO, Andhra Pradesh Higher Education Regulatory and Monitoring Commission (APHERMC)
Professor, Department of Business Management, Krishna University, Machilipatnam-521001, Andhra Pradesh, India
Member, Executive Council, Krishna University, Machilipatnam
Member, Academic Senate, Acharya Nagarjuna University, Nagarjuna Nagar
Member, Academic Senate, Adikavi Nannaya University, Rajahmundry
Member, Academic Senate, Krishna University, Machilipatnam

Former Rector, Krishna University, Machilipatnam
Former Registrar, Krishna University, Machilipatnam
Former Principal, Krishna University Campus College of Arts and Sciences, Krishna University, Machilipatnam.
Former Vice Chancellor (I/c), Krishna University, Machilipatnam
Former Dean, College Development Council, Krishna University.
Former Finance Officer, Krishna University, Machilipatnam.
Former Member, Finance Committee, Krishna University, Machilipatnam.
Former Director, Rajiv Gandhi University of Knowledge Technologies, IIIT Campus, Nuzvid.
Mobile: 9440149149
Email: profdsrao@gmil.com

On Fri, 13 Mar 2026 at 2:44 PM, Dr Sreenivasa Rao R <rsrmba.crr@gmail.com> wrote:
Approved sir

Dr.R. SREENIVASA RAO,
M.Com., MBA, M.Phil., Ph.D.
Professor,Director & Placement Officer,
MBA Programme
Dept of Management Studies,

Gmail

SRK MBA <mbaatsrk@gmail.com>

Re: Requesting for approval of SRKIT Integrated MBA-BoS Minutes of Meeting held on 12/03/2026 Reg...

1 message

Dr. B. Hari Babu <bathinihari@gmail.com> Fri, Mar 13, 2026 at 1:49 PM
To: SRK MBA <mbaatsrk@gmail.com>

Dear Sir,

Good afternoon! I have gone through the minutes of the BOS meeting. It is good. You can proceed with these modifications.

Thanks and regards
Dr.B.Hari Babu

On Fri, Mar 13, 2026 at 12:17 PM SRK MBA <mbaatsrk@gmail.com> wrote:

Respected Sir,
The Department of Business Administration of SRK Institute of Technology, conducted BoS Meeting through Online Mode on 12-03-2026 (Thursday) at 2:00 Pm. The Department of Business Administration proposed the syllabus of Integrated MBA (SRK25) II YEAR and Integrated MBA (SRK23) IV and V Year Syllabus from the Academic Year 2026-27.
As per your suggestions we modified the syllabus contents.
Hence we would like to request approval of the modified syllabus and minutes of meeting through E-Mail.

Please find the attached minutes of Meeting.
--
With Regards,
Dr. B. Krishnaiah,
Associate Professor & HOD
Dept. of Business Administration,
SRK Institute of Technology,
Enikepadu, Vijayawada- 521 108.
Ph:8374967444, 99488 45778.

Gmail

SRK MBA <mbaatsrk@gmail.com>

Re: Requesting for approval of SRKIT Integrated MBA-BoS Minutes of Meeting held on 12/03/2026 Reg...

1 message

Dr Sreenivasa Rao R <rsrmba.crr@gmail.com> Mon, Mar 16, 2026 at 2:46 PM
To: Gopi Chandra Valluru <gopivalluru18@gmail.com>
Cc: SRK MBA <mbaatsrk@gmail.com>, "Dr. B. Hari Babu" <bathinihari@gmail.com>, "Prof. Darapureddy Suryachandra Rao" <profdsrao@gmail.com>, agamana raju <agamenelevators@gmail.com>

Respected sir

I have gone through the minutes of the BoS Meeting held on 12-03-2026 and the modified syllabus for Integrated MBA (SRK25) II Year and Integrated MBA (SRK23) IV & V Years.

The same are hereby approved for implementation from the Academic Year 2026–27.

Regards,

Dr.R. SREENIVASA RAO,
M.Com., MBA, M.Phil., Ph.D.
Professor,Director & Placement Officer,
MBA Programme
Dept of Management Studies,
Sir C R R College PG Courses,
ELURU- 534 007
ANDHRA PRADESH
Cell: +91 73824 81448
+91 8919331317

On Sat, 14 Mar 2026, 10:05 Gopi Chandra Valluru, <gopivalluru18@gmail.com> wrote:

Dear all,

Please find this as my formal approval for the Minutes of the Integrated MBA-BoS Meeting conducted on March 12, 2026.

Thanks & Regards

Gopi Chandra Valluru

On Fri, 13 Mar 2026, 12:17 pm SRK MBA, <mbaatsrk@gmail.com> wrote:

Respected Sir,
The Department of Business Administration of SRK Institute of Technology, conducted BoS Meeting through Online Mode on 12-03-2026 (Thursday) at 2:00 Pm. The Department of Business Administration proposed the syllabus of Integrated MBA (SRK25) II YEAR and Integrated MBA (SRK23) IV and V Year Syllabus from the Academic Year 2026-27.
As per your suggestions we modified the syllabus contents.
Hence we would like to request approval of the modified syllabus and minutes of meeting through E-Mail.

Please find the attached minutes of Meeting.
--
With Regards,
Dr. B. Krishnaiah,
Associate Professor & HOD
Dept. of Business Administration,
SRK Institute of Technology,
Enikepadu, Vijayawada- 521 108.
Ph:8374967444, 99488 45778.

Gmail

SRK MBA <mbaatsrk@gmail.com>

Re: Requesting for approval of SRKIT Integrated MBA-BoS Minutes of Meeting held on 12/03/2026 Reg...

1 message

Gopi Chandra Valluru <gopivalluru18@gmail.com> Sat, Mar 14, 2026 at 10:05 AM
To: SRK MBA <mbaatsrk@gmail.com>
Cc: "Dr. B. Hari Babu" <bathinihari@gmail.com>, Dr Sreenivasa Rao R <rsrmba.crr@gmail.com>, "Prof. Darapureddy Suryachandra Rao" <profdsrao@gmail.com>, agamana raju <agamenelevators@gmail.com>

Dear all,

Please find this as my formal approval for the Minutes of the Integrated MBA-BoS Meeting conducted on March 12, 2026.

Thanks & Regards

Gopi Chandra Valluru

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SRK INSTITUTE OF TECHNOLOGY, Enikepadu, Vijayawada 521108
Approved by AICTE, An Autonomous Institution, Affiliated to JNTUK, Kakinada,
ISO 9001:2015 Certified Institution, Accredited with NAAC "A" Grade
DEPARTMENT OF BUSINESS ADMINISTRATION

COURSE STRUCTURE (SRK25)
INTEGRATED MBA III Semester

S.No.	Course Code	Course Title	L	T	P	Credit
1	CC	Business Laws	4	0	0	4
2	CC	Fundamentals of E-Commerce	4	0	0	4
3	CC	Business Environment	4	0	0	4
4	CC	Operations Management	4	0	0	4
5	MDE	Business Ethics	2	1	0	2
6	SEC	Management Information system (MIS)	1	1	0	1
7	VAC	Information Technology–Lab (*Spread sheet and Tally*)	0	0	4	1
					TOTAL	**20**

INTEGRATED MBA IV Semester

S.No.	Course Code	Course Title	L	T	P	Credit
1	CC	Human Resource Management	4	0	0	4
2	CC	Research Methodology	4	0	0	4
3	CC	Operations Research	4	0	0	4
4	CC	Cross culture Management	4	0	0	4
5	VAC	Public Health Management	1	0	0	1
6	SEC	Entrepreneurship Development	2	1	0	2
7	SEC	*Design of New Start–up (Mini Project)*	0	1	3	1
					TOTAL	**20**

**Performed during the year break, Evaluated during V Sem (Internal Evaluation)*

Integrated MBA III Semester

L	T	P	C
4	0	0	4

BUSINESS LAW

Course Objectives:

- To familiarize students with the fundamental principles and provisions of the Indian Contract Act applicable to business situations.
- To provide knowledge of the Negotiable Instruments Act and Partnership Act relevant to business operations in India.
- To develop an understanding of the legal framework governing companies under the Companies Act, 2013.
- To explain the essentials, execution, and legal implications of contracts under the Sale of Goods Act.
- To create awareness about the Right to Information Act and Consumer Protection Act for responsible business practices.

Course Outcomes:

CO1: Understand and apply the principles of contract law in analysing business agreements and contractual obligations.

CO2: Interpret the provisions of the Negotiable Instruments Act and Partnership Act in practical business contexts**.**

CO3: Explain the legal structure, functioning, and regulatory requirements of companies under the Companies Act, 2013.

CO4: Analyze sale of goods contracts and apply legal rules relating to transfer of property, warranties, and rights of unpaid sellers.

CO5: Demonstrate awareness of consumer rights and information transparency through the application of RTI Act and Consumer Protection Act.

UNIT-I: LAW OF CONTRACT

Definition, Essentials of valid contract, Kinds of contract, Offer, Acceptance, consideration. Capacity of Parties to contract, Free Consent, Discharge of Contract, Breach of Contract and Remedies for Breach. Special Contracts, Indemnity, Guarantee, Bailment.

UNIT-II: NEGOTIABLE INSTRUMENTS ACT 1881

Nature and characteristics of Negotiable Instruments, Kinds of Negotiable Instruments- Promissory Notes, Bills of Exchange and Cheques. Partnership Act, 1932- Definition, Essentials of Partnership, Kinds of Partners, Rights and Liabilities of Partners. Dissolution of Partnership Firm.

UNIT–III: COMPANIES ACT, 2013

Definition of Company, Types of Companies. Memorandum of Association, Articles of Association, prospectus, Meetings and Resolutions. Doctrine of Ultra Vires, Doctrine of Constructive Notice, Modes of Winding up of a Company.

UNIT–IV: SALE OF GOODS ACT

Meaning and definition, Essentials of Sale Contract, Sale and Agreement to Sell. Rules of transfer of property- conditions and warranties. Unpaid Seller-Rights of Unpaid Seller. Sale by Non-Owners, Auction Sale.

UNIT–V: RIGHT TO INFORMATION ACT & CONSUMER PROTECTION ACT

Right to Information Act- Overview of the Act, The Consumer Protection Act 2019, Consumer Councils, Consumer Redressal Agencies- District Consumer Disputes Redressal Commission **,** State Consumer Disputes Redressal Commission National Consumer Disputes Redressal Commission, Penalties for violation.

Reference Books:

1. P. C. Tulsian, Bharat Tulsian, Business Law, McGraw Hill Education.
2. N.D.Kapoor,ElementsofBusinessLaw,SultanChandPublication, Company.
3. Dr S. N. Maheshwari & Dr S. K. Maheshwari, Business Law, Himalaya Publishing House.
4. M. C. Kuchhal and Vivek Kuchhal, Business Law, Sultan Chand & Sons (P) Ltd. India.
5. Satyanarayana.,Corporate BusinessLaw,DiscoveryPublishingHousePvt.Ltd.,

Integrated MBA III Semester

L	T	P	C
4	0	0	4

FUNDAMENTALS OF E-COMMERCE

Course Objectives:

1. To introduce students to the concepts, scope, and framework of e-commerce and its role in modern business.
2. To familiarize students with consumer-oriented and business-to-business e-commerce models and applications.
3. To provide knowledge of electronic data interchange, electronic payment systems, and the digital economy.
4. To develop an understanding of security issues, threats, and protection mechanisms in e-commerce systems.
5. To create awareness about ethical, legal, social, and governance issues related to e-commerce.

Course Outcomes:

CO1: Understand the fundamentals, architecture, and applications of e-commerce in the digital business environment.
CO2: Analyze consumer-oriented and business-to-business e-commerce models and e-services.
CO3: Explain electronic data interchange, electronic payment systems, and methods of online transactions.
CO4: Identify security threats in e-commerce and apply appropriate network and information security measures.
CO5: Evaluate ethical, legal, privacy, and intellectual property issues associated with e-commerce operations.

Unit 1: Introduction: Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

Unit 2: Consumer Oriented E Commerce -E-Retailing: Traditional retailing and e-retailing, Benefits of e-retailing, Key success factors, Models of E- retailing, Features of e-retailing. E services: Categories of e-services, Web-enabled services, match making services, Information-selling on the web, e-entertainment, Auctions and other specialized services. Business to Business Electronic Commerce

Unit3: Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

Unit 4: Security in E Commerce: Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server

Unit 5: Issues in E Commerce: Understanding Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles Privacy and Information Rights: Information collected at E-Commerce Websites, The Concept of Privacy, Legal protections Intellectual Property Rights: Types of Intellectual Property protection, Governance

SuggestedReading:

1. Elias.M.Awad,"ElectronicCommerce",Prentice-HallofIndiaPvtLtd.
2. Ravi Kalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. EfraimTurban,JaeLee,DavidKing,H. MichaelChung,—ElectronicCommerce–A Managerial Perspective", Addison-Wesley.
4. EliasMAward,—ElectronicCommercefromVisiontoFulfilment‖,3rdEditio n,PHI, JudyStrauss,AdelEl-Ansary,RaymondFrost,—E-Marketing‖,3RDEdition,Pearson Education.

INTEGRATED MBA III SEMESTER

BUSINESS ENVIRONMENT

L	T	P	C
4	0	0	4

Course objectives:

- To enable the students to develop an understanding on Indian Business Environment and various factors impacting the business.
- To help them make effective decisions based on analysis of business environment.
- To develop an understanding of the MSME sector and challenges there in.
- To familiarize the students with international trade and issues related to Balance of Payments.
- To comprehend the role of International institutions in the growth of international business.

Course Outcomes:

CO1: Understand the concept, nature, and significance of business environment and analyze the salient features of the Indian economy.

CO2: Examine the impact of political, legal, and economic environments on business with reference to government policies and economic reforms.

CO3: Analyze the role, development, and challenges of MSMEs and evaluate government initiatives for MSME growth.

CO4: Understand the concept and components of Balance of Payments and assess measures for correcting BOP disequilibrium.

CO5: Explain the international business environment and evaluate the role of global institutions and FDI in India's economic development.

UNIT-I:INTRODUCTION

Business Environment- Concept, Significance and Nature of Business Environment; Elements of Environment- Internal and External. Salient features of Indian Economy, evolution in the recent years.

UNIT-II: POLITICAL, LEGAL AND ECONOMIC ENVIRONMENT OF BUSINESS

Elements of Political Environment, Role of Government in Business facilitation. Competition Act _FEMA, Licensing Policies. Elements of Economic Environment, Economic systems. Industrial Policy 1991, Economic Reforms. Planning Commission Vs NITI Aayog.

UNIT-III:MANGEMENT OF MICRO, SMALL & MEDIUM ENTERPRISE(MSME)

Concepts and Definitions of MSME, The MSME Development Act, 2006. Government Policy Initiative, Current Schemes for MSME development. Problems faced by MSME Sector. Role of Clusters in Promoting MSME.

UNIT–IV: BALANCE OF PAYMENTS

International Trade, Components of BOP, Disequilibrium in BOP, Reasons for disequilibrium. Measures to bring back equilibrium in BOP –trade regulation, Exchange Control, Convertibility of Currency, Current Account and Capital Account convertibility.

UNIT–V: INTERNATIONAL BUSINESS ENVIRONMENT

International economic institutions-Significance, Evolution and Functions – International Monetary Fund, World Trade Organization, World Bank, BRICS and EU Objectives and Evolution of GATT, Uruguay Round. Foreign Direct Investment-Need for FDI in Developing Countries, Role of FDI in India.

Reference Books:

1. Francis Cherunilam, Business Environment-Himalaya Publishing House.
2. Aswathappa,Essentials of Business Environment,Himalaya Publishing House.
3. Mishra and Puri,Indian Economy, Himalaya Publishing House.
4. Raj Aggarwal, Business Environment,Excel Books.

Integrated MBA III Semester

OPERATIONS MANAGEMENT

L	T	P	C
4	0	0	4

Course Objectives:

1. Provide fundamental knowledge of **Operations Management concepts**, functions, and its role in business organizations.
2. Familiarize students with **production systems, product design, process selection**, and facility planning.
3. Develop understanding of **forecasting, capacity planning, inventory, supply chain, and scheduling techniques**.
4. Enhance analytical skills related to **productivity improvement, work study, and job design**.
5. Create awareness of **quality management practices**, including TQM, ISO standards, and statistical quality control.

Course Outcomes:

CO1: Understand the nature, scope, and importance of Operations Management and its integration with other functional areas.

CO2: Analyze and apply concepts of product design, process selection, facility location, layout, and work measurement.

CO3: Apply forecasting techniques, capacity planning, MRP, inventory, and supply chain management concepts for operational decision-making.

CO4: Evaluate productivity factors and implement work study and job design methods to improve operational efficiency**.**

CO5: Understand and apply quality management tools and techniques such as SQC, TQM, Kaizen, ISO standards, and control charts.

UNIT-I:

Introduction to Operation Management: Nature & Scope of Operation / Production Management, Relationship with other functional areas, Recent trend in Operation Management, Manufacturing & Theory of Constraint, Types of Production System, Just in Time (JIT) & lean system.

UNIT-II:

Product Design & Process Selection: Stages in Product Design process, Value Analysis, Facility location & Layout: Types, Characteristics, Advantages and Disadvantages, Work measurement, Job design.

UNIT-III:

Forecasting & Capacity Planning: Methods of Forecasting, Overview of Operation Planning, Aggregate Production Planning, Production strategies, Capacity Requirement Planning, MRP, Scheduling, Supply Chain Management, Purchase Management, Inventory Management.

UNIT-IV:

Productivity: Factors, Affecting Productivity – Job Design – Process Flow Charts – Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT-V:

Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), ISO (9000 &14000 Series), Statistical Quality Control: Variable & Attribute, Process Control, Control Charts - Total Quality Management (TQM).

References:

1. Krajewski & Ritzman (2004).OperationManagement-StrategyandAnalysis. Prentice Hall of India.
2. PannerSelvem,ProductionandOperationManagement,PrenticeHallofIndia.
3. Chunnawals, Production & Operation Management Himalaya, Mumbai
4. K. Aswathappa & Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.
5. Satyanarayana(2020),ProductionandOperationManagement - DiscoveryPublishing House Pvt. Ltd., New Delhi
6. Charry,S.N(2005).ProductionandOperationManagement-Concepts,Methods Strategy. John Willy & Sons Asia Pvt Limited.
7. K. Aswathappa & Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.
8. Satyanarayana(2020),ProductionandOperationManagement - DiscoveryPublishing House Pvt. Ltd., New Delhi

Integrated MBA III Semester

L	T	P	C
2	1	0	2

BUSINESS ETHICS

Course Objectives:

- To introduce students to the concepts, nature, scope, and importance of ethics and moral standards in business.
- To develop an understanding of ethical corporate behavior, leadership, and values drawn from Indian and global perspectives.
- To enhance ethical decision-making skills and the ability to handle ethical dilemmas in organizations.
- To familiarize students with ethics in functional areas such as marketing, finance, HR, IT, and corporate governance.
- To create awareness about environmental ethics, gender issues, corruption, and trans-cultural human values in management.

Course Outcomes:

CO1: Understand the fundamental concepts of ethics, values, and moral decision-making in business organizations.
CO2: Analyze ethical corporate behavior and leadership practices with reference to Indian ethos and global perspectives.
CO3: Apply ethical frameworks to resolve ethical dilemmas and evaluate social responsibility and corporate governance practices.
CO4: Examine ethical issues in functional areas of management and adopt a holistic approach in managerial decision-making.
CO5: Assess contemporary ethical challenges such as environmental ethics, gender issues, corruption, and human values in management.

Unit I: Ethics and Business Ethics, Concepts Values and Ethics. Nature, scope and purpose of ethics, Importance of Ethics & Moral standards; Ethics & Moral Decision Making, Ethical Principles in Business

Unit-II: Ethical Corporate Behavior, Its Development, Ethical, Leadership. Ethics and Business Personal Growth and Lessons from Ancient Indian Educational System; Science and Human Values, System: Markets, Environment, Trade, Consumer Production and Marketing, Finance, HR

Unit III: Ethical Decision-making, Ethical Dilemmas in Organization, Social Responsibility of Business and Corporate Governance. Indian Ethos: Need, Purpose & Relevance Indian Ethos, Salient feature (Brain Stilling, Total Quality Mind, Intuition, Intellectual rational brain V/s Holistic-Spiritual Brain)

Unit IV: Ethic in Functional Area, Marketing, Finance, Human Resource and Information Technology. Holistic Approach for Managers in Decision Making, Professional ethos and

code of professional ethics.

Unit V: Environmental Ethics, Corruption and Gender Issues—Gender Ethics, Sexual Harassment and Discrimination. Trans-Cultural Human Values in Management Education; Psychological and Aesthetic Values, work, ethics, secular and spiritual, value.

Recommended Books:

1. S.S. Iyer –Managing for Value (New Age InternationalPublishers,2002)
2. Laura P Hartman Abha Chatterjee-Business Ethics (Tata McGraw Hill,2007)
3. S. K. Bhatia-Business Ethics and Managerial Values (Deep & Deep Publications Pvt. Ltd, 2000)
4. Velasquez–Business Ethics–Concepts and Cases (PrenticeHall,6thEd.)
5. Reed Darryl–Corporate Governance, Economic Reforms &Development (Oxford).
6. Mathur UC–Corporate Governance &Business Ethics (Mc Millan).
7. Human Values By: Prof. A.N. Tripathi New Age International
8. Wisdom Leadership By: Prof. S.K. Chakraborthy Wheeler Publication.
9. Corporate Governance2/e, Mac Mallin, OUP
10. The Management and ethics Omnibus-Chakraborty, OUP
11. Values and Ethics for Organizations, Chakraborty, OUP/OIP

Integrated MBA III SEMISTER

L	T	P	C
1	1	0	1

MANAGEMENT INFORMATION SYSTEM

Course Objectives:

1. To introduce the concepts, importance, and applications of Management Information Systems in business organizations.
2. To provide an understanding of MIS planning, development, implementation, and control processes.
3. To familiarize students with data processing systems, computer-based information systems, and system software.
4. To develop knowledge of managerial decision-making and the role of Decision Support Systems.
5. To impart skills related to system design, database management, and information security.

Course Outcomes:

CO1: Explain the concepts, structure, and role of MIS in supporting managerial functions and organizational processes.

CO2: Analyze the planning, implementation, and control of MIS in business organizations.

CO3: Understand data processing methods and the transition from manual to computer-based information systems.

CO4: Apply MIS tools and Decision Support Systems to support managerial decision-making.

CO5: Design basic information systems with appropriate input/output, database, control, and security features**.**

Unit I

Fundamentals of Data Processing, Computer Operation of Manual Information System, Components of Computer Systems, Flow Chart, Conversion of Manual to Computer Based Systems, Computer Systems Software, Application Software, Tele communication Modem.

Unit-II

The meaning and use MIS, System View of Business, Process of MIS, Development of MIS within the organization, Management Process, Information Needs, System Approach in Planning Organizing and Controlling MIS.

Unit-III

SDLC Life cycle Planning, Implementation and Controlling of Management Information System.

Unit-IV

System Design: System design consideration, input/output design, forms design, file organization and database, data management, file design, program design, control and security.

Unit-V

Managerial Decision Making, characteristics and components of Decision Support System.

Reference Books:

1. Kenneth C Laudon and Jane P.Laudon, et al: Management Information Systems, 9/e,Pearson Education, 2005.
2. Steven Alter: Information Systems, Pearson, 3/e, 2002.
3. Gordon B. Davis & Margrethe H.Olson: Management Information Systems, TMH, 2002.
4. W S Jawadekar: Management Information Systems, 2/e, TMH, New Delhi, 2002.
5. James A. Obrein: Management Information Systems, TMH, 10/e, 2004.Gerald V.Post, David L Anderson: Management Information Systems, Irvin McGraw Hill,2003.

Integrated MBA III SEMISTER

L	T	P	C
1	1	0	1

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The meaning and use MIS, System View of Business, Process of MIS, Development of MIS within the organization, Management Process, Information Needs, System Approach in Planning Organizing and Controlling MIS.

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4. W S Jawadekar: Management Information Systems, 2/e, TMH, New Delhi, 2002.
5. James A. Obrein: Management Information Systems, TMH, 10/e, 2004.Gerald V.Post, David L Anderson: Management Information Systems, Irvin McGraw Hill,2003.

Integrated MBA III SEMISTER

L	T	P	C
0	0	4	1

INFORMATION TECHNOLOGY–LAB
(SPREADSHEET AND TALLY)

Lab Evaluation:

i) For practical (LAB) subject the distribution shall be **20 marks** for internal evaluation and **30 marks** for the semester end examinations. There shall be continuous evaluation by the internal subject teacher during the semester for **20** internal marks. Out of the **20 marks internal, 10** marks shall be for day-to-day performance (**5 marks for day-to-day evaluation and 5 marks for Record**) and**10 marks** shall be evaluated by conducting an internal test towards the end of semester.

ii) Semester End examination shall be conducted by the teacher concerned and external examiner for **30 marks. Three QUESTIONS will be given in the external examination from the experiments based on the syllabus. Each question carries 10 marks. Duration of the examination is 90 minutes.**

UNIT-1

Introducing spreadsheet: Choosing the correct tool; Creating and Saving; Spreadsheet workspace; Managing the workspace; Entering and editing data; Data entry; Selecting cells; Saving time when entering data. Presenting a spreadsheet; Number and date/time format tools; Percentages; Dates and Times; Currency; Text; Performing calculations; Basic arithmetic; Using functions; Replicating formulae; Absolute cell addressing; References between worksheets.

UNIT-II

Ranges and functions: Creating named ranges; Using named ranges; Finding and inserting functions; Excel – Functions: what if, Conditional count, sum and average, Multiple criteria with count, sum and if. Time and date calculations.

UNIT-III

Basic of Accounting: Type of Accounts, Rules of Accounting, Principles of concepts and conventions, double entry system, book keeping Mode of Accounting, Financial Statements, Transaction, Recording Transactions. Getting the functional with Tally, Creation and setting up of company in Tally.

UNIT-IV

Accounting Masters in Tally- Features-Configurations-Setting up Account Heads.

UNIT-V

Inventory in Tally-Stock–groups–Stock Categories-Godowns/Location Units of Measure - Stock Items - Creating Inventor y Masters for National Traders.

Reference Books

1. Microsoft Excel 2019 Step by Step by Joan Lambert is published by Microsoft Press
2. Excel 2019 Bible by Michael Alexander and Richard Kusleika is published by Wiley
3. Financial Accounting by T. S. Grewal is published by S. Chand & Company Ltd.
4. Computerized Accounting Using Tally by A. K. Nadhani and K. K. Nadhani
5. Basic Accounting and Inventory using Tally Prime by Tax Sarthi is published by Notion Press

INTEGRATED MBA IV Semester

L	T	P	C
4	0	0	4

HUMAN RESOURCE MANAGEMENT

Course Objectives:

1. To understand the nature, scope, and significance of human resource management and the role of HR executives.
2. To provide knowledge of human resource planning, job analysis, recruitment, and selection processes.
3. To familiarize students with training, development, and executive development methods.
4. To develop an understanding of performance appraisal, job evaluation, and compensation management.
5. To create awareness of industrial relations, grievance handling, and collective bargaining practices.

Course Outcomes:

CO1: Explain the concepts, functions, and strategic role of human resource management in organizations.

CO2: Apply human resource planning, recruitment, and selection techniques in organizational contexts.

CO3: Design and evaluate training and development programmes to enhance employee and executive performance.

CO4: Analyze performance appraisal systems, job evaluation methods, and compensation structures.

CO5: Examine industrial relations issues and apply grievance redressal and collective bargaining mechanisms.

UNIT-1: INTRODUCTION

Human Resource Management –Nature, Significance and Scope. Functions of HRM, Role of HR Manager, Advisory and service function to other departments. Changing role of HRM, Contribution to Company's objectives and policies, organizing the HRM Department.

UNIT-II: PROCUREMENT AND DEVELOPMENT FUNCTIONS

Human Resource Planning, Job Analysis, Job description, job specification. Recruitment- Sources of recruitment, process of recruitment, Selection- stages in selection process, techniques of Selection. Placement and induction of new candidates, socialization process.

UNIT-III: TRAINING AND DEVELOPMENT

Significance and scope of Training, Designing of a Training Program, Steps in Training. Methods of Training- On the Job and Off the Job techniques. Evaluation of Training effectiveness. Executive Development-Concept, significance, Training Vs Development. Techniques of Executive Development.

UNIT-IV: PERFORMANCE APPRAISAL AND COMPENSATION

Performance Appraisal- Importance of Performance Appraisal, Process of Performance Appraisal. Methods of Performance Appraisal- Traditional and modern techniques. Job Evaluation-Significance of Job Evaluation, Process of Job Evaluation. Methods of Job Evaluation, Role of Job Evaluation in wage fixation. Compensation- Introduction to Compensation Management, Objectives of Compensation, Components of Compensation.

UNIT-V: INDUSTRIAL RELATIONS

Industrial Relations -Definition, Significance, Objectives of Industrial Relations. Industrial Disputes- Types of Industrial Disputes. Grievance Redressal Procedure. Collective Bargaining- Objectives of Collective bargaining, Process of Collective bargaining, types of Collective bargaining.

Reference Books:

1. A Textbook of Human Resource Management–C.B. Mammoria &S.V. Ghankar. -Himalaya Publishing House.
2. Personnel and Human Resource Management-Text & Cases, P Subba Rao, Himalaya Publishing House.
3. Human Resource Management–P. Jyothi, Oxford University Press.
4. Human Resource Management, R. Wayne Mondy, Robert M, Noe, Pearson Education.

INTEGRATED MBA IV Semester

RESEARCH METHODOLOGY

L	T	P	C
4	0	0	4

Course Objectives:

1. Provide students with a conceptual understanding of research and its role in business decision-making.
2. Familiarize learners with different types of research, research processes, and ethical issues.
3. Develop skills in data collection, sampling techniques, measurement, and scaling methods.
4. Enable students to apply statistical tools and hypothesis testing techniques in research analysis.
5. Train students in research report writing and presentation of findings.

Course Outcomes:

CO1: Explain the nature, importance, and types of business and social research and identify research problems.
CO2: Apply appropriate data collection methods, sampling designs, and questionnaire techniques.
CO3: Analyze research data using survey methods, tabulation, and graphical presentation techniques.
CO4: Formulate hypotheses and apply statistical tests such as t-test and chi-square test for decision-making.
CO5: Prepare and present a systematic research report following standard research methodology practices.

UNIT-I

Introduction: Nature and Importance of Research, The role of Business Research, Aims of social research, Types of Research- Pure research vs. Applied research, Qualitative research vs. Quantitative research, Exploratory research, Descriptive research and Experimental research, ethical issues in business research- Defining Research Problem, Steps in Research process.

UNIT-II

Data Base: primary data and secondary data, tools and techniques of collecting data. Methods of collecting data. Sampling design and sampling procedures. Random vs. Non- random sampling techniques, determination of sample size and an appropriate sampling design. Designing of Questionnaire –Measurement and Scaling – Nominal Scale – Ordinal Scale – Interval Scale – Ratio Scale – Guttmann Scale – Likert Scale – Schematic Differential Scale.

UNIT-III

Survey Research and data analysis: Selection of an appropriate survey research design, the nature of field work and Field work management. Media used to communicate with Respondents, Personal Interviews, Telephone interviews, Self- administered Questionnaires- Editing – Coding – Classification of Data – Tables and Graphic Presentation –Preparation and Presentation of Research Report.

UNIT-IV

Formulation of Hypothesis –Tests of Hypothesis - Introduction to Null hypothesis vs. alternative hypothesis, parametric vs. non-parametric tests, procedure for testing of hypothesis, tests of significance for small samples, application, t-test, Chi Square test.

UNIT-V

Report Writing: Process- type of reports - foundational elements of research, including research design, data collection and analysis, and the structure and components of a research report.

References:

1. C. R. Kothari: Research Methodology, methods and Techniques New Age International Publisher.
2. Navdeep and Gupta **Statistical Techniques & Research Methodology,** Kalyan Publishers.
3. William G. Zikmund, Adhkari**: Business Research Methods**, Learning New Delhi, 2013.
4. A.N.Sadhu,Amarjitsingh,Researchmethodologyinsocialsciences,7th Edition Himalaya Publications.
5. A Bhujanga rao, Research methodology, ExcelBooks,2008.

INTEGRATED MBA IV Semester

OPERATIONS RESEARCH

L	T	P	C
4	0	0	4

Course Objectives:

1. Introduce students to the importance, scope, and applications of Operations Research (OR) in managerial decision-making.
2. Enable students to formulate and solve linear programming problems using graphical and simplex methods.
3. Provide knowledge of transportation, assignment, sequencing, and replacement models for optimizing resources.
4. Develop understanding of game theory, simulation, inventory, and waiting line models for strategic and operational analysis.
5. Familiarize students with network techniques (CPM & PERT) for effective project planning, scheduling, and control.

Course Outcomes:

CO1: Understand the concepts, features, scope, and role of Operations Research in business and management decision-making.
CO2: Formulate and solve linear programming problems using graphical, simplex, and Big-M methods.
CO3: Apply transportation, assignment, sequencing, and replacement models to optimize operational efficiency.
CO4: Analyze game theory problems, simulation models, inventory systems, and waiting line models for competitive and service environments.
CO5: Use CPM and PERT techniques to plan projects, identify critical paths, and determine optimal time–cost trade-offs.

Unit–I:
Importance-The History of OR- Definition-Features-Scope of Operations Research –Linear Programming: Introduction-Advantages of using LP-Application areas of LP- Formation of mathematical modelling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements In the Simplex Tableau, Artificial variable techniques: Big M method.

UNIT II:
Transportation, Assignment Models: Definition and application of the transportation model, methods for finding initial solution- tests for optimality-variations in transportation problem, the Assignment Model, Travelling Salesman Problem.

UNIT – III: Replacement Models **-** Replacement models comprising single replacement and group replacement.

UNIT – IV:

Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT–V:

CPM and PERT: Drawing networks – identifying critical path – probability of completing the project within given time-optimum cost and optimum duration.

References:

1. Winston, Operations Research, Cengage, ND
2. AnandSharma,OperationsResearch,HimalayaPublishingHouse,3.Kalava rthy,S. Operations Research, Vikas Publishers House Pvt Ltd.,
4. Mcleavey&Mojena,PrinciplesofOperationsResearchforManagement, AITBS publishers,
5. V. K. Kapoor, Operation Research Techniques for Management, Sultan Chand & Sons,
6. Richard Bronson & Govindasami Naadimuthu, SCHAUM_SOUTLINE OF THE STORY &

PROBLEMS OF Operations Research, 2ndEd.,Tata McGraw-Hill Edition,

7. JK Sharma Operation Research – Theory and Applications, MacMillan.

INTEGRATED MBA IV Semester

L	T	P	C
4	0	0	4

CROSS CULTURAL MANAGEMENT

Course Objectives:

- To develop an understanding of the concept of culture and its relevance in the business and organizational context.
- To enhance the ability of students to analyze cultural differences affecting global business and management practices.
- To familiarize students with cross-cultural communication, negotiation, and decision-making processes.
- To impart knowledge on global human resource management practices including staffing, training, motivation, and retention.
- To enable students to understand, diagnose, and manage corporate culture and implement culture change strategies in organizations.

Course Outcomes:

CO1: Understand and analyze the role of culture in shaping business behavior and organizational effectiveness in a global context.
CO2: Examine cross-cultural communication processes and apply appropriate strategies for managing multicultural teams.
CO3: Analyze cross-cultural negotiation and decision-making practices and align organizational strategy with structure and culture.
CO4: Apply global human resource management concepts for staffing, training, motivation, leadership, and retention in international organizations.
CO5: Diagnose corporate culture and design effective culture change strategies for achieving high organizational performance.

Unit–I

Introduction – Concept of Culture for a Business Context; Brief wrap up of organizational culture & its dimensions; Cultural Background of business stakeholders [managers, employees, shareholders, suppliers, customers and others] – An Analytical framework.

Unit–II

Culture and Global Management – Global Business Scenario and Role of Culture. Framework for Analysis; Elements & Processes of Communication across Cultures; Communication Strategy for / of an Indian MNC and Foreign MNC & High-Performance Winning Teams and Cultures; Culture Implications for Team Building.

Unit–III

Cross Culture – Negotiation & Decision Making – Process of Negotiation and Needed Skills & Knowledge Base – Overview with two illustrations from multicultural contexts [India – Europe/ India – US settings, for instance]; International and Global Business Operations- Strategy Formulation & Implementation; Aligning Strategy, Structure & Culture in an organizational Context.

Unit–IV

Global Human Resources Management – Staffing and Training for Global Operations – Expatriate – Developing a Global Management Cadre. Motivating and Leading; Developing the values and behaviours necessary to build high-performance organization personnel [individuals and teams included] – Retention strategies.

Unit–V

Corporate Culture – The Nature of Organizational Cultures Diagnosing the As is Condition; Conflicts and cultural differences- Designing the Strategy for a Culture Change Building; Successful Implementation of Culture Change Phase; Measurement of ongoing Improvement.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Cash by Franklin, Revitalize your corporate culture: PHI, Delhi
2. Deresky Helen, International Management: Managing Across Borders and Cultures, PHI, Delhi
3. EsennDrlarry, Rchildress John, The Secret of a Winning Culture: PHI, Delhi

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INTEGRATED MBA IV Semester

PUBLIC HEALTH MANAGEMENT

Course Objective:

1. Introduce students to the fundamentals and scope of public health management.
2. Develop understanding of environmental and social determinants of health.
3. Provide knowledge of health policies, healthcare systems, and management practices.
4. Create awareness about communicable and non-communicable diseases and their management.
5. Enable students to understand health promotion, education, and preventive strategies.

Course Outcomes:

CO1: Explain the concepts and importance of environmental health sciences in public health.

CO2: Describe the structure, policies, and management practices of healthcare systems.

CO3: Analyze the role of social and behavioral factors in influencing health outcomes.

CO4: Distinguish between communicable and non-communicable diseases and their public health implications.

CO5: Apply principles of health promotion and education to improve community health and wellbeing.

Unit I:
Environmental Health Sciences: Focuses on understanding and preventing environmental health hazards.

Unit II: Health Policy and Management: Covers health policy development, health care systems, and management principles.

Unit III: Social and Behavioral Sciences: Explores the social and behavioral factors influencing health outcomes.

Unit IV: Communicable and Non-Communicable Diseases: In-depth study of infectious and chronic diseases.

Unit V: Health Promotion and Education: Strategies to promote healthy behaviors and lifestyles.

Reference Books:

1. **"**Essentials of Environmental Health**"** — *Robert H. Friis*
2. "Public Health Administration and Management" **Author:** *S. V. S. Rao*
3. "Health Behavior: Theory, Research, and Practice" **Authors:** Kimberly A. Glanz, Barbara K. Rimer & K. Viswanath

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INTEGRATED MBA IV Semester

L	T	P	C
2	1	0	2

ENTREPRENEURSHIP DEVELOPMENT

Course Objectives:

1. To introduce students to the concept, evolution, and role of entrepreneurship in economic development.
2. To help students identify entrepreneurial opportunities and develop creativity, design thinking, and problem-solving skills.
3. To enable students to transform business ideas into viable business models and business plans.
4. To familiarize students with venture creation processes, government support systems, and institutional frameworks for entrepreneurship.
5. To provide knowledge of innovation management, growth strategies, and intellectual property rights for sustainable entrepreneurial success.

Course Outcomes:

CO1: Understand the concept of entrepreneurship and analyze the role of entrepreneurs in economic and social development.

CO2: Develop an entrepreneurial mindset with skills such as creativity, opportunity recognition, risk-taking, and decision-making.

CO3: Design and evaluate business models and business plans using feasibility and competitive analysis techniques.

CO4: Apply knowledge of venture development, government initiatives, and institutional support for starting and managing enterprises.

CO5: Analyze innovation management practices and apply growth, renewal, and intellectual property strategies in entrepreneurial ventures.

UNIT– I

Entrepreneurship Introduction: Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, Theories of entrepreneurship; Classification of entrepreneurship - Entrepreneur: the skills / traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis.

UNIT– II

Entrepreneurial Plan: **Idea Generation**: - Sources of business ideas -Opportunity recognition. - **Idea Evaluation: -** Design thinking for finding solutions, prototyping, idea evaluation, entrepreneurial Outlook, value proposition design, customer insight, ideas development, capstone project presentation. - **Feasibility Analysis: -** Product/Service Feasibility Analysis, Industry & competition analysis, environment analysis, financial feasibility analysis- Understanding legal requirements, and compliance issues

UNIT– III

Development Processes: Translate Business Model into a Business Plan, Visioning for venture- Startup, Standup programs, other Government initiative programs for Women entrepreneur and Rural entrepreneur - Institutional support for new ventures - Supporting organizations- Govt. Incentives and facilities, Financial Institutions support- Small-scale Industries, Govt. Policies for SSIs- Role of SIDBI in Project Management- E-cell

UNIT – IV

Operation problems: Incubation and Take-off, Problems encountered Structural, Financial and Managerial Problems -Business Licenses, business permits- creating scalability- understanding of market size- Managing start-up finance, Types of Uncertainty- Sick industries- Anti dumping – Foreign Market-Reasons for Sickness, Remedies for Sickness- Role of BIFR in revival, Bank Syndications.

UNIT – V

Introduction to Innovation management, Managing Innovation within Firms, Business strategy & organization Knowledge, New Product Strategy & Managing New Product Development, Role of Technology in Management of innovation, Managing for Intellectual Property Right.

References:

1) Robert D Hisrich &Michael P Peters(2023)Entrepreneurship–Mc Graw Hill
2) NinaJacob,-CreativityinOrganisations(Wheeler,1998)
3) Jonne & Ceserani- Innovation &Creativity (Crest)2001.
4) BridgeSetal-UnderstandingEnterprise:Entrepreneurshipand SmallBusiness (Palgrave,2003)
5) Holt-Entrepreneurship: New Venture Creation(Prentice-Hall)1998.
6) Singh P & Bhanderkar A-Winning the Corporate Olympiad: The Renaissan cearadigm (Vikas)
7) Dollinger MJ- Entrepreneurship (Prentice-Hall, 1999).
8) Tushman, M. L. & Lawrence, P.R.(1997)-Managing Strategic Innovation & Change Oxford.
9) Jones T. (2003)-Innovating at the Edge: How Organizations Evolve andEmbedInnovationCapability. Butter work Heinemann, U. K.
10) Satyanarayana (2018) Entrepreneurship Management- Discovery Publishing House Pvt. Ltd., New Delhi

INTEGRATED MBA IV Semester

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Design of New Start–up/industry oriented Mini project/internship

Course Objectives:

- Foster creativity, problem-solving, and entrepreneurial thinking for innovative solutions or start-up ideas.
- Provide practical exposure to industry practices, tools ,and technologies through projects or internships.

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INTEGRATED MBA COURSE STRUCTURE (SRK23)
VII-SEMESTER

Code	Subject Code	Credits	Max. Marks
23IM701	Knowledge Management	4	100
23IM702	Strategic Cost Management	4	100
ELECTIVES			
HR			
23IMEH703	HR Planning	4	100
23IMEH704	Leadership Management	4	100
23IMEH705	Compensation and Reward Management	4	100
FINANCE			
23IMEF703	Security Analysis	4	100
23IMEF704	Banking and Insurance Management	4	100
23IMEF705	Behavioral Finance	4	100
MARKETING			
23IMEM703	Consumer Behavior	4	100
23IMEM704	Rural Marketing	4	100
23IMEM705	Retail Management	4	100
SYSTEMS			
23IMES703	Data science using R	4	100
23IMES704	Internet of Things	4	100
23IMES705	Web Designing (Full Stack)	4	100
Total		**20**	**500**

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DEPARTMENT OF BUSINESS ADMINISTRATION

INTEGRATED MBA COURSE STRUCTURE (SRK23)
VIII-SEMESTER

Code	Subject Code	Credits	Max. Marks
23IM801	Total Quality Management	4	100
23IM802	Project Management	4	100
ELECTIVES			
HR			
23IMEH803	Human Resource Metrics and Analytics	4	100
23IMEH804	Strategic Human Resource Management	4	100
23IMEH805	Organizational Development & Change Management	4	100
FINANCE			
23IMEF803	Strategic Financial Management	4	100
23IMEF804	Portfolio Management	4	100
23IMEF805	Financial Markets and Services	4	100
MARKETING			
23IMEM803	Customer Relationship Management	4	100
23IMEM804	Marketing Research	4	100
23IMEM805	Services Marketing	4	100
SYSTEMS			
23IMES803	Managing Software Projects	4	100
23IMEF804	Business Intelligence	4	100
23IMEF805	SAP Modules(FICO/SD/HRM/MM/SCM)	4	100
Total		**20**	**500**

INTEGRATED MBA COURSE STRUCTURE (SRK23)
IX SEMESTER

Code	Subject Code	Credits	Max. Marks
23IM901	Intellectual Property Rights	4	100
23IM902	Corporate Governance	4	100
ELECTIVES			
HR			
23IMEH903	International HRM	4	100
23IMEH904	Labor Welfare & Legislation	4	100
23IMEH905	Management of Industrial Relations	4	100
FINANCE			
23IMEF903	International Financial Management	4	100
23IMEF904	Risk Management	4	100
23IMEF905	Taxation	4	100
MARKETING			
23IMEM903	Promotion and Distribution Management	4	100
23IMEM904	International Marketing Management	4	100
23IMEM905	Digital and Social Media Marketing	4	100
SYSTEMS			
23IMES903	Cyber laws & Security	4	100
23IMES904	Information Systems and Audit	4	100
23IMES905	Cloud Computing	4	100
Total		**20**	**500**

INTEGRATED MBA COURSE STRUCTURE (SRK23)
X- SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
23IM1001	Major Project Report (Plagiarism by Turnitin less than 40%)	6	150
23IM1002	MOOCS: SWAYAM / NPTEL / Management Course (12 WEEKS)	4	100
23IM1003	Project Seminar **	4	100
23IM1004	Viva – Voce	4	100
Total		**18**	**450**

***Mini Project Report**

The student should undergo survey based fieldwork under the guidance of Internal Faculty and submit the report before the completion of VI Semester End Examinations.

** **Project Seminar**

The Student should make a presentation before the Internal Faculty before finalizing theFinal Project

** **Exit Option:** Student can opt for exit after 3 years subjected to fulfillment of required creditsof 120 For the award of BBA degree

VII Semester	KNOWLEDGE MANAGEMENT	4	100

Course Objectives:

COB 1:	To familiarize with the knowledge management aspects.
COB 2:	To facilitate in understanding knowledge management systems and tools used in organizations.
COB 3:	Understand the pillars of knowledge management.
COB 4:	To help in understanding knowledge implementation strategies.
COB 5:	To help in understanding and identifying the impact of technology on knowledge management.

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Determine the meaning of knowledge management and its significance.
CO 2 :	Outline essentials of knowledge management.
CO 3 :	Correlate drivers in knowledge management.
CO 4 :	Determine knowledge management systems and tools.
CO 5 :	Focus on technologies and knowledge management.

UNIT- I:

Introduction to Knowledge Management -Definition- Scope and Significance Knowledge Management – Techniques and difficulties in Knowledge Management - Implementation of Knowledge Management-Knowledge Management and Knowledge Sharing – Knowledge Dynamics – Principles of Knowledge Management.

UNIT- II:

Essentials of Knowledge Management – Data- information- knowledge – Basic types of Knowledge – Knowledge Capital – classification of organizational Knowledge and Knowledge life cycle- organizational Knowledge processes – conversion of Knowledge Organizational Knowledge Management – Technology Enablers.

UNIT- III:

Drivers of Knowledge Management – Pillars of Knowledge Management - Knowledge based products – Inventory Management – Supply Chain Planning – Seven layers of Knowledge Management – Success factors of Knowledge Management Implementation.

UNIT- IV:

Knowledge Management Systems and Tools- Knowledge Mapping Techniques – Core issues of implementation – Methodology of implementation and Acquisition Tools- Knowledge Indexing and Processing – Knowledge analysis on-line Analytical Processing.

UNIT-V:

Technologies and Knowledge Management – Information Technology and Knowledge Management – E-Commerce and KM – Total Quality Management and KM – Benchmarking - Customer Relationship and Knowledge Management – Measuring Knowledge Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. RL Nandeshwar, Bala Krishna: Change and Knowledge Management, Excel Books, New Delhi.
2. Irma Becerra, Fernandez: Knowledge Management, Pearson Education, New Delhi, 2009.
3. Sudhir Warier E: Knowledge Management Vikas Publishing House Private Limited, Hyderabad, 2009.
4. Daryl Morey: Knowledge Management, University Press, New Delhi, 2009.
5. B. Rathan Reddy: Knowledge Management, Himalaya Publication, 2007.

VII Semester	STRATEGIC COST MANAGEMENT	4	100

Course Objectives:

COB 1:	To help in understanding the basic concepts of strategic cost management.
COB 2:	To help in analyzing different cost management techniques.
COB 3:	To help in understanding quality cost management.
COB 4:	To understand the Balanced Scorecard and strategic performance measurement systems
COB 5:	To learn the measurement and control of quality and environmental

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Describe the meaning and concept of cost management.
CO 2 :	Explain the concepts of strategic cost audit.
CO 3 :	Distinguish between Life Cycle Cost Management and Product life Costing-Activities**.**
CO 4 :	Compare and contrast Activity-Based and Strategic Based Responsibility Accounting.
CO 5 :	Research on Quality Cost Management.

UNIT- I:

Cost Management: Introduction-Factors affecting cost Management-Strategic Cost Analysis-Cross Functional perspective of Cost Management-International issues in Cost Management-Levels of Involvement in International Trade-Foreign Currency Exchange-Managing Transaction risk, Economic Risk, Translation risk-Decentralization-Creation of Divisions-Role of Cost and Management Accountant.

UNIT-II:

Strategic Cost Audit: Management Audit – Structure – Objectives – Generally accepted Cost Accounting Principles – Cost Reporting.

UNIT-III:

Strategic Cost Management: Concepts-Strategic Positioning-key to Creating and Sustaining a Competitive Advantage, Value Chain Framework, linkages and Activities-organizational activities and Cost Drivers-Life Cycle Cost Management-Product life Costing-Activities-Project life cycle.

UNIT-IV:

Balanced Score-Card: Definition, Activity-Based V/s Strategic Based Responsibility Accounting-Assigning Responsibility-Balanced Score Card-Basic Concepts-Strategy Translation-Linking measures to strategy-Strategic Alignment.

UNIT-V:

Quality Cost Management: Meaning, Definition, Quality Cost Measurement-Reporting Quality Costs-Quality cost information and Decision Making-Controlling Quality Costs-Environmental costs: Definition, Measuring and Controlling environmental costs

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Don R. Hansen, Maryanne M. Mowen (2005): Cost Management: Accounting and Control (4th Edt). International Student Edition. Thomson South-Western.
2. Ravi M. Kishore, (1997): Advanced Management Accounting. Taxmann Allied Services (P) Ltd.
3. John K. Shank, Vijay Govindaraja, Strategic Cost Management. The Free Press Publication.
4. Dr.Pradip Kumar Sinha: Strategic Cost Management: Nirali Prakashan Publication.

HR SPECIALIZATION

VII Semester	HUMAN RESOURCE PLANNING	4	100

Course Objectives:

COB 1:	To acquaint students with a broad perspective on themes and issues of Human Resource Planning.
COB 2:	To familiarize the student with relevance and application of Human Resource Planning practices in the Indian perspective.
COB 3:	To familiarize students with basics of training and development activities.
COB4:	To Evaluate Recruitment, Selection and Induction Process.
COB5:	To Interpret Training and Performance Appraisals.

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Cite evolution and emerging trends of HRP.
CO 2 :	Critically analyze HRP concepts.
CO 3 :	List Quantitative Tools for Manpower forecasts.
CO 4 :	Evaluate Recruitment, Selection and Induction Process.
CO 5 :	Interpret Training and Performance Appraisals.

UNIT-I:
Introduction – History of HRM – HRM as a system – HRM Techniques – Roles duties and responsibilities of HR Managers – HR Organizational Structure- HR Policies and Strategies.

UNIT-II:
Human Resource Planning – Definition of HRP – Responsibilities of HR Department- Objectives of HRP- Man Power Demand Forecasting – Micro and Macro Human Resource Planning- Macro Level Manpower Planning Models and Techniques- Learning Curves – Labor Economics and Labor Markets.

UNIT-III:
Human Resource Planning Process – HRP Process outline – Quantitative Tools for Manpower forecasts – Manpower Planning Models- Simulation – Replacement Theory – Productive Statistics in Micro Level HRP.

UNIT-IV:
Recruitment Selection and Induction – Recruitment Function – Selection Process – Interviews- Recruitment Matrics – Induction – Employee Socialization – Placement – Career Planning and Development – Objectives of Career Development – Integration of Career Development – Steps in the Career Planning Process.

UNIT-V:

Training and Performance Appraisal – Classification of Training Programmes – Need for Manpower Training – Sequence of Training Programme – Performance Appraisal – Performance Counseling, Management, Mentoring and Performance Matrics – Introduction to Human Resource Accounting and Audit.

Relevant cases have to be discussed in each unit and in examination case is compulsory fromany unit.

References Books:

1. Human Resource Planning by Dipak Kumar Bhattacharyya – Ecel Books.
2. Strategic HRM by Mabey and Salama.
3. Development Human Resources by Mabey and Thompson.
4. Human Resource Information System: Development and Application by KavanaghM.J.

VII Semester	LEADERSHIP MANAGEMENT (ELECTIVE II-HR)	4	100

Course Objectives:

COB 1:	To develop good understanding of leadership importance in today's businesses.
COB 2:	To enable in developing leadership abilities.
COB 3:	To develop knowledge about evaluation of leadership abilities.
COB 4:	To enhance self-awareness and self-development attitude in students.
COB:5	To understand the importance of leadership across globe

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Determine the meaning of Leadership and its importance.
CO 2 :	Outline motivational theories and cultural dimensions
CO 3 :	Correlate leadership with learning and attitude.
CO 4 :	Determine the factors necessary developing leadership.
CO 5 :	Focus on leadership styles in other countries.

UNIT-I:

Situational Leadership Behaviour: Meaning, Fiedler Contingency Model, Path Goal and Normative Models - Emerging Leadership Behaviour: Transformational, Transactional and Visionary Leadership - Leadership for the new Millennium Organisations - Leadership in Indian Organisations. Leadership Effectiveness: Meaning, Reddins' 3-D Model, Hersey and Blanchard Situational Model, Driving Leadership Effectiveness, Leadership for Organisational Building.

UNIT-II:

Motivation Theories for Leadership: Maslow's, Herzberg, X, Y and Z theories of Motivation - Similarities and Distinctions of Need Hierarchy and Two Factors theories. ERG – McClelland - Expectancy - Porter and Lawler Theories. - Emerging Challenges in Motivating Employees. Organisational Culture: Meaning, Definitions, Significance, Dimensions, Managing Organisational Culture, Changing organizational Cultural. Organisational Building: Approaches, Quality of Work Life. Cross Cultural Values, Developing ValueOrientation in Behaviour for change.

UNIT-III:

Leadership development: Significance – Continuous Learning: Principles of learning to develop effective leadership – Vision and Goals for organisation: significance of goals for leaders – Charting vision and goals of Indian leaders and abroad - Tools for developing dreams for effective leadership dreams – Leaders vision in organisation building – Leadership Attitude: significance– Developing and Maintaining positive attitude for effectiveleading.

UNIT-IV:

Leader Self-management: Significance - Developing self-esteem and balancing emotions – Interpersonal Leadership Skills: Praise – Criticise – Communicate – Leadership Assertiveness: Circle of influence and circle of concern – Leadership with Edification: Tools of edification –Leadership and creativity: Developing creative thinking – Leadership and Team Building: Principles of team building – Leadership and Integrity: Developing character and values.

UNIT-V:

Leadership across Globe: Characteristics - Significance – Functions – GLOBE research program of Wharton School – challenges of leadership in varying culture and values – Global perspectives of leadership – Leadership in USA – Leadership in Japan – European leadership – Leadership in Arab countries – Implications of global leadership – Leadership and Corporate Social Responsibility across globe.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Sarma V S Veluri (2009), Organisational Behaviour - An Interactive Learning Approach (Text and Cases), Mumbai, Jaico Publishing House.
2. Hellriegel Don, Jackson and Slocum W John (2008), Management – A Competency Based Approach, New Delhi, Cengage Learning India Private Limited.
3. Peter G. Northouse, Leadership, 2010, Sage.
4. Peter Lornge, Thought leadership Meets Business, 1st edition, 2009, Cambridge.
5. John ADAIR, Inspiring Leadership, 2008, Viva Books.
6. Lussir, Effective Leadership, 2009, Cengage.
7. Srivastava, Transformation Leadership, 2008, Macmillan.
8. Aravind V Pathak, Rabi S Bhagat, Roger J Kashlak, International Management, NewDelhi, Tata McGraw Hill.

VII Semester	**COMPENSATION AND REWARD MANAGEMENT (ELECTIVE III-HR)**	**4**	**100**

Course Objectives:

COB 1:	To make the students aware of the various compensation systems.
COB 2:	To equip them with the tools and techniques used for analyzing compensation structures.
COB 3:	To impart skills in designing ,analysis and restructure compensation management system.
COB 4:	To understand the role of compensation in determining the competitive advantage of an organization.
COB 5:	To understand the pay structure and Tax planning in Indian context.

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Gain in-depth knowledge on the compensation
CO 2 :	Understand the compensation structure
CO 3 :	The concept of wage and salary administration and its legal frame work is clearly understood.
CO 4 :	Understand the concept on the pay structure and tax
CO 5 :	Understand the legally required benefits for the employees

UNIT-I:
Compensation: concept and definition – objectives and dimensions of compensation program – factors influencing compensation –Role of compensation and Reward in Modern organizations-Compensation as a Retention strategy- aligning compensation strategy with business strategy – concept of reward - non-financial compensation system-Reward management process - Managing Compensation: Designing a compensation system – internal and external equity– pay determinants - frame work of compensation policy - influence of pay on employee attitude and behavior - the new trends in compensation management at national and international level.

UNIT-II:
Job evaluation and Compensation Structure: Introduction to Principles and Procedures of job evaluation programs-Introduction to basic job evaluation methods-Compensation Structure-History and past practices, elements of, management compensation –Types of compensation system, Role of compensation and Reward in modern organizations-**compensation surveys**-Incentive payments and its objectives.

UNIT-III:
Wage and Salary administration: Nature and Purpose, Wage surveys-Administration of wage and salary-Principles-Components of wages-Theory of wages-Wage differentials-Importance-Wage differentials in India-Executive compensation plans-Legal frame work for wage and salary administration.

UNIT-IV:

Control Systems for labour costs: Introduction-Direct and Indirect labour, Role of various departments-The personnel department-Industrial engineering department-Types of worker-Payroll department-Process and steps for preparation of payroll-Wage analysis-Cost accounting treatment of wages components-Compensation surveys-Profit sharing.

UNIT-V:

Pay Structure and Tax Planning: Introduction- Compensation Structures-Performance based and Pay based structures-Designing pay structures-comparison in evaluation of different types of pay structures-Significance of factors affecting-Tax Planning –Concept of Tax planning-Role of tax planning in compensation benefits-Tax efficient compensation package-Fixation of tax liability salary restructuring.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Dr. Kanchan Bhatia ‒Compensation Management‖, Himalaya Publishing House, New Delhi 2012.
2. A.M.Sarma, N.Sambasiva Rao: ―Compensation and Performance management‖, Himalaya Publishing House, Mumbai.
3. Dewakar Goel: ‒Performance Appraisal and Compensation Management‖, PHI Learning, New Delhi, 2012.
4. ER Soni Shyan Singh _Compensation Management' – Excel Books, New Delhi – 2008.
5. Mousumi S Bhattacharya Nilanjan Sengupta, ‒Compensation Management‖ – Excel Books, New Delhi – 2009.
6. Tapomoy Deb ‒Compensation Management‖ – Excel Books, New Delhi – 2009.

FINANCE SPECIALIZATION

VII Semester	**SECURITY ANALYSIS**	**4**	**100**

Course Objectives:

COB 1:	To make students aware of the various Securities.
COB 2:	To understand various Investment alternatives.
COB 3:	To understand the Equity and Bond valuation models.
COB 4:	To help the student in analyzing the investment decisions by using Fundamental Analysis and Technical Analysis.
COB 5:	To understand the Portfolio Analysis and Selection by using various models.

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Identify various concepts of Security Analysis.
CO 2 :	Explain the process of Investment alternatives and Stock Exchange operations.
CO 3 :	Determine risks and returns of securities.
CO 4 :	Analyze the importance of investment decisions by using Fundamental and Technical Analysis.
CO 5 :	Analyze various Industries.

UNIT-I:
Concept of Investment Decisions: Investment Vs Speculation, Investment alternatives - Investment Process - Sources of Investment Information – Trading System in Stock Exchanges – Market Indices. Calculation of SENSEX and NIFTY - Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk - Measurement of Risk. (Problems)

UNIT-II:
Alternative Investment Outlets – Preference Shares and Equity Shares Earning valuation-Cash flow valuation-Asset Valuation-Dividend-discount model; Valuation of Bonds – Bond Returns and Risks -Bond Pricing Theorems convexity, duration, bond immunization. (Problems)

UNIT-III:
Investment Analysis: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Dow Theory – Elliot Wave Theory – Trends and Trend Reversals - Efficient Market Theory –Hypothesis- Forms of Market Efficiency.

UNIT-IV:

Risk and Returns Security Analysis: Economic Analysis – Security Analysis and Investment Decisions – Fundamental Analysis of Economy Industry – Investment Making Process – Economic Forecasting – Barometric or Indian Approach – Money and Stock Prices- Diffusion Index.

UNIT-V:

Industry Analysis – Importance of Industry Analysis – Classification of Industries – Key Indicators in Analysis – Analytical Frame Works – Forecasting Methods – Conditional and Profitability – Industry Analysis Factors.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Sudhindra Bhat. ―Security Analysis and Portfolio Management‖, Excel Books, New Delhi 2015.
2. S.Kevin: ―Security Analysis and Portfolio Management‖, PHI Learning, New Delhi, 2009.
3. Punithavathy Pandian: ―Security Analysis and Portfolio Management‖, Vikas Publishing House, New Delhi, 2009.
4. Sudhendra Bhat: ―Security Analysis and Portfolio Management‖, Excel Books, New Delhi, 2009.
5. Shashi K Gupta: ―Security Analysis and Portfolio Management‖, Kalyani Publishers, New Delhi, 2010.
6. Prasanna Chandra, ―Investment Analysis and Portfolio Management‖, 3/e Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2003.
7. Ranganatham: –Investment Analysis and Portfolio Management‖ Pearson Education.

VII Semester	**BANKING AND INSURANCE MANAGEMENT (ELECTIVE II- FINANCE)**	**4**	**100**

Course Objectives:

COB 1:	To develop good understanding of Evolution of Banking in India and Financial Statement Analysis
COB 2:	To enable in developing knowledge on fixing prices on loans and credit worthiness
COB 3:	To develop knowledge about Banking Innovations and changing role of banks as Financial Intermediaries
COB 4:	To enhance awareness on types and principles of insurance and concept of reinsurance
COB:5	To create awareness Life Insurance and General Insurance and third party administration

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Determine the meaning of Banker and customer and outline the financial statement analysis
CO 2 :	Outline the fixing prices on loans and credit worthiness
CO 3 :	Correlate Banking Innovations and changing role of banks as Financial Intermediaries
CO 4 :	Determine the types and principles of insurance and concept of reinsurance
CO 5 :	Focus on Life Insurance and General Insurance and third party administration

UNIT-I:

Introduction to Banking: Introduction to Indian Financial System - Meaning of a Bank and Customer- Bank and customer Relationship - Role of commercial banks in Economic Development - Evolution of Banking in India - Financial Inclusionin India Financial statement analysis of banks: CAMEL Approach, Key Performance indicators- Sources of Bank Funds.

UNIT-II:

Uses of Bank Funds: Types of lending - assessment of credit worthiness of a prospective borrower - management of credit process - different types of loans and their features - The basic model, pricing fixed & floating rate loans, cost-benefit loan pricing, Customer Profitability Analysis - Non Performing Assets: - gross and net concept of NPAs, causes, implications & recovery of NPAs.

UNIT-III:

Banking Innovations:-Core Banking Solution - Retail Banking - Products & Services: Nature, Scope, Future and Strategies - Plastic Money - National Electronic Funds Transfer - ATM - Mobile Phone Banking - Net Banking- Banc-assurance. Changing role of Banks as Financial Intermediaries. Customer service quality in Indian banking industry.

UNIT-IV:

Introduction to Insurance: Insurance as a Risk Management Tool- Principles of Insurance - Characteristics of Insurance contract -Underwriting, Rate Making, Managing Claims and Losses, Investment & Financing, Accounting & Record Keeping and other miscellaneous functions - Concept of Reinsurance, Marketing channels: Agents & brokers –professionalism, remuneration, responsibilities.

UNIT-V:

Life Insurance and General Insurance: The concept of Life Insurance - types of Life Insurance contracts - Tax treatment of Life Insurance- Life Insurance Products- Classification of Life Insurance - The Actuarial Science- Provisions of Life Insurance contracts - Special Life Insurance forms - Health and General insurance–Overview, Types, Third Party Administrators.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Peter.S.Rose & Sylvia. C. Hudgins: ‒Bank Management & Financial Services‖, Tata McGraw Hill New Delhi, 2010.
2. James S. Trieschmann, Robert E. Hoyt & David. W. Sommer B: ―RiskManagement & Insurance‖, Cengage Learning, New Delhi.
3. Reddy K S and Rao R N: ‒Banking & Insurance‖, Paramount Publishing House 2013.
4. Vasant Desai: ‒Banks & Institutional Management‖, Himalaya Publishing House 2010.
5. R.K.Sharma, Shashi and Jagwant: ‒Banking and Insurance‖, Kalyani Publishers, 16th edition.

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VII Semester	BEHAVIOURAL FINANCE	4	100

Course Objectives:

COB 1:	To understand the foundations of behavioral finance and the psychological biases influencing investment decisions under uncertainty.
COB 2:	To analyze expected utility theory, bounded rationality, and the challenges to rational decision-making and market efficiency.
COB 3:	To examine behavioral factors affecting financial markets, market efficiency, arbitrage limits, and portfolio performance.
COB 4:	To evaluate the impact of behavioral factors on corporate financial decisions and investor behavior.
COB:5	To understand the role of emotions, personality traits, and neurophysiological factors in risk perception and financial decision-making.

COURSE OUTCOMES

CO 1:	Explain the key concepts of behavioral finance and identify psychological biases affecting investment decisions under uncertainty.
CO 2:	Evaluate expected utility theory, bounded rationality, and assess their implications for rational decision-making and market efficiency.
CO 3:	Analyze the influence of behavioral factors on financial markets, arbitrage limitations, and portfolio performance.
CO 4:	Assess the impact of behavioral biases on corporate financial policies and investor behavior.
CO:5	Examine the role of emotions, personality traits, and neurophysiologic factors in shaping risk perception and financial decision-making

Unit – I

Introduction to Behavioral finance – Nature, scope, objectives and application; Investment Decision Cycle: Judgment under Uncertainty :Cognitive information perception - Peculiarities (biases) of quantitative and numerical information perception - Weber law -Subjective probability – Representativeness – Anchoring - Asymmetric perception of gains and losses framing and other behavioral effects - Exponential discounting - Human economic behavior - Discount factors for short and long horizons - Experimental measurement of the discount factor - Hyperbolic discounting.

Unit – II

Utility/ Preference Functions: Expected Utility Theory [EUT] and Rational Thought: Decision making under risk and uncertainty - Expected utility as a basis for decision-making – Theories based on Expected Utility Concept – Decisionmaking in historical prospective - Allais and Elsberg's Paradoxes - Rationality from an economics and evolutionary prospective – Herbert Simon and bounded rationality- Investor rationality and market efficiency - Empirical data that questions market efficiency.

Uni

t –III

Behavioral Factors and Financial Markets: The Efficient Markets Hypothesis – Fundamental Information and Financial Markets - Information available for Market Participants and Market Efficiency -Market Predictability –The Concept of limits of Arbitrage Model - Asset management and behavioral factors - Active Portfolio Management: return statistics and sources of systematic underperformance. - Fundamental information and technical analysis – the case for psychological influence.

Unit – IV

Behavioral Corporate Finance: Behavioral factors and Corporate Decisions on Capital Structure and Dividend Policy - Capital Structure dependence on Market Timing - Mergers and Acquisitions. Systematic approach to using behavioral factors in corporate decision-making. External Factors and Investor Behavior: Mechanisms of the External Factor influence on risk perception and attitudes - Connection to human psychophysiology and emotional regulation Active portfolio management – the source of the systematic underperformance.

Unit – V

Emotions and Decision – Making: Experimental measurement of risk-related - Measuring Risk - Emotional mechanisms in modulating risk-taking attitude - Neurophysiology of risktaking. Personality traits and risk attitudes in different domains.

References:

1. Behavioral Finance: Psychology, Decision-Making, and Markets", by Ackert and Deaves.¬ The Psychology of Investing by John R.
2. Understanding Behavioral Finance by Ackert¬ Nofsinger, Pearson Prentice Hall, (4th Edition)
3. What Investors Really Want - Learn the lessons of behavioral Finance, Meir Statman,¬ McGraw-Hill
4. Handbook of Behavioral Finance – Brian R. Bruce
5. Behavioral finance - Wiley Finance - Joachim Goldberg, Rüdiger von Nitzsch
6. Plous, Scott, 1993, The Psychology of Judgment and Decision Making, Ch 10-15
7. Shleifer, Andrei, 2000, Are Financial Markets Efficient?, Chapter 1 in Inefficient
8. Markets, Oxford University Press. Ackert, L., and R. Deaves, 2010, Behavioral Finance: Psychology, Decision-Making and
9. Markets, South-Western Cengage Learning, Mason, Ohio. Nofsinger, J. R., 2001, Investment Madness, Prentice Hall.
10. Mitchell, O. S., and S. P. Utkus, eds., 2004. Pension Design and Structure: New Lessons
11. from Behavioral Finance (Oxford University Press, New York, New York). Shleifer, Andrei (2000): Ineffcient Markets: An Introduction to Behavioral
12. Finance,Oxford University Press, Oxford. Montier, James (2002): Behavioural Finance, John Wiley & Sons, New York.
13. Plous, S. (1993). The psychology of judgment and decision-making NY: McGrawHill.

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MARKETING SPECIALIZATION

VII Semester	**CONSUMER BEHAVIOR**	**4**	**100**

Course Objectives:

COB 1:	To develop an understanding on consumer behavior, characteristics, purchase-decision making process, customer relations and its application to marketing strategy.
COB 2:	To develop an understanding of peoples' consumption-related behaviors and todevelop and evaluate marketing strategies intended to influence those behaviors.
COB 3:	To enlighten the students with the concepts and Practical applications of consumer behavior and consumerism
COB 4:	To equip them with the tools and techniques of economic analysis for improving their decision-making skills.
COB 5	To understand the consumer protection act 2019 and its provisions

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Understand the concept of Consumer Behavior.
CO 2 :	Understand the concept of Psychological Foundations of Consumer Behavior
CO 3 :	Appraise the importance of communication with consumer behavior.
CO 4 :	Able to understand the concept of consumerism.
CO5:	Able to understand the consumer protection act 2019 and its provisions

UNIT-I:

Introduction to Consumer Behavior: Understanding consumers and market segments. Evolution of consumer behaviour, consumer analysis and business strategy. Models of Buyer Behavior, Howard Model, Howard- Sheth Model, EKB Model, Webster and Wind Model and Sheth Industrial Buyer Behaviour Model.

UNIT- II:

Psychological Foundations of Consumer Behavior: Consumer Motivation, Perception, Personality and Behavior, Learning and Behavior Modification, Information Processing, Memory Organization and Function, Attitude Formation and Attitude Change. Social and Cultural Environment Economic, Demographic, Cross Cultural and Socio–Cultural Influences, Social Stratification, Reference Groups and Family, Personal influence.

UNIT- III:

Communication and Consumer Behavior: Components of communications process, designing persuasive communication and Diffusion of Innovations. Consumer Decision Processes High and Low Involvement, Pre-purchase Processes, Post Purchase processes, Consumption and evaluation, Brand Loyalty and Repeat Purchase Behavior.

UNIT–IV:

Consumerism: The roots of consumerism, consumer safety, consumer information, environmental concerns, consumer privacy, legislative responses to consumerism and marketer responses to consumer issues.

UNIT- V:

Consumer Protection: Consumer Protection Act 2019, Central consumer protection council, state consumer protection councils, consumer disputes redressal agencies, consumer disputes redressal forum, National Consumer Disputes Redressal Commission.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Ramneek Kapoor, Nnamdi O Madichie: –Consumer Behavior‖ Text and Cases‖, TMH, New Delhi, 2012.
2. Ramanuj Majumdar: –Consumer Behavior insight from Indian Market‖, PHI Learning, New Delhi, 2011
3. M.S.Raju: –Consumer Behavior Concepts, applications and Cases‖, Vikas Publishing House, New Delhi, 2013.
4. David L Loudon and Albert J Della Bitta, –Consumer Behavior‖ 4/e, TMH, New Delhi, 2002.
5. Schiffman, L.G and Kanuk L.L –Consumer Behavior‖, 8/e, Pearson Education, New Delhi, 2003.

VII Semester	RURAL MARKETING	4	100

Course Objectives:

COB 1:	To develop an understanding on Rural marketing
COB 2:	To develop an understanding on Agricultural Marketing
COB 3:	To enlighten the students with the defects in Agricultural Marketing
COB 4	To Appraise the importance of Rural Consumer Behavior and Innovations.
COB 5	To analyze the behavior rural consumer s

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Understand the concept of Rural Marketing.
CO 2 :	Understand the concept of Agricultural Marketing.
CO 3 :	Articulate the defects in Agricultural Marketing.
CO 4 :	Appraise the importance of Rural Consumer Behavior and Innovations.
CO 5:	Able to analyze the behavior rural consumer s

UNIT - I:

Introduction to Rural Marketing: Meaning and definition - stages in development of rural markets - characteristics of rural markets - differences between urban and rural markets - rural marketing environment- problems and challenges of rural markets.

UNIT - II:

Agricultural Marketing-I: Marketing of agricultural inputs - Features - seeds - fertilizers - pesticides - tractors - challenges and opportunities - An overview of Indian agrochemical market. Marketing of agriculture products- definition and scope - features of agricultural products - classification of agricultural markets-methods of sale- Channels of distribution.

UNIT - III:

Agricultural Marketing –II: Defects in agricultural marketing - Steps to improve agricultural marketing - Role of middleman in agricultural marketing Aims, Objectives, Role and functioning of different agricultural marketing agencies and institutions - Regulated markets, Cooperative marketing institutions, Periodic markets, Rural retail outlets - NAFED, MARKFED, APEDA.

UNIT - IV:

Rural Marketing Mix: Strategies of Rural product- strategies and brand management - Rural pricing strategies - Rural distribution strategies - Rural promotional strategies.

UNIT - V:

Rural Consumer Behaviour and Innovations: Rural consumer Behaviour - Types and characteristics of rural consumers - Factors influencing rural consumer behaviour - Shopping habits of rural consumers - Opinion leaders. Rural marketing initiatives by corporate sector - corporate sector in agri-business - cultivation, processing and retailing.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Balram Dogra and Karminder Ghuman: Rural Marketing - Concepts and Practices, Tata McGraw Hill.
2. CNG Krishnama charyulu and Lalitha Ramakrishnan: Rural Marketing - Text and Casesd, Pearson Edn. 3. RV Badi and NV Badi : Rural Marketing : Himalaya
3. R Krishna Murthy: Introduction to Rural Marketing: Himalaya
4. CK Prahlad: The Future of the Bottom of the Pyramid: Pearson Edn.

VII Semester	**RETAIL MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To study in understanding the concept of retail industry
COB 2:	To aware the students the concepts of the retail marketing segmentation
COB 3:	To understand the store location and layout importance
COB 4:	To recognize customer relationship management in retailing
COB5:	To understand in international retailing

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Become familiar with the fundamental concept and how the retail industry works
CO 2 :	To able to apply the knowledge that how retailing fits within the border disciplines of business
CO 3 :	Able to understand the area of accountability for retail management
CO 4 :	Able to understand the role of the manager impact the success of a retail business
CO5:	Able to analyse the concepts of international retailing

Unit – I

Introduction to Retailing: Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Retailing Marketing Environment: Elements in a Retail Marketing Environment, Environmental Issues, , Indian vs. Global Scenario

Unit – II

The Retail Marketing Segmentation: Introduction, Importance of Market, Segmentation in Retail, Targeted Marketing Efforts, Criteria for Effective Segmentation, Dimensions of Segmentation, Positioning Decisions , Limitations of Market Segmentation Store Location and Layout: Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies

Unit – III

Store Location and Layout: Introduction, Target Market and Retail Format, Gauging Growth Opportunities, Building a Sustainable Competitive Advantage, the Strategic Retail Planning Process, Differentiation Strategies, Positioning Decisions,

Retail Pricing- Introduction, Establishing Pricing Policies, Factors Influencing Pricing, Pricing Strategies, Psychological pricing, Mark-up and Mark-down Pricing.

Unit – IV

Customer Relationship Management in Retailing-Introduction, Benefits of Relationship Marketing, Management of Relationship, Principles of CRM, Customer Relationship Management Strategies, Components of CRM, Customer Service in Retailing, CRM and Loyalty Program Understanding Integrated Marketing Communication, - Integrated marketing process, Tools of IMC,
Upcoming tools of IMC, Factors influencing the Increased use of sales promotion

Unit – V

International Retailing- Introduction, Stages in Retail Global Evolution, Reasons for Going Global, Benefits of Going Global, Other Opportunities and Benefits of Going Global, Market Entry Methods

Suggested References:

2. Sheikh and Kaneez Fatima, ‒Retail Management‖, Himalaya Publishing House, Mumbai, 2012
3. A.J. Lamba:‖The Art of Retailing‖, Tata McGraw Hill Education Pvt. Ltd. N. Delhi.2011

Sivakumar, A, ‒Retail Marketing‖, Excel Books, New Delhi, 2007

Swapna Pradhan, ‒Retail management‖, Tata McGraw Hill Education Pvt. Ltd. New Delhi, 2012

SYSTEMS SPECIALIZATION

VII Semester	Data Science Using R Programming	4	100

Objectives: The student shall learn

- Basic concepts of data science
- Principles and programming skills of R programming
- Principles and graphics skills of R programming
- Application of R programming skills to data manipulations
- expand their knowledge of R on their own.

Outcomes: After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

UNIT-I:

Data Science – Meaning – Introduction – Era of Data Science – Concepts – Objectives – Business Intelligence Vs Data Science – Life cycle of Data Science – Tools of Data Science - Introduction R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

UNIT-II:

R Programming Structures, Control Statements, Loops, - Looping Over Non vector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT-III:

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function –Customizing Graphs, Saving Graphs to Files-

UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

References:

1) Introduction to data science using R, Prema Alla, BS Publications
2) The Art of R Programming, Norman Matloff, Cengage Learning
3) R for Everyone, Lander, Pearson
4) R Cookbook, PaulTeetor, Oreilly
5) R in Action,Rob Kabacoff, Manning.
6) Garrett Grolemund, Hands on Programming with R, Oreilly

VII Semester	**INTERNET OF THINGS**	**4**	**100**

OBJECTIVES:

COB 1:
To understand the fundamental concepts, architecture, enabling technologies, and domain-specific applications of the Internet of Things.

COB 2:
To analyze IoT and M2M communication models, network management protocols, and system management frameworks for IoT environments.

COB 3:
To apply IoT design methodology and develop IoT applications using Python programming concepts and tools.

COB 4:
To implement IoT solutions using physical devices, cloud platforms, web frameworks, and communication APIs.

COB 5:
To evaluate IoT case studies and utilize big data analytics tools and frameworks for real-time and batch data processing in IoT systems.

OUTCOMES:

CO1:
Explain the architecture, components, enabling technologies, and applications of IoT in various domains.

CO2:
Analyze IoT and M2M communication systems and implement appropriate network management protocols such as SNMP and NETCONF-YANG.

CO3:
Design and develop IoT applications using Python programming and appropriate IoT design methodologies.

CO4:
Implement IoT solutions using Raspberry Pi, cloud platforms, RESTful APIs, and web application frameworks.

CO5:
Apply IoT analytics tools and big data frameworks to process and analyze real-time and batch IoT data through case studies.

UNIT- I

Introduction to Internet of Things, Definition & Characteristics of IoT, Physical Design of IoT Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle

UNIT- II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1 Need for IoT Systems Management , Simple Network Management Protocol (SNMP) , Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

UNIT- III

IoT Platforms Design Methodology IoT Design Methodology, Case Study on IoT System for Weather Monitoring , Motivation for Using Python , IoT Systems - Logical Design using Python,Installing Python , Python Data Types & Data Structures ,Control Flow , Functions, Modules,Packages , File Handling l, Date/Time Operations , Classes ,Python Packages of Interest for IoT

UNIT -IV

IoT Physical Devices & Endpoints, Raspberry Pi , About the Board , Linux on Raspberry Pi , Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication APIs , WAMP - AutoBahn for IoT , Xively Cloud for IoT , Python Web Application Framework - Django , Designing a RESTful Web API , Amazon Web Services for ,SkyNet IoT Messaging Platform

UNIT -V

Case Studies Illustrating IoT Design, Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications, Data Analytics for IoT , Introduction , Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis , Apache Oozie , Apache Spark , Apache Storm, Using Apache Storm for Real- time Data Analysis , Structural Health Monitoring Case Study ,Tools for IOT, Chef Case Studies, NETCONF-YANG Case Studies.

TEXTBOOKS:

Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:

Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012.

VII Semester	WEB DESINING	4	100

Course Objectives:

COB 1:	To make the students aware of fundamental concepts in web designing
COB 2:	To equip with the tools and techniques used in web designing.
COB 3:	To help in understanding problems faced by Indian organizations in web Designing.
COB 4:	To create awareness in latest techniques used for web designing.
COB 5:	To Research on Java scripts and HTML forms.

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Describe fundamental concepts of web designing.
CO 2 :	Explain HTTP and other models.
CO 3 :	Distinguish between HTML and HTTP.
CO 4 :	Compare cascading style sheets and its practical applications.
CO 5 :	Research on Java scripts and HTML forms.

UNIT-I:

Web Fundamentals – Introduction To The Web, History of the Web, Protocols Governing the Web, Creating Websites for Individuals and the Corporate World, Web Applications, Writing Web Projects, Identification of Objects, Target User, Web Team, Planning and Process Development, Web Architecture, Major Issues in the Web Solutions Development, Web Servers (Apache Web Server), Web Browsers, Internet Standards, TCP/IP Protocol Suite, IP Addresses, MIME, Cyber Laws.

UNIT-II:

Hyper Text Transfer Protocol (HTTP): Introduction - Web Server and Clients, Resources, URL and its Anatomy – Examples, Message Format, Persistent and Non-Persistent Connections, Web Caching, Proxy. Java Network Programming- Java and the Net, Java Networking Classes and Interfaces, Looking up Internet Address, Client/Server Programs, Socket Programming, E-mail Client.(lab sessions to be conducted)

UNIT-III:

Hyper Text Markup Language (HTML): Introduction, Structure, Text, Lists, Links, Images, Tables, Forms, Frames, Images, and Meta Tags. (lab sessions to be conducted)

UNIT-IV:

Cascading Style Sheets (CSS) Introduction, Advantages, Color, Text, Boxes, Lists, Tables and Forms, Layout, Images, HTML5 Layout. (Lab Sessions to be conducted)

UNIT-V:

JavaScript Introduction, Variables, Literals, Operators, Control Structure, Conditional Statements, Arrays, Functions, Objects, JavaScript and HTML DOM, Advanced JavaScript and HTML Forms (Lab sessions to be conducted).

(Lab Sessions to be conducted wherever it is required)
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Uttam K Roy: ―Web Technologies‖ — Oxford University Press, 2010.
2. Jon Duckett: ―HTML & CSS: Design and Build Websites‖ – John Wiley & Sons, 2014.

VIII Semester	**TOTAL QUALITY MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To Create awareness of the basic concepts of Total Quality management.
COB 2:	To equip with the Leadership qualities, Continuous process improvement.
COB 3:	To Create awareness of New management tools, Six-sigma: Concepts and benchmarking process
COB 4:	To provide the insights on various approaches related to Quality circles and implementation of TQM.
COB 5:	To create knowledge about the need of ISO 9000-2000 Quality system

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe basic concepts in Total Quality management.
CO 2 :	Relate leadership and Total Quality Management.
CO 3 :	Illustrate the tools in Total Quality management.
CO 4 :	Articulate various approaches related to Quality circles and implementation of TQM.
CO:5	Able to articulate the knowledge about the need of ISO 9000-2000 Quality system

UNIT- I:

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT- II:

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement.

UNIT-III:

Tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT-IV:

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT-V:

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. Dale H.Bester filed, et at., ―Total Quality Management‖, Pearson Education Asia,3rd Edition, Indian Reprint (2006).
2. James R. Evans and William M. Lindsay, ―The Management and Control of Quality‖, 6th Edition, South-Western (Thomson Learning), 2005.
3. Suganthi,L and Anand Samuel, ―Total Quality Management‖, Prentice Hall (India) Pvt. Ltd.,2006.

VIII Semester	**PROJECT MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To Create awareness of the basic concepts of Project management.
COB 2:	To equip with the tools and techniques of project management.
COB:3	To equip with skills and knowledge to systematically assess the viability performance and potential risks of projects to make informed investment decisions.
COB:4	To accurately estimate project costs and effectively analyze and manage project risks to ensure successful project delivery.
COB: 5	To evaluate project outcomes and conduct through audits to ensure compliance efficiency and continuous improvement

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe basic concepts in project management.
CO 2 :	Illustrate tax incentives and tax planning.
CO 3 :	Relate project appraisal with organizational environment.
CO 4 :	Articulate various approaches related to Project Cost Estimate, Project Evaluation and Audit.
CO 5:	A comprehensive understanding of both theoretical & practical aspects of project education and audit.

UNIT- I:

Project Identification and Formulation: characteristics, Taxonomy of projects, Project Identification, Preparation, and Screening of Project Ideas.

UNIT- II:

Tax Incentives and Tax Planning: The Project Investment decisions - Zero based project formulation - UNIDO manuals - Detailed Feasibility Study Report

UNIT- III:

Project Appraisal: Technical appraisal - Commercial appraisal - Economic appraisal - Financial Appraisal - Management appraisal - Govt. Projects and Social Projects, Social Cost Benefit analysis- Environmental Appraisal.

UNIT- IV:

Project Cost Estimate and Risk Analysis: Cost of project - Components of capital cost of a project - Project Risk Analysis - Techniques of Risk Analysis - Project Organization. Infrastructure projects - characteristics and issues related to infrastructure projects - State of Infrastructure in India - New Approaches for infrastructure - PPP mix of govt. - Support and Regulation.

UNIT- V:

Project Evaluation and Audit: Sources of financing - Role of Financial Institutions in project financing - Covenants attached to lending - Data required for calculation of NPV, PI, IRR, BCR, and NBCR - Project cost over runs and cost control - Phases of post audit - Type of Post Audit - Project close out – and Termination.
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References Books:

1. B Patel, ―Project Management‖, Vikas.
2. N Singh, ―Project Management and Control‖, HPH.
3. P. Chandra, ―Projects‖, TMH.
4. Project Management – Managerial Approach, Jack R Meridith & Samuel J Mantel Jr Jhon wiky & Sons 2011.
5. Project Management – The Managerial Process: 6th Edition, Clifford F. Gray, Eric W. Larson, Gawtam V. Desai; McGraw Hill Education.

HR SPECIATIZATION

VIII Semester	**HUMAN RESOURCE METRICS AND ANALYTICS**	**4**	**100**

Course Objectives:

COB 1:	To understand the importance of HR Metrics and analytics in measuring hr's impact and drive business results
COB 2:	To help in identifying the right HR Metrics aligning HR and business goals
COB 3:	Turn metrics into analytics for effective management decisions
COB 4:	To understand decisions about HR initiatives using data based reasoning and analysis
COB 5:	To understand statistical output involving HR Data

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Importance of using data based reasoning to support HR decisions
CO 2 :	Calculate absenteeism cost, turnover cost and return on investment
CO 3 :	Develop recommendations for work force planning based on the result of analysis
CO 4 :	Develop effective surveys for use in an organizational setting
CO:5	Translate research findings into practical conclusions and recommendations

Unit I
HR Metrics Overview--Concepts, Objectives-- Historical evolution of HR metrics.--Explain how and why metrics are used in an organization--Deciding what metrics are important to your business--HR metrics design principles-- Approaches for designing HR metrics--The Inside-Out Approach--The Outside-In Approach-- Align HR metrics with business strategy, goals and objectives--Link HR to the strategy map-- Creating levels of metrics measures—HR Effeciency measures—HR Effectiveness measures-- HR value / impact measures.

Unit II
Building HR functions metrics-- Workforce Planning Metrics-- Recruitment Metrics -- Training & Development Metrics-- Compensation & Benefits Metrics -- Employee relations & Retention Metrics

Unit III

HR Analytics Overview -- What HR Analytics. -- Importance of HR Analytics. -- Translating HR metrics results into actionable business decisions for upper management (Using Excel Application exercises, HR dashboards)-- HR information systems and data sources-- HR Metrics and HR Analytics-- Intuition versus analytical thinking-- HRMS/HRIS and data sources-- Analytics frameworks like LAMP-- HCM:21(r) Model.

Unit IV

Diversity Analysis-- Equality, diversity and inclusion, measuring diversity and inclusion, Testing the impact of diversity, Workforce segmentation and search for critical job roles.. Recruitment and Selection Analytics-- Evaluating Reliability and validity of selection models, Finding out selection bias.

Unit V

Predicting the performance and turnover. Performance Analysis-- Predicting employee performance, Training requirements, evaluating training and development, Optimizing selection and promotion decisions. Monitoring impact of Interventions-- Tracking impact interventions-- Evaluating stress levels and value-change-- Formulating evidence based practices and responsible investment-- Evaluation mediation process, moderation and interaction analysis.

References

1. Edwards Martin R, Edwards Kirsten (2016),―Predictive HR Analytics: Mastering the HR Metric‖,Kogan PagePublishers, ISBN-0749473924
2. Fitz-enz Jac (2010), ‒The new HR analytics: predicting the economic value of your company‘s human capital investments‖, AMACOM, ISBN-13: 978-0-8144-1643-3
3. Fitz-enz Jac, Mattox II John (2014), ‒Predictive Analytics for Human Resources‖, Wiley, ISBN- 1118940709 Bernard Marr(2018), Data Driven HR:How to use Analytics and metrics to data driven performance,Kindle Edition.
4. John Sullivan(2003)HR Metrics The World Class Way, Kennedy Information ISBN 978-1932079012

VIII Semester	STRATEGIC HUMAN RESOURCE MANAGEMENT	4	100

Course objectives

COB 1:	To inculcate strategic orientation in the students.
COB 2:	To create awareness on strategic orientation of human resources.
COB:3	To understand strategy implementation
COB:4	To create awareness on SHRD effectives
COB:5	To equip students with the HR Evaluation and HR outsourcing Strategy

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe the meaning and concept of Strategic human resource management.
CO 2 :	Explain the concepts of strategic human resource planning.
CO 3 :	Distinguish the concepts of strategy implementation.
CO 4 :	Compare and contrast Human resource development strategies at various Levels.
CO 5 :	Research different human resource evaluation systems.

UNIT-I:

Human Resource Strategy: Introduction to Strategic Human Resource Management - Evaluation objectives and Importance of Human Resources Strategy- Strategic fit – A conceptual framework -Human Resources contribution to strategy - Strategy driven role behaviors and practices – Theoretical Perspectives on SHRM approaches - Linking business strategies to HR strategies.

UNIT-II:

Strategic Human Resource Planning: Objectives, benefits, levels of strategic planning- Activities related to strategic HR Planning-Basic overview of various strategic planning models- Strategic HR Planning model-Components of the strategic plan.

UNIT-III:

Strategy Implementation: Strategy implementation as a social issue-The role of Human Resource-Work force utilization and employment practices-Resourcing and Retention strategies-Reward and Performance management strategies.

UNIT-IV:

Strategic Human Resource Development: Concept of Strategic Planning for HRD-Levels in Strategic HRD planning-Training and

Development Strategies-HRD effectiveness.

UNIT-V:

Human Resource Evaluation: Overview of evaluation - Approaches to evaluation, Evaluation Strategic contributions of Traditional Areas - Evaluating Strategic Contribution of Emerging Areas-HR as a Profit centre and HR outsourcing strategy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Charles R. Greer: ―Strategic Human Resource Management‖ - A General Manager Approach - Pearson Education, Asia.
2. Fombrum Charles & Tichy: ―Strategic Human Resource Management‖ - John Wiley Sons, 1984.
3. Dr. Anjali Ghanekar ―Strategic Human Resource Management‖ Everest Publishing House, Pune 2009.
4. Tanuja Agarwala ―Strategic Human Resource Management‖ Oxford University Press, New Delhi 2014.
5. Srinivas R Kandula ―Strategic Human Resource Development‖ PHI Learning PVT Limited, New Delhi 2009.
6. Dreher, Dougherty ―Human Resource Strategy‖ Tata Mc Graw Hill Publishing Company Limited, New Delhi 2008.

Course Objectives:

COB 1:	To make aware of the various concepts of organizational change and development.
COB 2:	To help in understanding the importance change and development activities in organizations.
COB 3:	To help in analyzing the role of change in organizational development.
COB 4:	To help in understanding problems in change management.
COB: 5	To create awareness on team building skills

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe the meaning and concepts of change and development.
CO 2 :	Explain the importance of mapping change.
CO 3 :	Distinguish between organizational development and change.
CO 4 :	Compare change management strategies in organizations.
CO 5 :	Research on team building.

UNIT- I:

Basics of Change Management: Meaning, nature and Types of Change – change programmes– change levers – change as transformation – change as turnaround – value based change.

UNIT- II:

Mapping change: The role of diagramming in system investigation – A review of basic flow diagramming techniques –systems relationships – systems diagramming and mapping, influence charts, multiple cause diagrams- a multidisciplinary approach -Systems approach to change: systems autonomy and behavior – the intervention strategy model – total project management model (TPMM). Learning organization: The relevance of a learning organization - strategies to build a learning organization

UNIT- III:

Organization Development (OD): Meaning, Nature and scope of OD - Dynamics of planned change – Person-focused and role-focused OD interventions –Planning OD Strategy – OD interventions in Indian Organizations – Challenges to OD Practioners

UNIT- IV:

Negotiated Change: Change in the labour - management relations in the post-liberalized India– collective bargaining strategy to the challenges of Globalization and the restructuring of enterprises in India - Changes in the legal frame work of collective bargaining - Negotiated flexibility, productivity bargaining, improved work relations, public sector bargaining and social security.

UNIT- V:

Team Building: Nature and Importance of Teams – Team Vs Groups – Types of teams – Characteristics of Virtual teams – Team building life cycle – Team building skills – Virtual team.

High performance teams – self managing teams – Building team relationships – empowered teams – leadership on teams – Managing cross –cultural diversity in teams – Group think as a decision making process – effective decision making techniques for teams and groups – role of change consultant-– contemporary issues in managing teams.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

- Cummings: ―Theory of Organisation Development and Change‖, Cengage Learning, New Delhi, 2013.
- Robert A Paton: Change Management, Sage Publications, New Delhi, 2011.
- Nilanjan Sengupta: Managing Changing Organisations, PHI Learning, New Delhi, 2009.
- Adrian Thornhill: Managing Change, Pearson Education, New Delhi, 2012. Radha R Sharma: Change Management, TMH, New Delhi, 2012.

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FINANCE SPECIALZTION

VIII Semester	**STRATEGIC FINANCIAL MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To help in understanding the basic concepts of strategic financial management.
COB 2:	To help in analyzing different investment opportunities.
COB 3:	To differentiate between financial strategies of different firms.
COB 4	To Compare and contrast corporate financial engineering concepts
COB 5	To Research on corporate restructuring

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe the meaning and concept of strategic financial management and corporate policy.
CO 2 :	Explain the concepts of corporate financial strategies.
CO 3 :	Distinguish between net present value and rate of return.
CO 4 :	Compare and contrast corporate financial engineering concepts.
CO 5 :	Research on corporate restructuring.

UNIT- I:

Corporate Policy: Strategic Financial Planning- changing complexion of regulatory framework. Shareholder Value Creation (SCV): Market Value Added (MVA) – Market-to-Book Value (M/BV) – Economic Value Added (EVA) – Managerial Implications of Shareholder Value Creation- Corporate Risk Management – Understanding the firms Strategic Exposure.

UNIT-II:

Corporate Financial Strategies: Capital Structure Planning- EBIT, EPS, ROE analysis- Shareholders' Risk — Financial Options and Value of the Firm – Dividend Policy and Value of the Firm – Growth and External Financing Requirement. (Problems)

UNIT-III:

Corporate Investment Strategy: Techniques of Investment Appraisal Under Risk and Uncertainty – Risk Adjusted Net Present Value – Risk Adjusted Internal Rate of Return – Capital Rationing – Decision Tree Approach for Investment Decisions – Evaluation of Lease Vs Borrowing Decision- Long term investment plans analysis with risk and return. (Problems)

UNIT-IV:

Corporate Financial Engineering: Merger Strategy – Theories of Mergers – Horizontal and Conglomerate Mergers – Merger Procedure – Valuation of Firm – Financial Impact of Merger – Merge and Dilution Effect on Earnings Per Share – Merger and Dilution Effect on Business Control. (Problems)

UNIT-V:

Corporate Restructuring: Takeover Strategy – Types of Takeovers – Negotiated and Hostile Bids – Takeover Procedure – Takeover Defenses – Takeover Regulations of SEBI – Distress Restructuring Strategy – Sell offs – Spin Offs – Leveraged Buyouts- Buy back shares – Alignment of Interest – Corporate Governance. (Problems)

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Coper and Weston: ‒Financial Theory and Corporate Policy‖
2. Braley and Myers: ‒The Principles of Corporate Finance‖. Mc. Graw Hill, N.Y.1993.
3. Prasanna Chandra : ‒Financial Management‖ Theory and Practice.
4. I.M. Pandey – ‒Financial Management‖ Vikas Publishers, New Delhi.

VIII Semester	**PORTFOLIO MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To make students aware of the various concepts of Portfolio Management
COB 2:	To understand various Investment alternatives and Investment process and stock exchange operations.
COB 3:	To help the student in analyzing the investment decisions by using Fundamental Analysis and Technical Analysis.
COB 4:	To understand the Portfolio Analysis and Selection by using various models.
COB 5:	To understand the Portfolio Evaluation and Mutual Funds.

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Identify various concepts of Portfolio Analysis.
CO 2 :	Explain the process of Portfolio Evaluation and Revision.
CO 3 :	Determine the Forecasting of Portfolio Performance.
CO 4 :	Analyze the importance of Financial Derivative Markets.
CO 5 :	Analyze the Commodity Markets.

UNIT-I:

Portfolio Analysis and Selection: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model and Capital Asset Pricing Model, Arbitrage Pricing Theory. (Problems).

UNIT-II:

Portfolio Evaluation and Revision: Performance Evaluation of Portfolios; Sharpe Model – Jensen's Model for PF Evaluation, Evaluation of Mutual Fund – Portfolio Revision. (Problems).

UNIT-III:

Forecasting of Portfolio Performance: Neural Networks – Artificial Neural Networks – Fuzzylogic – Behavioral Models -. Portfolio Management – Phases of Portfolio Management – Phases of Portfolio Management – Investment Risk Pyramid – Risk Reward Concept – Asset Allocation- Asset Mix – Portfolio Strategies.

UNIT-IV:

Financial Derivative Markets: Characteristics of Derivatives – Derivatives Trading – Hedging Portfolio Rebalancing – Introduction of Futures – Frequently used terms in index Futures Market – Hedging, Options, Futures, Forward and Swaps.

UNIT-V:

Commodity Markets: The Indian Connection with Commodity Market – Commodity and Currency Derivatives – Legal Frame Work – Policy Liberization – Wholesale Price Index – Foreign Portfolio Investments – Foreign Portfolio investment as Alternative Source.

Relevant cases have to be discussed in each unit and in examination case is compulsory fromany unit.

References:

1. Sudhindra Bhat. ―Security Analysis and Portfolio Management‖, Excel Books, NewDelhi 2015.
2. S.Kevin: ‗Security Analysis and Portfolio Management‖, PHI Learning, New Delhi, 2009.
3. Punithavathy Pandian: ‗Security Analysis and Portfolio Management‖, Vikas Publishing House, New Delhi,2009.
4. Sudhendra Bhat: ‗Security Analysis and Portfolio Management‖, Excel Books, New Delhi, 2009.
5. Shashi K Gupta: ―Security Analysis and Portfolio Management‖, Kalyani Publishers,New Delhi,2010.
6. Prasanna Chandra, ‗Investment Analysis and Portfolio Management‖, 3/e Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2003.
7. Ranganatham: ‗Investment Analysis and Portfolio Management‖ Pearson Education.

VIII Semester	**FINANCIAL MARKETS & SERVICES**	**4**	**100**

Course Objectives:

COB 1:	To help in understanding of structure of Indian financial system
COB 2:	To able to understand of regulatory framework Indian financial system
COB 3:	To help in analyzing the leasing and borrowing
COB4:	To aware in analyzing the leasing and borrowing
COB:5	To able to aware of debt rating systems

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Able to make decisions of investment in capital markets
CO 2 :	Able to explain the concepts of financial services
CO 3 :	Capable to compute leasing and borrowing financial aspects
CO 4 :	Capable of understanding the credit rating agencies and its duties
CO 5 :	Able to aware about mutual fund evaluation and portfolio construction

UNIT- I:

Structure of Financial System: Role of Financial System in Economic Development – Financial Markets and Financial Instruments – Capital Markets – Money Markets – Primary Market Operations – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector Problems and Reforms.

UNIT – II:

Financial Services: Concept, Nature and Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning-Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India.

UNIT – III:

Venture Capital: Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital, Leasing – types of Leases – Evaluation of Leasing Option vs. Borrowing.

UNIT – IV:

Credit Rating: Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context;

UNIT- V:

Mutual Funds: Concept and Objectives, Functions and Portfolio Classification, Organization and Management, Guidelines for Mutual Funds, Working of Public and Private Mutual Funds in India. Debt Securitization – Concept and Application – De-mat Services-need and Operations-role of NSDL and CSDL.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Bhole & Mahakud, Financial Institutions and Market, TMH, New Delhi.
2. DK Murthy, and Venugopal, Indian Financial System, IK Int Pub House.
3. Anthony Saunders and MM Cornett, Fin Markets & Institutions, TMH, ND.
4. Edminister R.D., Financial Institution, Markets and Management:
5. Punithavathy Pandian, Financial Markets and Services, Vikas, New Delhi.
6. Vasanth Desai, Financial Markets & Financial Services, Himalaya, Mumbai.

MARKETING SPECIALZATION

VIII Semester	CUSTOMER RELATIONSHIP MANAGEMENT	4	100

Course Objectives:

COB 1:	To make the students aware of the various concepts of CRM.
COB 2:	To help the student in understanding the increasing importance of CRM in business organizations.
COB 3:	To help the student in analyzing the various CRM strategies.
COB 4:	To help them in applying concepts of CRM for improving their decision-making skills.
COB5:	To analyze the various strategies and issues of implementing operational CRM

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Identify the basic concepts of CRM.
CO 2 :	Explain the importance of integrating CRM into the business strategy.
CO 3 :	Predict the various marketing aspects of CRM.
CO 4 :	Analyze the various analytical CRM strategies and their impact on customer retention.
CO 5 :	Analyze the various strategies and issues of implementing operational CRM Mapping of program outcome and course outcome.

UNIT- I:

Introduction: Definition of CRM –Elements of CRM – CRM Processes and systems, Importance of CRM, Critical success factors for a winning CRM program – Advantages of CRM – Integrated CRM system –Planning and Managing CRM Programme - Application areas.

UNIT-II:

CRM as an integrated business strategy: Nature of CRM strategy – Contents of CRM Strategy – Description of Customer – Supplier Relationships, The dynamics of Relationships, The relationship oriented organization.

UNIT-III:

CRM marketing aspects: Customer knowledge, value of customer knowledge, utilization of data as an asset, multi-channels and communication- Influence of the channels on pricing and the formation of relationships – The relationship policy to improve size, quality and relationship with the customer base.

UNIT –IV:

Analytical CRM: Relationship data management – Expanding the size of customer database - Data analysis and data mining – Concept of customer loyalty – customer value assessment – Customer Retention strategies – Retention and Cross – sell analyses – effect of marketing activities – Reporting the results.

UNIT-V:

Operational CRM and CRM implementation: Call center Management – internet and the websites – traffic building – Providing quality during the visit to the website – Process of developing, producing, sending and following – up direct mailings. Causes for disappointing CRM results – The best CRM implementation strategies –Privacy and ethics Consideration in CRM implementation.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Ed Peelen: ‒Customer Relationship Management‖ Pearson, Education.
2. Roger J Baran, Robert J Galka and Daniel P Strunk: ―Customer Relationship Management‖ Cengage learning.
3. S.Shanmuga sundaram: ‒Customer Relationship Management‖ Prentice Hall of India.

VIII Semester	MARKETING RESEARCH	4	100

Course Objectives:

COB 1:	To help in understanding market research
COB 2:	To help in analyzing the research process
COB 3:	To recognize various sources of market information
COB 4:	To help in understanding marketing research techniques
COB 5:	To help in analyzing marketing mix research

Course Outcomes:
At the end of this course students will be able to:

CO 1 :	Understand the conceptual framework of marketing research
CO 2 :	Able to understand drafting the research proposal
CO 3 :	Recognize different methods of collecting market information
CO 4 :	Able to apply different market research techniques
CO 5 :	Able to understand marketing effectiveness and analytics research

UNIT-I
Marketing Research – Definition, Scope, Significance, Limitations, Obstacles in acceptance. Ethics in marketing research. Marketing Intelligence system

UNIT-II
Research process – Management dilemma (problem) – decision problem – research problem – hypothesis statement – characteristics of a good hypothesis – drafting the research proposal.

UNIT-III
Various sources of market Information – Methods of collecting Market Information - Secondary data – sources – problems of fit and accuracy. Syndicated services.

UNIT-IV
Marketing research techniques: Market development research: Cool hunting – socio cultural trends, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminant analysis. Sales forecasting – objective and subjective methods.

UNIT-V
Marketing Mix Research: Concept testing, Brand Equity Research, Brand name testing, Commercial eye tracking – package designs, Conjoint analysis, Multidimensional scaling - positioning research, Pricing Research, Shop and retail audits, Advertising Research – Copy Testing, Readership surveys and viewer ship surveys, Ad tracking, viral marketing research. Marketing effectiveness and analytics research: Customer Satisfaction Measurement, mystery shopping, Market and Sales Analysis

References

1. Marketing Research, Concept & Cases – Cooper Schindler.
2. Research for Marketing Decisions – Paul Green, Donald Tull, Gerald Albaurn
3. Marketing Research – Nargundkar.
4. Marketing Research – Beri
5. Marketing Research – Measurement & Methods – Donald S.Tull, Del I.Hawkins
6. Marketing Research –Aakar, Kumar, Day

VIII Semester	SERVICES MARKETING	4	100

Course Objectives:

COB 1:	To help in understanding on Services Marketing.
COB 2:	To help in understanding the importance of Services Marketing.
COB 3:	To help in analyzing the effects of Services Marketing.
COB 4:	To help in understanding services marketing of Financial and Insurance Services
COB 5:	To help in understanding services marketing of Health Care, Cellular and Entertainment Services

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe the meaning and concept Services Marketing.
CO 2 :	Explain the importance of Services Marketing.
CO 3 :	Distinguish between factors affecting Management of Services Marketing.
CO 4 :	Compare Service Marketing Practices.
CO 5 :	Able to understand the services marketing of Health Care, Cellular and Entertainment Services

UNIT- I:

Introduction to Services Marketing: Scope and Definition- Services Marketing Environment- Definition- Goods and Services- Components of Service- Characteristics- Service Delivery as a System- Service Facility Design and Layout- HRM Issues- -Building Services Aspirations- Tracking Customer Behavior-.

UNIT-II:

Key Dimensions of Services Marketing: Introduction- Service Environment- Service Blue Printing- Service Encounter- Customer Expectations- Demand- Supply Management- Service Quality- Service Quality Gap- Service Quality Audit-Delivering Quality Services- Communication Strategies- Bench Marking-TQM-Customer Satisfaction Measurement Techniques- MPQ-ROQ- Service Guarantees.

UNIT-III:

Management of Services Marketing: Introduction- Marketing Mix- Developing a Package- Product Attractiveness- Components of Promotion Mix- Strategic Services Marketing- Service Target Segments- Positioning the Services- Creating and Maintaining Value Relationship-Market Leadership Strategies.

UNIT-IV:

Service Marketing Practices I: Marketing of Financial and Insurance Services- Major Characteristics- Technological Innovations- Regulatory Mechanism- Marketing of Hospitality, Travel and Tourism Products- Marketing for Travel and Tourism- Segmentation- Tourism Marketing Strategies- Yield Management- Services Delivery- Global Service Quality- Marketing of Educational, Software and other Professional Services.

UNIT-V:

Service Marketing Practices II: Marketing of Health Care, Cellular and Entertainment Services-Health Care Marketing Strategy- Major Hospital Products- Cellular Promotion Mix- Entertainment Marketing Mix- Emerging Influence of Retailing and Shopping Malls- Internationalization of Services- Liberalization of Services- Off shoring – ITES- Industry Structure- Business Models

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Dr. S. Shajahan: Services Marketing, Himalaya Publishing House, New Delhi 2009.
2. Rajendra Nargundkar: –Services Marketing‖, Tata McGraw Hill, New Delhi, 2011.
3. S.M. Jha: Service Management and Marketing, Himalaya Publishing House, New Delhi, 2011.
4. C.Bhattacharjee :Services Marketing, Excel Books, New Delhi, 2010.

SYSTEMS

VIII Semester	**MANAGING SOFTWARE PROJECTS**	**4**	**100**

OBJECTIVES:

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

OUTCOMES:

- Able to match organizational needs to the most effective software development model
- Able to understand the basic concepts and issues of software project management
- Able to effectively Planning the software projects
- Able to implement the project plans through managing people, communications and change
- Able to select and employ mechanisms for tracking the software projects

UNIT -I: Introduction

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals
Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

UNIT -II: Project Approach

Lifecycle models, Choosing Technology, Prototyping
Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

UNIT -III: Effort estimation & activity Planning

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

UNIT -IV: Risk Management

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT -V: Project Monitoring & Control, Resource Allocation

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling, Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

REFERENCE BOOKS:

1. Software Project Management, Joel Henry, Pearson Education.

VIII Semester	BUSINESS INTELLIGENCE	4	100

Course Objectives:

COB 1:	To help in understanding basic concepts in Business Intelligence.
COB 2:	To help in understanding the importance of Business Intelligence.
COB 3:	To help in analyzing the effects of Business Intelligence.
COB 4	To Compare Business Rules with current practices.
COB 5	To Research on Business Intelligence Implementation.

Course Outcomes:

At the end of this course students will be able to:

CO 1 :	Describe the meaning of Business Intelligence.
CO 2 :	Explain the importance of Data Ware Housing.
CO 3 :	Distinguish Data Mining required for Business Intelligence.
CO 4 :	Compare Business Rules with current practices.
CO 5 :	Research on Business Intelligence Implementation.

UNIT- I:

Introduction to Business Intelligence: The Business pressure-Responses and support model-Definition of BI- Architecture of BI- Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business intelligence-Value driven and Information use-Performance metrics and key performance indicators-horizontal use cases for BI.

UNIT-II:

Data Ware Housing: Definitions and concepts-DW process an Innovation-Data Warehousing Implementation-Data warehousing Administration-Security Issues and future trends. Business Performance Management-Overview Strategic plan, monitor, performance measurement, BPM methodologies-BPM Techniques-Performance dashboard and scorecards

UNIT-III:

Data Mining for Business Intelligence: Data mining concepts and definitions-Data mining applications - Artificial neural Networks for data mining - Text and web mining-Natural language processing-Text mining applications-Text mining process-tools-Web mining overview-Web content overview-Web structure mining-Web usage mining.

UNIT-IV:

Business Rules: The Value Preposition of Business Rules - Business rules approach-Business rule system - Sources of business rules and management approach.

UNIT –V:

Business Intelligence Implementation: Business Intelligence and integration - Implementation 5 connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI. Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Amit Johri ―Business Intelligence‖ Himalaya, 2012.

2. Rajiv Sabherwal ―Business Intelligence‖ Wiley Publications, 2012.

3. Carlo Vercellis ―Business Intelligence‖ Wiley Publications, 2012.

4. Nina Godbole & Sunit Belapure ―Cyber Security‖ Wiley India 2012.

5. Jawadekar, MIS Text and Cases, TMH, 2012.

6. Efraim Turban et al. ―Business Intelligence‖ 2e, Pearson Education, 2012.

VIII Semester	SAP MODULES (FICO/SD/HRM/MM/SCM)	4	100

Course Objectives:

COB 1:	Be familiar with basic Concepts of SAP and Object-Oriented Programming.
COB 2:	To acquire general knowledge on SAP Objective Settings process, Appraisals template Creation and its integrations with other components.
COB 3:	To understand the mechanism of SAP and its Functional Modules.
COB 4:	To understand and Apply the SAP Master Data.
COB 5:	To understand and Apply the SAP functional Modules-FI/CO, HRM, SD.

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Understand the Date Wearhouse and apply the architecture of Data Warehouses.
CO 2:	Understand and Apply the Object-Oriented programming and BPM Implementation of plans and strategies to the organization.
CO 3:	Apply the concepts of Organizational Management and Commodity Management.
CO 4:	Understand and Apply the SAP Master Data.
CO 5:	Understand and Apply the SAP functional Modules-FI/CO, HRM, SD.

UNIT-I:

Introduction to data warehouses: Introduction to Data Warehouse, OLTP Systems; Differences between OLTP Systems and Data Warehouse: Characteristics, Functions, Applications and types of Data Warehouse.SAP Portfolio Overview: Identify the parts of the SAP Portfolio, Listing the key capabilities of SAP Net weaver, considering the Release strategy of SAP

UNIT-II: Introduction to Object –Oriented Programming: Object-Oriented Programming Model, Analyzing and Design Unified Modeling Language (UML), Class, Objects, Constructors. Business Processes Management: Definition, Process of BPM, Process Models, BPM Life Cycle, Process Identification, Core Processes, Support Processes.

UNIT-III: Organizational Management Concepts: Organizational Management Concepts, Objects Relationships, planning objects, confirm the active plan version, object characteristics. Commodity Management: SAP Commodity Procurement, SAP Commodity Sales, SAP Commodity Risk Management.

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NIT-IV: SAP Master Data: Master Data Introduction-Explore SAP ERP Basics Master Data, MDG Overview, Roadmap and Product Portfolio-Explore MDG Introduction Central Governance and Mass Processing-Describe the general concepts and capabilities of SAP MDG, central governance- Illustrate the scope of SAP MDG, central governance in the current version- Understand EIM Product Portfolio.

UNIT-V: SAP Modules: FI/CO-Automatic Payments- Dunning Program- Correspondence- Basics of Parallel Accounting- Document Control- Posting Control- Clearing, HRM-Organization management –time management –payroll-ESS& MSS, SD-Enterprise Structures in sales and Distribution –Overview of sales Process-master data in sales and distribution.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining and OLAP‖, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. SAP S/4 HANA. An Introduction written by Devraj Bardhan, Axel Baumartl, Nga-Sze Choi, Mark Dudgeon, Asidhara Lahiri, Bert Meijerink, Andrew Worsley-Tonks.
3. Commodity Derivatives and Risk Management by Prabin

IX Semester	**INTELLECTUAL PROPERT RIGHTS**	**4**	**100**

Course Objectives:

COB 1:	To acquaint the students with basics of intellectual property rights with special Reference to Indian Laws and its practices.
COB 2:	To provide an overview of the statutory, procedural, and case law underlining Copyrights.
COB 3:	Patents, and its types & compulsory licensing.
COB 4:	To create awareness on trademarks and registration aspects.
COB 5:	To acquaint the knowledge on protection of E-documents and cyber-crimes-prevention and punishments.

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Gained Knowledge on International Instruments and IPR, IPR Tool Kit - Protection and Regulation
CO 2:	Knowledge on copyrights and its related rights and registration aspects.
CO 3:	Awareness of patents in India –registration, ownership, infringement, current trends in IPR and Govt. steps in fostering IPR.
CO 4:	Knowledge on trademarks and registration aspects.
CO 5:	Awareness on protection of E-documents and cyber-crimes-prevention and Punishments.

UNIT-I:

Introduction to Intellectual Property Rights (IPR): Concept of Property - Introduction to IPR – Types of IPR-International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Industrial Property- Agencies for IPR Registration – Emerging Areas of IPR - Use and Misuse of Intellectual Property Rights.

UNIT-II:

Copyrights and Neighboring Rights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership-Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations.

UNIT-III:

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents.

UNIT-IV:

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies.

UNIT-V:

Cyber Law and Cyber Crime: Introduction to Cyber Law –Information Technology amendment Act 2023- Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

Reference Books:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford UniversityPress, New Delhi.
2. Deborah E. Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. Prabhuddha Ganguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers-B.S Publications.

IX Semester	**CORPORATE GOVERNANCE**	**4**	**100**

Course Objectives:

COB 1:	To inculcate about Corporate Governance in all walks of life.
COB 2:	To help in understanding the importance of Corporate Governance.
COB 3:	To understand the land marks in emergence of Corporate Governance.
COB 4:	To Compare and contrast the practical applications of corporate governance and employees.
COB 5:	To Evaluate corporate social responsibilities and sustainability.

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Describe the meaning of Corporate Governance.
CO 2:	Explain the importance of Corporate Governance in Indian Scenario.
CO 3:	Identify various models of Corporate Governance.
CO 4:	Compare and contrast the practical applications of corporate governance and employees.
CO 5:	Evaluate corporate social responsibilities and sustainability.

UNIT-I:

Corporate Governance: An overview – Theory and Practice of Governance- Indian model of Governance- Good Corporate Governance – Land marks in emergence of Governance OECB Principles – Sarbanes-Oxley Act 2002- SEBI Initiatives

UNIT-II:

Corporate Governance Indian Scenario: Role of Government in Ensuring Corporate Governance - Governance issues relating to Board of Directors – Duties and responsibilities of Auditors – Governance under limited competition – Role of Media – Corporate Governance in Developing and Transiting Economies.

UNIT-III:

Land marks in emergence of Corporate Governance: CG Committees – OECD Principles- McKinsey Survey on CG –Indian Committees and guidelines – Models of Governance – Managerial Obligations- Obligations towards employees, Customers, and Investors.

UNIT-IV:

Corporate Governance and other Stakeholders: Corporate Governance and employees, Customers, Institutional Investors Creditors, Community and Government – Grievance Redressal Process – Poor Track Record of Shareholder Protection.

UNIT-V:

The Reality of the Board Room: Directors' Capabilities and Responsibilities – Board effectiveness – Assessment of Directors, Boards, and Companies – Corporate Risk Management - Corporate Social Responsibilities and Sustainability.

Reference Books:

1. S.K. Mandal: ‗**Ethics in Business and Corporate Governance**‖, TMH, New Delhi, 2012.
2. S. Prabhakaran: ‗**Business Ethics and Corporate Governance**‖, Excel Books, New Delhi, 2011.
3. N. Balasubramanyam: ‗**A Case Book on Corporate Governance and Stewardship**‖, TMH., New Delhi, 2011.
4. A.C. Fernando: ‗**Business Ethics and Corporate Governance**‖, Pearson Publishers, New Delhi, 2013.
5. Bob Tricker: ‗**Corporate Governance**‖, Oxford University Press, New Delhi, 2010.

HR SPECIALIZATION

IX Semester	**INTERNATIONAL HUMAN RESOURCE MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To understand the concept of globalization and its challenges.
COB 2:	To understand the concept of global HR planning.
COB 3:	To understand the models & theories of cross culture.
COB 4:	To understand the implications of Indian system & global assignments.
COB 5:	To understand the challenges of HRD & Quality of work life.

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Understand the HR in Global perspective.
CO 2:	Understand forecasting of HR in an effective manner.
CO 3:	Understand the cultural & behavioral variables in HRM of International organization.
CO 4:	Ability to handle employee issues & evaluate the new trends in IHRM
CO 5:	Understand the strategic perspective of IHRM

UNIT I

Introduction: A Global HR Perspective in New Economy-Challenges of Globalization - Implications of Managing People and Leveraging Human Resource - Strategic Role of International HRM – Distinction between Domestic and International HRM – HR Challenges at International Level.

UNIT II

Managing International Assignments: Significance -Global HR Planning – Staffing policy – Training and development – performance appraisal –International Labour relations – Industrial democracy - Positioning Expatriate – Repatriate – factors of consideration - Strategies - Legal content of Global HRM- International assignments for Women - Problems.

UNIT III

Cross Culture Management: Importance – Concepts and issues – theories- considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams. Talent crunch – Indian MNCs and Challenges.

UNIT IV

Compensation Management: Objectives -Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – Approaches of Compensation in Global Assignments - global compensation implications on Indian systems - Performance Management.

UNIT V

Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Subba Rao P: ‒International Human Resource Management‖, Himalaya Publishing House, Hyderabad, 2011
2. NilanjanSen Gupta: ‒International Human Resource Management Text and cases‖ Excel Books, New Delhi.
3. Tony Edwards :—International Human Resource Management‖, Pearson Education, New Delhi, 2012
4. Aswathappa K, Sadhana Dash: ‒International Human Resource Management, TMH, New Delhi,
5. Monir H Tayeb: ‒International Human Resource Management‖, Oxford Universities Press, Hyderabad, 2012.

IX Semester	**LABOR WELFARE & LEGISLATION**	**4**	**100**

Course Objectives:

COB 1:	To help in understanding different legislations in labour welfare.
COB 2:	To establish practical understanding about the applications of legislations.
COB 3:	To help in analyzing the impact of legislations on Human Resource Welfare Practices.
COB:4	To understand the importance of labor welfare
COB:5	To develop good understanding of labor welfare programmes

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Describe the meaning and concept of welfare legislations.
CO 2:	Explain legislations relating to industrial relations.
CO 3:	Distinguish wage and social security legislations
CO 4:	Compare labour welfare in Indian organizations.
CO 5:	Research on labour welfare programs in India and contribution of CBWE.

UNIT-I:

Welfare Legislation: Factories Act 1948, Mines Act 1952, Plantation Labour Act 1951, Contract Labour (Regulation and Abolition) Act 1970 and A.P. Shops and Establishments Act.

UNIT-II:

Industrial Relations Legislation: Industrial Disputes Act 1947; Industrial Employment (standing orders) Act 1946 and Trade Unions Act 1926.

UNIT-III:

Wage and Social Security Legislation: Payment of wages Act 1936 - Minimum wages Act 1948 - Payment of Bonus Act 1966 -. Payment of Gratuity Act 1972 - Workmen's Compensation Act 1923 - Employees State Insurance Act 1948 - Maternity Benefit Act 1961 and Employees Provident Fund and Miscellaneous Provisions Act 1952.

UNIT-IV:

Labour Welfare: Concept, scope and philosophy, principles of labour welfare, Indian constitution on labour, Agencies of labour welfare and their role. Impact of ILO on labour welfare in India. Labour problems – Indebtedness, Absenteeism, Alcoholism, Personal and Family Counselling.

UNIT-V:

Labour welfare programmes: Statutory and non-statutory, extra mural and intra mural, Central Board of Workers' Education; Workers' Cooperatives; Welfare Centers, Welfare Officers' Role, Status and Functions. Role of social work in industry.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Govt. of India (Ministry of Labour, 1969). Report of the Commission on Labour Welfare, New Delhi: Author.
2. Govt. of India (Ministry of Labour, 1983). Report on Royal Commission on Labour in India, New Delhi: Author.
3. Malik, P.L: ‒Industrial Law‖, Eastern Book Company. Laknow, 1977.
4. Moorthy, M.V: ―Principles of Labour Welfare‖, Oxford University Press, New Delhi.
5. Pant, S.C: ‒Indian Labour Problems‖, Chaitanya Pub. House. Allahabad.

IX Semester	**MANAGEMENT OF INDUSTRIAL RELATIONS (ELECTIVE IX-HR)**	**4**	**100**

Course Objectives:

COB 1:	To make aware of the various concepts of Industrial Relations.
COB 2:	To help in understanding the importance of congenial Industrial relations.
COB 3:	To help in analyzing the role of industrial relations in organizational Development.
COB 4:	To help in understanding problems faced by organizations in maintaining industrial relations.
COB 5:	To research on employee grievances and its causes.

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Describe the meaning and concepts of industrial relations.
CO 2:	Explain about contribution of Trade unions in managing industrial relations.
CO 3:	Distinguish between various factors affecting quality of work life
CO 4:	Compare social security in India and other countries.
CO 5:	Discuss research on employee grievances and its causes.

UNIT-I:

Industrial Relations Management: Concept- Evaluation –Background of industrial Relations in India- Influencing factors of IR in enterprise and the consequences. Economic, Social and Political environments- Employment Structure –Social Partnership-Wider approaches to industrial relations- Labour Market.

UNIT-II:

Trade Unions: Introduction-Definition and objectives-growth of Trade Unions in India-trade Unions Act, 1926 and Legal framework-Union recognition-Union Problems-Employees Association-introduction, Objective Membership, Financial Status.

UNIT-III:

Quality of Work Life: Workers' Participation in Management - Worker's Participation in India, shop floor, Plant Level, Board Level- Workers' Welfare in Indian scenario- Collective bargaining concepts & Characteristics –Promoting peace.Wage and Salary administration: Nature & Significance of wage, salary administration, essentials- Minimum wage- Fair wage, Real wage, Incentives & fringe benefits. Issues and Constraints in Wage Determination in India.

UNIT-IV:

Social Security: Introduction and types –Social Security in India, Health and Occupational safety programs- Salient features of Workmen Compensation Act and Employees' State Insurance Act relating to social security – Workers' education objectives -Rewarding.

UNIT-V:

Employee Grievances: Causes of Grievances –Conciliation, Arbitration and Adjudication procedural aspects for Settlement of Grievances –Standing Orders- Code Discipline. Industrial Disputes: Meaning, nature and scope of industrial disputes - Cases and Consequences of Industrial Disputes –Prevention and Settlement of industrial disputes in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. C.S Venkataratnam: ‒Industrial Relations‖, Oxford University Press, New Delhi, 2011.
2. Sinha: ‒Industrial Relations, Trade Unions and Labour Legislation‖, Pearson Education, New Delhi, 2013.
3. Mamoria: ‒Dynamics of Industrial Relations‖, Himalaya Publishing House, New Delhi, 2010.
4. B.D.Singh: ‒Industrial Relations‖ Excel Books, New Delhi, 2010.
5. Arun Monappa: ‒Industrial Relations‖, TMH, New Delhi, 2012.
6. Prof. N.Sambasiva Rao and Dr. Nirmal Kumar: ‒Human Resource Management and Industrial Relations‖, Himalaya Publishing House, Mumbai.
7. Ratna Sen: ‒Industrial Relations‖, MacMillon Publishers, New Delhi, 2011.

FINANCE SPECIALIZATION

IX Semester	INTERNATIONAL FINANCIAL MANAGEMENT	4	100

Course Objectives:

COB 1:	To understand international financial and monitory aspects
COB 2:	To know the techniques and risks in foreign exchange system
COB 3:	To know the different financial markets and its instruments
COB 4:	To Understand the concept of foreign investment decisions
COB:5	To create awareness on currency transfers.

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Analyze various trends in international financial management
CO 2:	Explain the process of exchange risks
CO 3:	Identify various alternative instruments in international financial system
CO 4:	Able to analyze the risks involved in foreign investment decisions
CO 5:	Create awareness on foreign currency transactions

Unit I
International Monetary and Financial System: Evolution; Breton Woods Conference and Other Exchange Rate Regimes; European Monetary System, South East Asia Crisis and Current Trends.

Unit II
Foreign Exchange Risk: Transaction Exposure; Accounting Exposure and Operating Exposure – Management of Exposures – Internal Techniques, Management of Risk in Foreign Exchange Markets: Forex Derivatives – Swaps, futures and Options and Forward Contracts (Cases).

Unit III
Features of Different International Markets: Euro Loans, CPs, Floating Rate Instruments, Loan Syndication, Euro Deposits, International Bonds, Euro Bonds and Process of Issue of GDRs andADRs.

Unit IV
Foreign Investment Decisions : Corporate Strategy and Foreign Direct Investment; Multinational Capital Budgeting; International Acquisition and Valuation, Adjusting for Risk in Foreign Investment.

Unit V
International Accounting and Reporting; Foreign Currency Transactions, Multinational TransferPricing and Performance Measurement; Consolidated Financial Reporting.

References:

1. Buckley Adrin, Multinational Finance, 3rd Edition, Engle Wood Cliffs, Prentice Hall of India.
2. S.P.Srinivasan, B.Janakiram, International Financial Management, Wiley India, New Delhi.
3. Clark, International Financial Management, Cengage, ND
4. V.Sharan, International Financial Management, 3rd Edition, Prentice Hall of India.
5. A.K.Seth, International Financial Management, Galgothia Publishing Company.
6. P.G.Apte, International Financial Management, Tata McGrw Hill, 3rd Edition.
7. Bhalla, V.K., International Financial Management, 2nd Edition, New Delhi, Anmol, 2001.
8. V.A.Avadhani, International Financial Management, Himalaya Publishing House.
9. Bhalla, V.K., Managing International Investment and Finance, New Delhi, Anmol, 1997.

IX Semester	**RISK MANAGEMENT (ELECTIVE VIII-FINANCE**	**4**	**100**

Course Objectives:

COB 1:	To make aware of the various concepts of risk management.
COB 2:	To help in understanding the importance of risk management.
COB 3:	To help in analyzing the role risk management in Business.
COB 4:	To help in understanding problems faced in risk management.
COB 5:	To Research on Important Concepts of Risk Management.

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Describe the meaning and concepts of risk management.
CO 2:	Explain about issues in measurement f risk.
CO 3:	Distinguish between various factors affecting management and measurement of risk.
CO 4:	Compare Regulatory and Other Issues in Risk Management.
CO 5:	Research on Important Concepts of Risk Management.

UNIT-I:

Introduction to Risk Management: Role of Financial Institutions- Future Trends and Global Issues- Financial Services provided by Intermediaries- Need of Risk Management- What is Risk- Sources of various Risk- Risk Management frame work in Organization- Identification of Risks like Liquidity Risk, Market Risk, Foreign Exchange Risk, Operational Risk etc.

UNIT-II:

Measurement of Risks: Measurement of Interest Rate Risk and Market Rate Risk- Measurement of Credit Risk- Measurement of operational and Technology Risk- Measurement of Foreign Exchange and Sovereign Risk- Measurement of Liquidity Risk- Measurement of Off-Balance Sheet Risks.

UNIT-III:

Management of Risks: Risk Management Tools- Interest Rate Risk Management- Market Risk Management- Credit Risk Management- Operational Risk Management- Foreign Exchange and Sovereign Risk Management- Liquidity Risk Management- Management of Capital Adequacy- Risk Reporting

UNIT-IV:

Regulatory and Other Issues in Risk Management: Regulatory Frame Work- Revised RBI Risk Management Norms to Banks- Organizational Structure for Market and Credit Risk- SEBI, NHB- Bank for International Settlement- BASEL Committee on Banking Supervision- BASEL Settlement I, II & III- Calculation of Minimum CapitalRequirements.

UNIT-V:

Important Concepts of Risk Management: Time Value of Money- Advance Bond Concepts- Calculation of VaR-and CaR. Balck-Scholes Model- Moody's KMV Portfolio Manager- Probability Distribution and Fundamentals of Statistics- Derivative Products and its Markets- Margin and Mark-to-Market. Emerging trends in risk management

Relevant cases have to be discussed in each unit and in examination case is compulsory fromany unit.

Reference Books:

1. Dr. G. Kotreshwar: –Risk Management‖, Himalaya Publishing House, Delhi. 2012.
2. Trieschmann, Hoyt, Sommer: –Risk Management and Insurance‖, Cengage Learning. 2005.
3. Dhanesh Kumar Khatri: –Derivatives and Risk Management‖, Mac Millan, 2012.
4. Vivek, P.N. Asthana: –Financial Risk Management‖, Himalaya Publishing House, Delhi. 2012.
5. Rene M. Stulz. –Risk Management & Derivatives‖ Cengage Learning. 2003.

IX Semester	TAXATION	4	100

Course Objectives:

COB 1:	To make students aware of Finance Act, Income Tax Act & Principles of Tax
COB 2:	To understand various provisions of the Income Tax
COB 3:	To understand about Assessment of various Persons
COB:4	To help the students in analyzing Corporate Taxation
COB:5	To understand about Tax Auditor Qualifications and Disqualifications

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Interpret basic concepts of Finance Act & Income Tax
CO 2:	Computation of Total Income of Individuals and Filing of Income Tax Returns within the due dates
CO 3:	Computation of Total Income of Partnership Firms, HUF & AOP
CO 4:	Understanding of MAT provisions & tax treatment on Amalgamation & Demerger of Companies
CO 5:	Understanding of different forms, reports & disclosures in Financial Statements

Unit –I
General Principles of Tax – Direct and Indirect Taxes – State Power to Levy Tax – Tax System –Provisions of Income Tax Act 1961 – Finance Act – Basic Concepts.

Unit- II
Income Tax – Deductions, Computation, Payment and Accounting- deductions from Gross Total Income, Rebates and Reliefs and Computation of Taxable Income and Tax Payable, Filing of Income Tax Returns – Provisions, Forms and Due Dates, Notices and Assessments.

Unit III
Tax Planning for Firms, HUFs and AOPs- partnership firm under Income Tax Law, tax deductions available to firms, Provisions relating to interest and remuneration paid to partner, Computation of partnership firms' book profit, Set-off and carry-forward of losses of Firms and taxation of HUFs and Associations of Persons (AOPs).

Unit IV
Corporate Taxation- Computation of taxable income, Carry-forward and set-off of losses for companies, Minimum Alternative Tax (MAT), Set-off and Carry-forward of Amalgamation Losses, Tax Planning for Amalgamation, Merger and Demerger of Companies, Tax Provisions for Venture Capital Funds.

Unit V
Tax Audit and Accounting for Income Tax - Tax Audit, Qualities and Qualifications Required in Tax Auditors, Forms, Reports and Returns and Tax Reporting and Disclosure in Financial Statements

Suggested Readings:

1. Dr. V.K. Singhania & Dr. Kapil Singhania, Direct Taxes Law and Practice, Taxman Publications Pvt.Ltd., New Delhi.

2. Bhagavati Prasad, Direct Taxes Law and Practice, Wishwa Prakashan, New Delhi.

3. Dinkar Pagare, Income Tax and Practice, Sultan Chand and Sons, New Delhi.

MARKETING SPECIALIZATION

IX Semester	**PROMOTION AND DISTRIBUTION MANAGEMENT**	**4**	**100**

Course Objectives:

COB 1:	To help in understanding of basic concepts of Promotional and Distribution Management.
COB 2:	To help in understanding the importance of Promotional and Distribution Management in business.
COB 3:	To help in analysing the effects of Promotional and Distribution Management.
COB 4:	To Compare Channel Institutions and Designing Channel System.
COB 5:	To Examine on Ethical and Social Issues in Distribution Management.

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Describe the meaning of Promotional Management.
CO 2:	Explain the importance of Distribution Management.
CO 3:	Demonstrate Marketing Channels used for promotion and distribution Management.
CO 4:	Compare Channel Institutions and Designing Channel System.
CO 5:	Examine on Ethical and Social Issues in Distribution Management.

UNIT-I:

Introduction to Promotional Management: Sales Display and Sales Promotion- Sales Promotion Objectives- Types of Sales Displays- Factors Influencing Sales Promotion- Tools of Sales Promotion- Sales Promotion Strategies- Sales Promotion and Consumer Behavior- Consumers Price Perceptions- Perceived Risk and Attitudes- Types of Promotion.

UNIT-II:

Introduction to Distribution Management: Physical Distribution Management- The Concepts of Total Distribution Costs and Cost Trade-offs- Customer Service Standards- Strategic Issues in Physical Distribution- Challenges and Opportunities- From Physical Distribution to Marketing Logistics- Major Logistics Functions

UNIT-III:

Marketing Channels: Nature and Importance of Marketing Channels- Emergence of Marketing Channel Structures- Types of Marketing Channels- Direct Marketing Channels vs Indirect Marketing Channels- Problems in Distribution- Selection of Distribution Channels- Channel Decisions

UNIT-IV:

Channel Institutions and Designing Channel System: Wholesaling- Agent Wholesaling Middle Man- Patterns in Wholesaling- Wholesaler Marketing Decision- Changing Patterns- Channel Design Decisions- Channel Design Comparison Factors- Ideal Channel Structure-Types of Channels- Implementation and Integration of Channel Design.

UNIT-V:

Ethical and Social Issues in Distribution Management: Business Ethics and Sales Management - Ethical Issues facing Sales Managers - Managing Sales Ethics - Modeling Ethical Behavior - Making Decisions on Ethical Problems - Building a Sales Ethics Programme- International Distribution - Challenges in Managing an International Distribution Strategy.

Relevant cases have to be discussed in each unit and in examination case is compulsory fromany unit.

Reference Books:

1. K. Shridhara Bhat: ―Sales and Distribution Management‖, Himalaya PublishingHouse, 2011.
2. Dr. Matin Khan: –Sales and Distribution Management‖, Excel Books, New Delhi, 2005.
3. Pingali Venugopal: ―Sales and Distribution Management‖, Sage Publications, NewDelhi, 2008.
4. Dr. S. L. Gupta: –Sales and Distribution Management‖, Excel Books, 2010.

IX Semester	International Marketing Management	4	100

Course Objectives:

COB 1:	To help in understand various environmental factors effecting global marketer
COB 2:	To help in recognize perspective of global markets
COB 3:	To help in understanding global pricing strategies
COB:4	To help in understanding global promotional strategies
COB:5	To help in analyzing planning and control of global marketing operations

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Describe the meaning and concept of international marketing management
CO 2:	Recognize global markets and criteria for grouping countries
CO 3:	Able to take product pricing decisions in global market
CO 4:	Able to make multinational sales promotions
CO 5:	Able to understand plan and strategy for global business

Unit – I
Globalization: Scope and Objectives – Major Decisions in Global Business - Environmental Factors Effecting global Business; Economic Environment – Cultural Environment – Political Environment – Legal Environment – Regional Integration and Global Trade Protectionism.

Unit – II
Perspective of Global Markets: Global Marketing Research and Information – Information Requirements of Global Markets – Organization for Global Market Research – Global Marketing Information System - Segmenting the Global Market – Segmentation Basis and Process – Global Markets and Criteria for Grouping Countries.

Unit – III
Global Marketing Decisions: Product Policy and Planning – Global Pricing Strategies
– Global Channels of Distribution.

Unit – IV
Global Advertising – Multinational Sales Management and Foreign Sales Promotion – Export Procedure & Documentation – Special Economic Zones.

Unit – V
Planning and Control of Global Marketing Operations: Organization and Control in global Marketing – Marketing Planning and Strategy for Global Business.
(Case Studies are Compulsory)

References:

1. Wareen J.Keegan : Global Marketing Management

2. Keifer Lee, Steve Carter, Global Marketing Management, Oxford University Press.
3. Gillispe, International Marketing, Cengage, ND
4. Jean-Pierre Jennet & H. David Hennessey, Global Marketing Strategies, Wiley India, Delhi.
5. Vasudeva: International Marketing, Excel Publications.
6. Dana-Nicoleta Lascu, International Marketing, Wiley India, New Delhi.
7. Varshney R.L. & Bhattacharya : International Marketing Management
8. Subhash C.Jain : International Marketing Management Saravanauel. P : International Marketing.

IX Semester	**DIGITAL AND SOCIAL MEDIA MARKETING**	100	**4**	**0**	**0**	**3**

Course Objectives:

COB 1:	To help in understand digital marketing
COB 2:	To help in understand channels of digital marketing
COB 3:	To help in analyzing digital marketing plan
COB 4:	To help in understand search engine marketing and online advertising
COB 5:	To help in understand social media marketing

Course Outcomes:

At the end of this course students will be able to:

CO 1:	Understand the conceptual framework of digital marketing and its strategies to make use of various web presence options
CO 2:	Recognize different social media platform and develop profile on various social media platforms for campaigning
CO 3:	Able to write digital market plan and process to implementing the plan
CO 4:	Analyze and apply diverse tools for digital marketing so as to make presence in the market.
CO 5:	Able to make social media campaigns by using various online analytical platforms for brand building

Unit – I Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

Unit – II Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels. Marketing in the Digital Era Segmentation – Importance of Audience Segmentation, How different segments use Digital Media –Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

Unit – III Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

Unit – IV Search Engine Marketing and Online Advertising Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

Unit – V Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Micro blogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

SYSTEMS SPECIALIZATION

IX Semester	**CYBER LAWS & SECURITY**	**4**	**100**

Course Objectives:

COB 1:	To help in understanding basic concepts in cyber security.
COB 2:	To help in understanding the importance of Secure System Planning and administration
COB 3:	To help in analysing the effects of Secure System Planning and administration.
COB4:	To Compare and contrast the practical applications of Information security systems.
COB5:	To Research on Organizational and Human Security.

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Describe the meaning and concepts of cyber security.
CO 2:	Explain the importance of Secure System Planning and administration.
CO 3:	Distinguish Information security policies and procedures in organizations.
CO 4:	Compare and contrast the practical applications of Information security systems.
CO 5:	Research on Organizational and Human Security.

UNIT-I:

Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II:

Secure System Planning and administration: Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III:

Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy-developingstandards.

UNIT-IV:

Information security: fundamentals-Employee responsibilities- information classification Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V:

Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

Relevant cases have to be discussed in each unit and in examination case iscompulsory from any unit.

Reference Books:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)‖, 2nd Edition, O' Reilly Media, 2006.
2. Thomas R. Peltier, ―Information Security policies and procedures: A Practitioner's Reference‖, 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, ―Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions‖, IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John blackley,
5. ‖Information Security Fundamentals‖, 2nd Edition, Prentice Hall, 1996.
6. Jonathan Rosenoer, ―Cyber law: the Law of the Internet‖, Springer-verlag, 1997.

IX Semester	INFORMATION SYSTEMS & AUDIT	4	100

Course Objectives:

COB 1:	To help in understanding basic concepts in Information Systems Audit.
COB 2:	To help in understanding the importance of Information and systems audit.
COB 3:	To help in analyzing the effects of Information Systems and Audit.
COB4:	To Compare and contrast Evidence Evaluation systems.
COB5:	To Research corporate governance issues in Indian context.

Course Outcomes:
At the end of this course students will be able to:

CO 1:	Describe the meaning and concepts of Information System Auditing.
CO 2:	Explain the importance of Management Control Framework.
CO 3:	Distinguish Management Control Framework required for establishing effective controls.
CO 4:	Compare and contrast Evidence Evaluation systems.
CO 5:	Research corporate governance issues in Indian context.

UNIT-I:

Overview of Information System Auditing: Effect of Computers on Internal Controls, Effects of Computers on Auditing, Foundations of information Systems Auditing, Conducting an Information Systems Audit.

UNIT-II:

The Management Control Framework-I: Introduction, Evaluation the Planning Function, Leading Function and Controlling Function, Systems Development - Management Controls, Approaches to Auditing Systems Development , Normative Models of the Systems Development Process, Evaluating the Major phases in the Systems Development Process, Programming Management Controls, Data Resource Management Controls.

UNIT-III:

The Management Control Framework-II: Security Management Controls, Operations Management Controls Quality Assurance Management Controls-Case Studies.

UNIT-IV:

Evidence Collection: Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires, and

Control Flowcharts. Performance Management tools- Case Studies.

UNIT-V:

Evidence Evaluation: Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Evaluating System Efficiency. Information Systems Audit and Management: Managing the Information Systems Audit Function,

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Ron Weber: –Information Systems Control and Audit‖, Pearson Education, 2013.
2. D P Dube: Information System Audit and Assurance, TMH, New Delhi, 2008.

IX Semester	**CLOUD COMPUTING**	**4**	**100**

Course Objectives (COBs)

COB 1:
To understand the concepts of systems modeling, virtualization, and scalable computing in distributed and cloud environments.
COB 2:
To analyze virtualization technologies, virtual machines, and data center automation for efficient cloud resource management.
COB 3:
To explore cloud platform architectures, service models, inter-cloud resource management, and security frameworks.
COB 4:
To develop skills in cloud programming, parallel and distributed paradigms, and using platforms like Google App Engine, AWS, and Azure.
COB 5:
To examine cloud resource management, scheduling policies, and algorithms for optimized performance in computing clouds.

Course Outcomes (COs)

CO1:
Explain the fundamentals of distributed and cloud computing, including system models, virtualization, performance, security, and energy efficiency.
CO2:
Apply virtualization techniques for CPU, memory, and I/O devices, and manage virtual clusters and data centers efficiently.
CO3:
Analyze cloud service models, platform architectures, middleware, and security mechanisms for cloud deployments.
CO4:
Implement cloud-based applications using programming environments and tools provided by Google App Engine, AWS, and Microsoft Azure.
CO5:
Design and evaluate resource management strategies and scheduling algorithms for efficient and deadline-aware cloud computing.

UNIT –I

Systems modeling, Clustering and virtualization
Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT- II
Virtual Machines and Virtualization of Clusters and Data Centers Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT- III
Cloud Platform Architecture
Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT –IV

Cloud Programming and Software Environments

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT- V

Cloud Resource Management and Scheduling

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

REFERNCE BOOKS:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola,