# Meenakshi Sundararajan Engineering College

## (An Autonomous Institution)

Managed by I.1.E.T Society, Approved by AICTE, New Delhi,
Affiliated to Anna University, Chennai,
Accredited by NAAC with 'A' grade and NBA for programs applied,
Recognized by UGC with 2(f) & 12(8) status

# B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
# CURRICULUM AND SYLLABUS
# REGULATIONS 2024
## CHOICE BASED CREDIT SYSTEM

**Powered by**

Meenakshi Sundararajan Career Development Cell

Achievers Excellence Program

Meenakshi Sundararajan Innovation and Incubation Centre

MSEC JAPANESE CLUB

Institutions' Innovation Council

Societal Beneficial Innovation

MATLAB Enabled Campus

**363, Arcot Road, Kodambakkam, Chennai - 600 024.**
**www. msec.edu.in**

# Meenakshi Sundararajan Engineering College

(An Autonomous Institution, Affiliated to Anna University, Chennai)

**Sundararajan,** educationalist,
of Engineering Technology (I.I.E.T) society in the year
Chennai. The total area of 14 acres was purchased with enormous hardship and was donated to the IIET Society for the cause of education. The society's main objective is to provide quality education and it has been ensured since 1951.

**The IIET Society has the following to its credit :**

An uninterrupted and continuous education since 1951 in its premises
All Colleges run by the institution are ranked among the top 5 – top programs in Tamil Nadu
350 KW Solar Power Plant Generating upto 70% of its electricity needs
Significant portion of the students are first generation learners

- Campus holds approximately 7000 plus students from the ages of 4 to 35 plus.
- Large Green Campus in the heart of the city of Chennai, Tamil Nadu
- In existence since 1947 – Completed 75 years
- Targeting to be Carbon Neutral from the end of the year 2025

**The society currently has the following institutions :-**

- **Meenakshi Sundararajan Engineering College(MSEC)** :stablished in 2001 & affiliated to Ann University offering engineering programs with about 2000 plus students.
- **Management(MSSM)**
  University of Madras offering MBA programs with about 100 plus students.
- **The NEST School (TNS)**- established in 2022 offering IB (International Baccalaureate) & CAIE (Cambridge) boards.

All of the institutions have earned an enviable name and are rated as one among Top 10 colleges in the Tamil Nadu state in their respective programs. Efforts are on to make the campus carbon neutral in 2 years (end of 2025) by using our community of staff and students.

**Meenakshi Sundararajan Engineering College (MSEC)** was established by the IIET Society in 2001. MSEC is defined by two keywords "Industry Ready" & "Vibrancy". Creating a new generation of self- actualized learners is our raison d'etre. If children are our future, then education is the key to their future. When education is shaped around them, and not the other way around, we are laying the foundation for a future/world where creativity, diversity and caring, independent-thinkers thrive. Our curricula thrive on continuous learning while interacting with and incorporating real-world situations and challenges.

## MSEC's Hallmark of Quality

Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi
Accredited by NBA for programs in:

- Civil Engineering
- Computer Science and Engineering
- Electronics and Communication Engineering
- Mechanical Engineering
- Electrical and Electronics Engineering
- Information Technology

Accredited by NAAC with a prestigious "A" grade
Declared under Section 2(f) and 12(B) of the UGC Act

- Conferred with Autonomous status for 10 years ( 2024-25 to 2033-34 ) by the University Grants Commission (UGC) on February 1, 2024
- Meenakshi Sundararajan Innovation and Incubation Centre ( MSIIC )
- Meenakshi Sundararajan Career Development Cell ( MSCDC )
- MSEC Research Centre ( MSEC RC)
- Center of Excellence – Industry Tie Up in Specialized Labs
- Industry MOU's – 200 Plus

## Vision of the Institute

To impart state-of-the-art technical education, including sterling values and shining character, producing engineers who contribute to nation building thereby achieving our ultimate objective of sustained development of an unparalleled society, nation and world at large.

## Mission of the Institute

Sundararajan Engineering college, constantly of Excellence with the singular aim of producing students of outstanding academic excellence and sterling character to benefit the society, our nation and the world at large.

To achieve this, the college ensures

Continuous upgradation of its teaching faculty to a high ıdard of quality education and to meet the ever-changing needs of the society

- Constant interaction with its stakeholders
- Linkage ions and industries at the national and international level for mutual benefit
- Provision of research facilities and infrastructure in line with global trends
- Adequate opportunities a ' exposure ' the stud through programs, develop their personality with an emphasis on professional ethics and moral values.

## We offer following courses:

| S.No | Course | Intake |
|---|---|---|
| | **Undergraduate courses in B.E / B. Tech** | |
| 01 | B.E Civil Engineering | 60 |
| 02 | B.E Computer Science and Engineering | 120 |
| 03 | B.E Electronics and Communication Engineering | 120 |
| 04 | B.E Electrical & Electronics Engineering | 60 |
| 05 | B.E Mechanical Engineering | 60 |
| 06 | B. Tech Information Technology | 120 |
| 07 | B. Tech Artificial Intelligence & Data Sciences | 120 |
| | **Postgraduate courses in M.E / M. Tech** | |
| 08 | M.E. Construction Engineering and Management | 18 |
| 09 | M.E. Computer Science and Engineering | 18 |
| 10 | M.E. Embedded System Technologies | 18 |
| 11 | M.E Energy Engineering | 18 |

## DEPARTMENT OFHUMANITIESAND SCIENCE

The H&S Department stands out for its commitment to providing a well-rounded academic experience for first-year students. Covering key subjects like Physics, Chemistry, Mathematics, English, and Tamil. The department boasts a high pass percentage in semester exams, a testament to the hard work and dedication of the faculty. This year, the department enhanced offerings with industry and alumni talks, foreign language courses, engaging games, and specialized coaching for AEP and ICS. Additionally, the department introduced an industry-oriented and department-specific syllabus to better prepare students for future challenges and opportunities

## DEPARTMENT OF CIVIL ENGINEERING

The Civil Engineering Department at our college, established in 2002, is a beacon of academic excellence and research innovation. Offering both undergraduate program and postgraduate program in M.E. Construction Engineering and Management, the department is committed to integrating advanced technologies and sustainable practices into its curriculum. The department boasts state-of-the-art laboratories and strong industry collaborations. Graduates of the department have made significant contributions to civil engineering, both nationally and internationally, and continue to shape the future of the discipline through unwavering commitment to excellence.

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

The Department of Computer Science and Engineering was established in 2001. It has its mission to inculcate innovative thinking and analytical abilities in addition to imparting quality education in the theory and application of Computer Science and Engineering. The department offers UG and PG programmes with State-of-the-art Computer laboratories equipped with high end hardware and software packages provided with high-speed leased line connectivity. The department takes pride in its academic excellence and outstanding placement records. It has consistently produced 68 university rank holders till 2023 batch and accredited by National Board of Accreditation.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

The Electrical and Electronics Engineering Department, established in 2003, is expanding its offerings to M.E. program in Embedded System Technologiesfrom the 2024-25 academic year. With a focus on knowledge - based training, the department faculty empowers students with a deep understanding of concepts and industry - ready skills. The department forged partnerships with 22 companies through MOUs, facilitating collaboration and knowledge exchange.

The Electrical Technocrats Association (ETA) is a vibrant platform for technical activities, including the publication and showcasing of newsletters by staff and students every fortnight. Our mission is to drive technological advancements, foster research, and address industry needs.

## DEPARTMENT OF MECHANICAL ENGINEERING

Meenakshi Sundararajan Engineering College inaugurated the Department of Mechanical Engineering in the academic year 2011-12. The department has well qualified faculties with excellent teaching, training and industrial experience. It has state-of-the-art laboratories which include VMC, CNC Wire Cut, Spark Erosion, 3D CMM etc catering to academic, consultancy and research requirements. The department's endeavor is to develop its students to be industry ready when they graduate. Students of mechanical engineering department gain industrial exposure and are prepared to face future challenges by carrying out their Final Year Project work in various PSU/Private sectors as per their field of interest relevant to their program. The department has a memorandum of understanding with various Institutions, Industries and Research organizations for collaborative research and development work. There is a huge potential in the department for Consultancy as well as Technology and Product incubation.

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

The Department of Electronics and Communication Engineering, established in 2001, has grown significantly increasing its sanctioned intake from 60 to 120 in 2010. With NBA accreditation, the department is committed to delivering quality education, producing graduates who excel technically, socially, and professionally. Its state-of-the-art infrastructure, featuring ICT-enabled classrooms and advanced laboratories with cutting-edge tools like Cortex M4, Spartan 6, IoT kits, MATLAB, Cadence and PSPICE that supports academic excellence.

The Department's industry linkages with renowned organizations including ISRO, DRDO, NLTVC, and Ericson enhance students' technical skills through interactive events.

The Department's achievements include academic excellence, impressive placement records, and students' accomplishments in sports, arts, and culture, with alumni globally represented in top companies like Intel, Yahoo, and Apple.

## DEPARTMENT OF INFORMATION TECHNOLOGY

department of Information Technology was
intake of 60 students focusing on the area. The department
to the college. The department constantly strives with the singular aim of producing students with outstanding academic excellence and sterling character to benefit the society, our nation and the world at large. The department's commitment to high academic standards and successful student placements. It has consistently produced 65 university rank holders till 2023 batch and accredited by National Board of accreditation. Campus Agreement has been signed with leading software and hardware giants like Microsoft, IBM, Adobe and HP. The department has received a certificate partnership as a "Center of Excellence" with Virtusa Technology.

## DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

The Department of Artificial Intelligence & Data Science was established in 2021 with an initial intake of 60 students, which was subsequently increased to 120 in 2024. Our department boasts a team of highly qualified, experienced, and competent faculty members and features spacious infrastructure with modern amenities, including six well-equipped computer laboratories with backup and internet facilities. We emphasize continuous knowledge enrichment through seminars, guest lectures, workshops, and skill enhancement programs for both students and faculty, and engage in meticulous academic planning to ensure a well-structured approach to each semester. Additionally, our student-driven club, serves as an incubation center, nurturing innovative ideas and fostering creativity.

## INTERNAL QUALITY ASSURANCE CELL (IQAC)

MSEC established the Internal Quality Assurance Cell (IQAC) in 2016 to develop and implement quality standards and benchmarks in key performance areas. In alignment with the National Education Policy (NEP) 2020 and subsequent reforms, the IQAC has been further strengthened to ensure compliance with the new policy directives.

Through IQAC, the institute strive to:

Maintain and enhance the quality of education and services
Align with our institution's vision and mission
Foster a culture of continuous improvement and excellence
Ensure accountability and transparency in institutional functioning
Promote innovative practices in teaching, learning, and research
Develop and implement effective quality benchmarks and parameters

- Facilitate student-centered learning and feedback mechanisms
- Enhance faculty development and capacity building
- Strengthen industry-academia partnerships and collaborations
- Ensure efficient governance and administrative processes
- Promote a culture of sustainability and social responsibility
- Facilitate accreditation and ranking processes
- Identify and mitigate quality assurance risks

## CONTROLLER OF EXAMINATION

The institution, granted autonomous status by UGC and Anna University from the academic year 2024-2025, has established the Controller of Examinations (COE) office to oversee assessment processes with confidentiality, ensuring quality and standards. The COE conducts fair examinations, declares results, and manages examination activities for Internal Assessment Tests (IATs) and Semester End Examinations (SEE). Their yearly schedule includes planning, coordinating, conducting, evaluating, and reviewing exams, as well as issuing certificates and transcripts. The COE ensures smooth conduct, maintains exam integrity, and coordinates with stakeholders, adapting to the institution's specific needs and exam cycle.

## MEENAKSHI SUNDARARAJAN RESEARCH CENTRE(MSRC)

The MSEC Research Centre has a steadfast commitment to fostering a strong research culture. It empowers students and faculties in their intellectual exploration and discovery. The center aims to advance knowledge, drive neoteric innovation, and contribute to the broader academic and industrial fraternity ultimately aimed at uplifting humankind.

## THE MEENAKSHI SUNDARARAJAN CAREER DEVELOPMENT COMMITTEE (MSCDC)

The Meenakshi Sundararajan Career Development Committee (MSCDC) is a strategic group dedicated to fostering students' professional growth and development. Our mission is to support students in achieving their career goals, fostering a culture of professional growth and development.

The MSCDC plays a vital role in aligning individual career goals through various initiatives, including:

1. Career Pathways
2. Specialised Expert Talk & Guidnace on Different Career Pathways
3. Higher Education – Awareness Sessions on various Geographical Locations
4. University Fairs
5. Training / Coaching Programs for different Competitive Exams
6. Repository / Text Books for various Competitive Exams

By providing a career pathway, we help students understand the opportunities available to them and what is required to achieve their career goals. We encourage students as they navigate their professional journey, providing them with the tools, knowledge, and opportunities needed for successful career development.

## OFFICE OF STUDENTS AFFAIRS

Our mission is to crea supportive tional environment that empowers

We achieve this by:

- Providing individualized support and responding to student needs
- Fostering a culture of academic integrity and excellence
- Promoting personal hygiene, cleanliness, discipline and sprucing
- Encouraging a moral code of conduct and respect for others
- Cultivating a sense of campus decency and decorum
- Modeling exemplary behavior and attitudes

By fulfilling these responsibilities, the institution aims to inspire students to become responsible, successful, and compassionate individuals who make a positive impact in their communities.

## COLLEGE COUNSELING SERVICES

College counseling services are essential in supporting students' overall well-being and academic success. These services often encompass various areas, including healthy mind well-being, career guidance, and academic counseling. Here's a breakdown of the typical counseling services available for college students in the institution:

**Counseling:**
psychologists to address personal issues such as relationship problems, and any other psychological concerns.
**Group Counseling:** Support groups where students with similar issues can share experiences and strategies for coping in a safe and supportive environment.
**Crisis Intervention:** Immediate support for students in distress, trauma response, and any emergency psychological concerns.

## TRAINING AND PLACEMENT CELL

Meenakshi Sundararajan Engineering College training placement committed to providing exceptional placement opportunities for its students. Placement Cell takes meticulous efforts to ensure that students are recruited by top notch companies in the industry.
The training pathway is established starting from the first semester with 180 Hours of Placement training which includes Communications Skills, Aptitude Training. Specialised Programming, Guidance on Certifications, Projects, Competitions, Grooming, Etiquette, Group Discussion and Mock Interviews.

Placement Cell leadership Officer, Faculty representatives and Coordinators from each department. The Cell's ultimate aim is to achieve 100% placement. Its Other Functions include

1. Implementation of the training pathway at appropriate semesters
2. Industry Talks
3. Alumni Talks
4. Arranging Internships & Projects
5. Centers of Excellence with Industry
6. Industry Specialised training & guidance

This comprehensive training empowers students to face the campus interviews with confidence through enhancing their employability skills for a successful future.

## DEPARTMENT OF PHYSICAL EDUCATION

Our college campus boasts an array of sports facilities, including

- Basketball Court
- Badminton Court
- Pickle Ball Court
- Volleyball
- Cricket / Foot Ball / Athletics Ground
- Tennis Court
- Kho Kho

The institution is much dedicated in nurturing the talent through specific college sports teams :

Expert coaching and mentorship
Formation of new sports teams
Dedicated Sports Hour (1 hour/week)

- Regular Sports Day events - that are meticulously planned for maximum student participation.

## DEPARTMENT OF SAFETY AND SECURITY

MSEC's Safety Department include the Chief Security Officer (Retd. Lt. Col), Trained & Certified Safety Officers (18) and Chief Safety Officer.

The department ensures a secure and hazard-free environment within the campus through:

- Monitoring all areas of the campus to ensure a secure environment
- Conducting daily reviews and maintaining a register to track and address any safety issues
- Performing maintenance tasks such as securing compound walls, replacing damaged fencing, and ensuring proper drainage
- Educating the community through regular safety awareness programs and training sessions
- Organizing fire drills and evacuation procedures to prepare for emergencies
- Identifying and mitigating potential hazards to prevent accidents
- Developing and implementing comprehensive safety policies to guide the community
- Continuously monitoring CCTV cameras to quickly respond to any security incidents

The department's proactive approach helps to prevent accidents, minimizes risks, and fosters a culture of safety among students, staff, and faculty members.

## MEENAKSHI SUNDARARAJAN INNOVATION AND INCUBATION CENTRE (MSIIC)

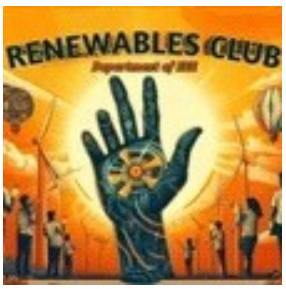
Meenakshi Sundararajan Innovation and Incubation Centre (MSIIC) is a dynamic and forward-thinking organization dedicated to fostering innovation, entrepreneurship, and skill development etc. Our center serves as a catalyst for a transformative change - providing aspiring entrepreneurs with the resources, mentorship, and support that is needed to turn their ideas into successful ventures. MSIIC is dedicated to promoting entrepreneurship and an innovative mindset among students and entrepreneurs at institutions. Through mentorship MSIIC helps to develop talents and support their initiatives, provide knowledge on market access and funding, and empower individuals to identify opportunities, take risks, and create positive change. The institution solely believes in entrepreneurship as a catalyst for innovation and societal impact, providing resources and a supportive environment for individuals to thrive and make a difference in their communities and beyond. Its activities include

1. Managing the 100 Seat Innovation & Incubation Center
2. Guidance to both Internal & External Start-ups from Ideation to Funding
3. Competitions – Identification & Mentoring
4. Conducting Competitions :- 30 Hour Hackathons, All India Hackathons etc.
5. Managing Student Clubs
6. Art & Music Festival
7. Skill Development / Value Added Courses
8. Societal Beneficial Projects

## MSEC STUDENTS CLUBS

objective to provide a platform
and improve their interests, strengths and passion. There are 7 clubs in our college namely, AI Epoch Club, Eco Design Club, Adyant Coding Club, Renewables Club, Nodenova IOT Club, Dev Dynasty Web App Development Club and Product Development Club. Clubs foster vibrant student community in the campus by conducting variety of events and activities which include workshops, seminars, technical and non-technical events, campus benefit projects, long term projects such as SAE Baja etc that cater to diverse interests. Clubs help the students to collaborate with different disciplines and exchange knowledge with peer groups.






# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department : Electronics and Communication Engineering, R2024, CBCS**

| Vision of the department | Mission of the department |
|---|---|
| To emerge as a Centre of excellence in offering quality education to produce students technically competent, socially responsible and industry ready graduates in electronics and communication engineering. | • Ensuring effective teaching learning methodologies.<br>• Inculcating creative thinking through innovative and group work exercises.<br>• Developing and motivating research ability among students by establishing research linkage with leading industries.<br>• Equipping faculty and students with the latest developments in Electronics and Communication and to face the challenges. |

**PROGRAM OUTCOMES (PO) and PROGRAM SPECIFIC OUTCOME (PSO)**

| | |
|---|---|
| **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 analyse 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 modelling 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 lifelong learning in the broadest context of technological change |
| **PSO1** | Demonstrate principles of basic electronic circuits, digital electronics, microprocessor and signal processing. |
| **PSO2** | Design systems for applications in the areas of communication, networking and embedded systems. |
| **PSO3** | Design low cost quality, energy efficient and eco-friendly products. |

# Meenakshi Sundararajan Engineering College

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Department: Electronics and Communication Engineering, R2024, CBCS

**Curriculum for I to VIII semesters**

| SEMESTER I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| | U24IP101 | Induction Program-Universal Human values | VAC | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24EN101 | Technical English | HSMC | 30 | 2 | 0 | 0 | 2 |
| 2 | U24MA101 | Mathematical Foundation for Engineers | BSC | 60 | 3 | 1 | 0 | 4 |
| 3 | U24PH103 | Physics for Electronics Engineering -1 | BSC | 45 | 3 | 0 | 0 | 3 |
| 4 | U24CY103 | Chemistry for Electrical and Electronics Engineering | BSC | 45 | 3 | 0 | 0 | 3 |
| 5 | U24TA101 | தமிழர்மரபு/ Heritage of Tamils | HSMC | 15 | 1 | 0 | 0 | 1 |
| 6 | U24EE103 | Basics of Electrical Engineering | ESC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL (TCP)** | | | | | | | | |
| 7 | U24CS101 | Programming in C | ESC | 90 | 2 | 0 | 4 | 4 |
| **PRACTICAL** | | | | | | | | |
| 8 | U24BS101 | Physics and Chemistry Laboratory | BSC | 60 | 0 | 0 | 4 | 2 |
| 9 | U24TP110 | Communication Skills Lab I | HSMC | 30 | 0 | 0 | 2 | 1 |
| 10 | U24ED111 | Design Thinking -Building Innovation & Solutioning Mindset | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| **TOTAL** | | | | **465** | **17** | **1** | **11** | **23.5** |

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| SEMESTER II | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| | U24IP201 | Value Added Course - II (Biology for Engineers) | VAC | 24 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24EN201 | Professional English | HSMC | 30 | 2 | 0 | 0 | 2 |
| 2 | U24MA203 | Differential Equations and Transforms | BSC | 60 | 3 | 1 | 0 | 4 |
| 3 | U24PH203 | Physics for Electronics Engineering -II | BSC | 45 | 3 | 0 | 0 | 3 |
| 4 | U24CY201 | Green and Sustainability Chemistry | BSC | 30 | 2 | 0 | 0 | 2 |
| 5 | U24TA201 | தமிழரும் ெ தாழில்நுட்பமும/ Tamils and Technology | HSMC | 15 | 1 | 0 | 0 | 1 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 6 | U24CS201 | Python Programming | ESC | 90 | 3 | 0 | 3 | 4.5 |
| 7 | U24CE203 | Engineering Graphics for Electronics and Communication Engineering | ESC | 75 | 3 | 0 | 2 | 4 |
| **PRACTICAL** | | | | | | | | |
| 8 | U24ME101 | Engineering Practices Laboratory | ESC | 60 | 0 | 0 | 4 | 2 |
| 9 | U24TP210 | Communication Skills Lab II | HSMC | 30 | 0 | 0 | 2 | 1 |
| 10 | U24ED211 | Decoding Innovation Opportunity | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| **TOTAL** | | | | **465** | **16** | **1** | **14** | **24** |

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**SEMESTER III**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| | | **VAC** | | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24MA303 | Random Process and Linear Algebra | BSC | 60 | 3 | 1 | 0 | 4 |
| 2 | U24EC301 | Signals and Systems | PCC | 60 | 3 | 1 | 0 | 4 |
| 3 | U24EC302 | Basic Electric Circuit Analysis | PCC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 4 | U24EC303 | Electronic Devices and Circuits | PCC | 75 | 3 | 0 | 2 | 4 |
| 5 | U24EC304 | Digital System Design | PCC | 75 | 3 | 0 | 2 | 4 |
| 6 | U24AD302 | Oops and Data Structures Design | ESC | 75 | 3 | 0 | 2 | 4 |
| **PRACTICAL** | | | | | | | | |
| 8 | U24TP310 | General Aptitude & Logical Reasoning | EEC | 30 | 0 | 0 | 2 | 1 |
| 9 | U24ED311 | Design Thinking Innovation tool kits | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 10 | U24RM312 | Introduction to Problem Solving | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 11 | U24MC313 | Foreign Language (Japanese/French) | MC# | 30 | 2 | 0 | 0 | 0 |
| **TOTAL** | | | | **510** | **20** | **2** | **10** | **25** |

**#Mandatory Course is a Non-credit.**

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Department: Electronics and Communication Engineering, R2024, CBCS

| SEMESTER IV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| | | VAC | | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24MA402 | Statistics and Numerical Methods | PCC | 60 | 3 | 1 | 0 | 4 |
| 2 | U24EC401 | Analog and Digital Communication | PCC | 45 | 3 | 0 | 0 | 3 |
| 3 | U24EC402 | Electromagnetic fields | PCC | 45 | 3 | 0 | 0 | 3 |
| 4 | U24EC403 | Linear Integrated Circuits | PCC | 45 | 3 | 0 | 0 | 3 |
| 5 | U24EE408 | Control Systems Engineering | PCC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 6 | U24EC404 | Digital Signal Processing | PCC | 75 | 3 | 0 | 2 | 4 |
| **PRACTICAL** | | | | | | | | |
| 7 | U24EC405 | Linear Integrated Circuits LAB | PCC | 30 | 0 | 0 | 3 | 1.5 |
| 8 | U24EC406 | Communication Systems Lab | PCC | 30 | 0 | 0 | 3 | 1.5 |
| 9 | U24TP410 | Critical and Creative Thinking Skills | EEC | 30 | 0 | 0 | 2 | 1 |
| 10 | U24ED411 | Idea & Simulation Lab | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 11 | U24RM412 | Hypothesis | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 12 | U24MC413 | Indological studies | MC# | 30 | 2 | 0 | 0 | 0 |
| **TOTAL** | | | | **465** | **20** | **1** | **12** | **25** |

**#Mandatory Course is a Non-credit course.**

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**SEMESTER V**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| | | **VAC** | | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24EC501 | Transmission lines and RF Systems | PCC | 45 | 3 | 0 | 0 | 3 |
| 2 | | Professional Elective I | PEC | 45 | 3 | 0 | 0 | 3 |
| 3 | | Professional Elective II | PEC | 45 | 3 | 0 | 0 | 3 |
| 4 | | Professional Elective III | PEC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 5 | U24EC502 | VLSI and chip design | PCC | 75 | 3 | 0 | 3 | 4.5 |
| 6 | U23EC503 | Wireless Communication | PCC | 75 | 3 | 0 | 2 | 4 |
| **PRACTICAL** | | | | | | | | |
| 7 | U24TP510 | Analytical and Logical Thinking Skills | EEC | 30 | 0 | 0 | 2 | 1 |
| 8 | U24EC511 | Summer Internship* | EEC | | | | | 1 |
| 9 | U24RM512 | Domain Specific Experiments/Methodology/Algorithms | RMC | 30 | 0 | 0 | 2 | 1 |
| 10 | U24ED511 | Prototype & Market Validation | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 11 | U24MC513 | Fitness for Life-Yoga, Food nutrition | MC# | 30 | 0 | 0 | 2 | 0 |
| **TOTAL** | | | | **435** | **18** | **0** | **11** | **24** |

***Two weeks Summer Internship carries one credit and it will be done during IV semester summer vacation and same will be evaluated in V semester.**

**#Mandatory Course is a Non-credit course.**

# Meenakshi Sundararajan Engineering College

(An Autonomous Institution, Affiliated to Anna University, Chennai

Department: Electronics and Communication Engineering, R2024, CBCS

**SEMESTER VI**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| | | **VAC** | | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | | Open Elective I | OEC | 45 | 3 | 0 | 0 | 3 |
| 2 | | Professional Elective IV | PEC | 45 | 3 | 0 | 0 | 3 |
| 3 | | Professional Elective V | PEC | 45 | 3 | 0 | 0 | 3 |
| 4 | | Professional Elective VI | PEC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 5 | U24EC601 | Embedded Systems and IOT Design | PCC | 75 | 3 | 0 | 2 | 4 |
| 6 | U24EC602 | Networks & Security | PCC | 60 | 2 | 0 | 2 | 3 |
| **PRACTICAL** | | | | | | | | |
| 7 | U24RM612 | Technical Writing and Research Ethics | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 8 | U24TP610 | Employability Skills & Problem Solving Techniques | EEC | 30 | 0 | 0 | 2 | 1 |
| 9 | U24ED611 | Business Management - Go To Market & Start-up Journey | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 10 | U24MC613 | Integrated Disaster Management | MC# | 30 | 2 | 0 | 0 | 0 |
| **TOTAL** | | | | **405** | **19** | **0** | 8 | **21** |

**#Mandatory Course is a Non-credit course.**

# Meenakshi Sundararajan Engineering College

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Department: Electronics and Communication Engineering, R2024, CBCS

| SEMESTER VII | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| | | **VAC** | | **30** | | | | |
| **THEORY** | | | | | | | | |
| 1 | | Open Elective II | OEC | 45 | 3 | 0 | 0 | 3 |
| 2 | | Open Elective III | OEC | 45 | 3 | 0 | 0 | 3 |
| 4 | | Constitution Of India | MC | 30 | 2 | 0 | 0 | 0 |
| 5 | U24MG701 | Engineering Economics and Finance Management | HSMC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 6 | U24EC701 | Microwave and Optical Communication | PCC | 75 | 3 | 0 | 2 | 4. |
| 7 | U24EC702 | Artificial Intelligence and Machine learning | ESC | 60 | 2 | 0 | 2 | 3. |
| **PRACTICAL** | | | | | | | | |
| 8 | U24ME703 | Summer Internship* | EEC | | | | | 1. |
| 9 | U24RM712 | Data Collection, Analysis and Interpretation | RMC | 15 | 0 | 0 | 1 | 0.5 |
| **TOTAL** | | | | **330** | **19** | **0** | **5** | **17.5** |

***Two weeks Summer Internship carries one credit and it will be done during VI semester summer vacation and same will be evaluated in VII semester.**

# Meenakshi Sundararajan Engineering College

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Department: Electronics and Communication Engineering, R2024, CBCS

| SEMESTER VIII | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| | | VAC | | 30 | | | | |
| PRACTICAL | | | | | | | | |
| 1 | U24ME801 | Project Work | EEC | 240 | 0 | 0 | 16 | 8 |
| TOTAL | | | | 240 | 0 | 0 | 16 | 8 |
| OVERALL TOTAL | | | | | | | | 168 |

| EDIC – Entrepreneurial Development and Innovation Courses | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. No. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| 1 | U24ED111 | Design Thinking - Building Innovation and Solutioning Mindset | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 2 | U24ED211 | Design Thinking - Decoding Innovation Opportunity | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 3 | U24ED311 | Innovation tool kits | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 4 | U24ED411 | Idea & simulation lab | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 5 | U24ED511 | Prototype & Market Validation | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 6 | U24ED611 | Business Management - Go To Market & Startup Journey | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| **Placement Training by EduTech** | | | | | | | | |
| SL. No. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| 1 | U24TP110 | Interpersonal skills Laboratory | HSMC | 30 | 0 | 0 | 2 | 1 |
| 2 | U24TP210 | Professional Communication Laboratory | HSMC | 30 | 0 | 0 | 2 | 1 |
| 3 | U24TP310 | General Aptitude & Logical Reasoning | EEC | 30 | 0 | 0 | 2 | 1 |
| 4 | U24TP410 | Critical and Creative Thinking Skills | EEC | 30 | 0 | 0 | 2 | 1 |
| 5 | U24TP510 | Analytical and Logical Thinking Skills | EEC | 30 | 0 | 0 | 2 | 1 |
| 6 | U24TP610 | Employability Skills & Problem Solving Techniques | EEC | 30 | 0 | 0 | 2 | 1 |

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Department: Electronics and Communication Engineering, R2024, CBCS

| RMC – Research Methodology Courses | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SL. No. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
| | | | | | L | T | P | |
| 1 | U24RM312 | Introduction to Problem Solving | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 2 | U24RM412 | Hypothesis | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 3 | U24RM512 | Domain Specific Experiments/Methodology/ Algorithms | RMC | 30 | 0 | 0 | 2 | 1 |
| 4 | U24RM612 | Technical Writing and Research Ethics | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 5 | U24RM712 | Data Collection, Analysis and Interpretation | RMC | 15 | 0 | 0 | 1 | 0.5 |

# Meenakshi Sundararajan Engineering College

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## CATEGORY OF COURSES AND CREDIT DISTRIBUTION

| S. No. | Subject Area | Credits per Semester | | | | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 1 | HSMC | 4 | 4 | | | | | 3 | | 11 |
| 2 | BSC | 12 | 9 | 4 | | | | | | 25 |
| 3 | ESC | 7 | 10.5 | 4 | | | | 3 | | 24.5 |
| 4 | PCC | | | 15 | 23 | 11.5 | 7 | 4 | | 60.5 |
| 5 | PEC | | | | | 9 | 9 | | | 18 |
| 6 | OEC | | | | | | 3 | 6 | | 9 |
| 7 | EEC | | | 1 | 1 | 2 | 1 | 1 | 8 | 14 |
| 8 | MC | | | √ | √ | √ | √ | | | √ |
| 9 | EDIC | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | | 3 |
| 10 | RMC | | | 0.5 | 0.5 | 1 | 0.5 | 0.5 | | 3 |
| **Total** | | 23.5 | 24 | 25 | 25 | 24 | 21 | 17.5 | 8 | **168** |

**HSMC** - Humanities, Social Sciences and Management Courses

**BSC** - Basic Sciences Courses

**ESC** - Engineering Sciences Courses

**PCC** - Professional Core Courses

**PEC** - Professional Elective Courses

**OEC** - Open Elective Courses

**EEC** - Employability Enhancement Courses

**MC** - Mandatory Courses / Non-Credit

**EDIC** - Entrepreneurial Development and Innovation Courses

**RMC** - Research Methodology Courses

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24IP101 | INDUCTION PROGRAMME |
|---|---|
| **Modules** | |
| **1** | **Universal Human Values I (UHV I)** |
| To help the student to see the need for developing a holistic perspective of life. | |
| To sensitize the student about the scope of life – individual, family (interpersonal relationship), society and nature/existence. | |
| Strengthening self-reflection. | |
| To develop more confidence and commitment to understand, learn and act accordingly. | |
| **2** | **Physical Health and Related Activities** |
| To understand the basic principles to remain healthy and fit. | |
| To practice them through exercise, games etc. | |
| Involving health center, staff, sports coaches, faculty, staff, students sports team etc. | |
| **3** | **Familiarization of Department/ Branch and Innovation** |
| To get a broad perspective about goals of institution, department/branch in the context of the world, the nation, the state, and region. | |
| To get an idea of how the institution operates to fulfill its goals through various disciplines of education, research, development, and practice. | |
| To get an idea of how students can connect /participate in it. | |
| **4** | **Visit to a Local Area** |
| For a student to relate to the social environment of the educational institution as well as the surroundings, a place wherein their most significant years students will scribble some indelible memories, an absolute necessity is generated for city visits to let students understand the environment through interaction with the people, place and history. | |
| **5** | **Lectures by Eminent People** |
| Guest lectures are a great way to help the students gain a perspective on many different things in the world. Eminent personalities in different fields of expertise like academics, sports, industry, business etc. can share their story and talk about important subjects like career, entrepreneurship, government policies and technology | |
| **6** | **Proficiency Modules** |
| This module is to help fill the gaps in basic competency required for further inputs to be absorbed. It includes efforts to make the student proficient in interpersonal communication and expression. | |
| **7** | **Literature / Literary Activities** |
| To develop the clarity of humanistic culture and its expression through literature, students may be exposed to local, regional, national, or international literature. It will help them in understanding traditional and<br>contemporary values and thought. | |
| **8** | **Creative Practices** |
| This module is to help develop the clarity of humanistic culture and its creative, joyful expression. The students can choose one skill related to visual arts or performing arts. | |
| **9** | **Extra-Curricular Activities** |
| Wellness Sessions | |
| **10** | **Extra Activities** |
| Anti-Ragging Briefing | |
| Informal Interactions | |
| Club / Council / Committee/ Scholarship Briefings | |

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24EN101 | TECHNICAL ENGLISH | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives**

| | |
|---|---|
| 1 | To improve the communicative competence of learners |
| 2 | To develop the basic reading and writing skills of first year engineering and technology students. |
| 3 | To improve understanding of key grammar concepts and apply those concepts in both reading and writing tasks. |
| 4 | To help learners use language effectively in professional contexts. |
| 5 | To equip students with the skills to write clearly and concisely in a variety of context. |

| | |
|---|---|
| **UNIT 1 EFFECTIVE READING AND WRITING COMMUNICATION** | **6** |
| **Reading:** Comprehension of short technical texts – Skimming and scanning<br>**Writing:** Precis Writing, Email Writing<br>**Grammar:** Tenses, Question types: Wh/ Yes or No<br>**Vocabulary development:** Root words – Prefixes & Suffixes, Standard Abbreviations & Acronyms. | |
| **UNIT 2 NARRATION AND SUMMATION** | **6** |
| **Reading:** Reading biographies, travelogues, newspaper reports<br>**Writing:** Paraphrasing, Formal and informal Letter<br>**Grammar:** Prepositions, Subject-verb Agreement<br>**Vocabulary development:** One-word substitution | |
| **UNIT 3 LANGUAGE DEVELOPMENT** | **6** |
| **Reading:** Reading reviews, advertisements<br>**Writing:** Writing Instructions, Report writing (Industrial report, Survey report & Accident report)<br>**Grammar:** Discourse Markers, Degrees of comparison<br>**Vocabulary development:** Compound nouns, Homophones and homonyms | |
| **UNIT 4 RECOMMENDATIONS AND TRANSCODING** | **6** |
| **Reading:** Non-verbal communication (tables, pie charts etc.)<br>**Writing:** Writing recommendations, Transferring information (chart, graph etc.)<br>**Grammar:** Error corrections<br>**Vocabulary development:** Fixed and semi fixed expressions | |
| **UNIT 5 LANGUAGE FOR WORKPLACE** | **6** |
| **Reading:** Reading Editorial columns<br>**Writing:** Writing minutes of meeting<br>**Grammar:** Simple, compound and complex sentences<br>**Vocabulary development:** Verbal analogies | |
| **TOTAL PERIODS** | **30** |

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | To use appropriate words in a professional context |
| **CO2** | To gain understanding of basic grammatical structures and use them in the right context. |
| **CO3** | To read and infer the denotative and connotative meanings of technical texts |
| **CO4** | To write definitions, descriptions, narrations and essays on various topics |
| **CO5** | To expand vocabulary and technical language competency |

**TEXT BOOKS**

English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)

English for Science & Technology Cambridge University Press, 2021.

English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

**REFERENCES**

Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.

English For Technical Communication (With CD) By Aysha Viswamohan, McGraw Hill Education, ISBN: 0070264244.

Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.

**CO-PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak

Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | 3 | 3 | - | - | 2 | 2 | - |
| **CO2** | - | - | - | - | - | - | - | - | 2 | 3 | - | - | 2 | 2 | - |
| **CO3** | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 2 | 2 | - |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 3 | - | - | 1 | 1 | - |
| **CO5** | - | - | - | - | - | - | - | 2 | - | 3 | - | 2 | - | - | - |
| **AVG** | - | - | - | - | - | - | - | 0.4 | 1.6 | 2.6 | - | 0.4 | 1.4 | 1.4 | - |

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24MA101 | MATHEMATICAL FOUNDATION FOR ENGINEERS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives**

| | |
|---|---|
| 1 | To develop the use of matrix algebra techniques that is needed by engineers for practical applications. |
| 2 | To familiarize the students with differential calculus. |
| 3 | To familiarize the student with functions of several variables. This is needed in many branches of engineering. |
| 4 | To make the students understand various techniques of integration. |
| 5 | To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications. |

**UNIT 1 MATRICES** — **9+3**

Introduction - characteristic equation - Eigenvalues and Eigenvectors of a real matrix –Properties of Eigenvalues and Eigenvectors (without proof) – Cayley - Hamilton theorem (statement and applications only) – Diagonalization of matrices by orthogonal transformation –Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

**MATLAB:** To find matrix operations addition,multiplication ,transpose and inverse of the matrix and also to find eigenvalue and corresponding eigenvectors.

**UNIT 2 DIFFERENTIAL CALCULUS** — **9+3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum,product, quotient, chain rules) - The equations of tangent line and normal line, velocity and acceleration - Interval of increasing and decreasing functions-Maxima and Minima of functions of one variable - Intervals of concavity and convexity.

**MATLAB:**To determine maxima and minima for one variable.

**UNIT 3 FUNCTIONS OF SEVERAL VARIABLES** — **9+3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables - Lagrange's method of undetermined multipliers.

**MATLAB:**To determine maxima and minima for two variables.

**UNIT 4 INTEGRAL CALCULUS** — **9+3**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

**MATLAB:**To find the area using single integral.

**UNIT 5 MULTIPLE INTEGRALS** — **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – change of variables from cartesian to polar in double integrals - Triple integrals – Volume of solids .

**MATLAB:**To find the area and volume using double and triple integral.

**TOTAL PERIODS** — **60**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Use the matrix algebra methods for solving practical problems |
| **CO2** | Apply differential calculus tools in solving various application problems. |
| **CO3** | Able to use differential calculus ideas on several variable functions. |
| **CO4** | Apply different methods of integration in solving practical problems |
| **CO5** | Apply multiple integral ideas in solving areas, volumes and other practical problems |

**TEXT BOOKS**


1.Veerarajan.T,"Engineering Mathematics,for semester I and II", Updated second Edition,Tata Mcgraw Hill Education , private Limited ,2019.

2.Grewal B.S and Grewel J.S .“Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 45th Edition, 2020.

3.Won Y.Yang,Young K.Choi,Jaekwon Kim,Man Cheol Kim, H.Jin Kim,Taeho Im, "Engineering Mathematics with MATLAB" CRC Press Publishers , I st Edition , 2017.


**REFERENCES**


1.Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

2.Kandasamy.P.,Thilagavathy.K and Gunavathy.K.,"Engineering Mathematics For First Year B.E/B.Tech,Seventh Edition 2008 S.Chand and Co.,New Delhi.

3.Bali. N.P and Manish Goyal, “A Textbook of Engineering Mathematics, Semester-I”, ninth Edition, Laxmi Publications Pvt. Ltd, 2016.

4. Engineering Mathematics: First year. Calculus and Analytical Geometry, Volume, M.K.Venketaraman, National Publishing company,1965.


**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | - |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO3** | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO5** | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | - | - |
| **AVG** | 3 | 2.6 | 2.6 | 0.6 | 0.2 | - | - | - | - | - | - | - | 1 | - | - |

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24PH103 | PHYSICS FOR ELECTRONICS ENGINEERING I | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives**

| | |
|---|---|
| 1 | To enable the students to explore topics like Maxwell's equations, wave equations, and the behaviour of electromagnetic waves in different mediums |
| 2 | To explain the origin of laser action, production of laser, fibre optics and their applications. |
| 3 | To establish a sound grasp of knowledge on different optical properties of materials, optical displays and application |
| 4 | To make the students effectively to achieve an understanding of mechanics |
| 5 | Explore how the structure of materials influences their mechanical, electrical, and optical properties, and how these properties can be harnessed for various applications in engineering, electronics, and nanotechnology. |

**UNIT 1 ELECTROMAGNETIC WAVES** — **9**

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception- Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

**UNIT 2 LASERS AND FIBER OPTICS** — **9**

Characteristics of Lasers - Spontaneous and stimulated emission – Einstein's A&B coefficients- Population inversion – Pumping – Main components of lasers – Types of lasers: Nd:YAG and CO2 lasers – Industrial and medical applications of lasers.Light propagation in optical fibre - Numerical aperture and acceptance angle - Types of optical fibres – Losses in fibres: attenuation, dispersion, bending - Fibre optic Communication system - Active and passive sensors- Temperature ,Displacement &Pressure sensor.

**UNIT 3 OPTICAL PROPERTIES OF MATERIALS** — **9**

Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain -– Optoelectronic devices: light detectors and solar cells – light emitting diode - LASER Diodes- optical processes in organic semiconductor devices -excitonic state - Electro-optics and nonlinear optics: Modulators (Amplitude type) – plasmonics(qualitative).

**UNIT 4 MECHANICS** — **9**

Multiparticle dynamics: Center of mass – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I -moment of inertia of sphere,disc – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule.

**UNIT 5 CRSTALLOGRAPHY** — **9**

Crystal structures: Crystal lattice – basis - unit cell and lattice parameters – crystal systems and Bravais lattices – Structure and packing fractions of SC, BCC, FCC, diamond cubic, NaCL, ZnS structures – crystal planes, directions and Miller indices – distance between successive planes – linear and planar densities - crystalline and noncrystalline materials -Example use of Miller indices: wafer surface orientation - imperfections in crystals-Epitaxial growth of semiconductors.

**TOTAL PERIODS** — **45**

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Solve problems related to wave equations, calculate properties such as wavelength, frequency, and wave velocity, and discuss real-world applications of electromagnetic waves in technologies like radio communication, radar, and medical imaging. |
| **CO2** | Explain phenomena such as interference, diffraction, and laser amplification, and understand how these concepts are applied in devices like optical fibers, spectrometers, and laser pointers.. |
| **CO3** | Demonstrate an understanding of the working principles of various optical devices such as lenses, mirrors, and photodetectors, and discuss their applications in fields like imaging, telecommunications, and spectroscopy. |
| **CO4** | Appreciate how the mechanical concepts underpin engineering design, motion control, and structural stability in various applications.. |
| **CO5** | Discuss applications of crystal structures in fields such as semiconductor technology, metallurgy, and materials science, and appreciate the significance of crystallography in advancing technological innovation. |

**TEXT BOOKS**


1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017

2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.

3. Properties of matter – R. Murugesan – S. Chand & Co., 2004.

4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGrawHill (Indian Edition), 2017.


**REFERENCES**


1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009

2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004

3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019

4.. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015

5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. SpringerVerlag, 2012.


**CO/PO, PSO Mapping**
**(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak**
**Programme Outcomes (POs) and Programme Specific Outcomes PSOs'**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **AVG** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24CY103 | CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives**

| | |
|---|---|
| 1 | To make the students to be aware of various treatment processes of water for potable and industrial purposes. |
| 2 | To familiarize the knowledge about Thermodynamics and Batteries used in electronic industry. |
| 3 | To introduce the basic concepts of phase rule and Nano materials with its applications. |
| 4 | To apply the knowledge on usage of electrochemical derivations with its applications to form sensor like materials. |
| 5 | To impart the principles and applications of sensors and spectroscopy in various industries. |

**UNIT1 WATER TECHNOLOGY** — **9**

Introduction-Characteristics of water – Hardness – Types of hardness - Estimation by EDTA (problems on hardness) -Alkalinity – Determination (problems on alkalinity) – Boiler feed water – Requirements – Priming and foaming, Scales and sludges Caustic embrittlement and Boiler corrosion – Application - External conditioning (Ion Exchange, zeolite) – Internal conditioning (Carbonate, phosphate, calgon, sodium aluminate conditioning) – Brackish water treatment - Reverse osmosis.

**UNIT2 CHEMICAL THERMODYNAMICS AND ENERGY STORAGE DEVICES** — **9**

Introduction - Thermodynamic process (isothermic, isobaric, isochoric and adiabatic processes) - Internal energy – first law of thermodynamics (Mathematical statement& limitation) - Enthalpy - Second law of thermodynamics - Entropy - Entropy change of an ideal gas & problems - Free energy - work function - Gibbs Helmholtz equation- Van't Hoff isotherm -derivation, applications.

Batteries – Types of batteries – Characteristics-Definition of Electricity storage density and power discharge rate--Principle, working and applications of lead-acid battery, Ni-Cd and lithium ion batteries – Fuel cell.

**UNIT3 PHASE RULE AND NANOMATERIALS** — **9**

Phase rule - Introduction, definition of terms - phase, components and degree of freedom - phase diagram-one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system.

Nanomaterials-Classification-Properties and uses-. Synthesis-Top down method (Ball milling)and Bottom up methods -Laser Evaporation method -chemical vapour deposition, - Applications of nanomaterials - Application - A Case Study – Medicine, Agriculture, Industry and Electronics.

**UNIT4 ELECTROCHEMISTRY** — **9**

Introduction-Electrrodes-Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf - Single electrode potential – Nernst equation (problem) – reference electrodes -Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - $Fe^{2}$ + vs dichromate and precipitation - Ag + vs Cl - titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,.

**UNIT5 SENSORS AND SPECTROSCOPY** — **9**

Sensors, types of sensors. Chemical Sensors – characteristics and elements - Carbon dioxide, glucose detector, Mosquito, and Pregnancy test. Electrochemical sensors – potentiometric sensors, amperometric sensors, polarization techniques - Working Principles and Applications.Integrated and Smart sensors, Definitions and applications of various smart sensors-types- , Humidity sensor, UV sensor and Ultra Sonic Sensors.

Introduction-importance of spectroscopy-types of spectroscopy-Spectrum-Electromagnetic radiation-Electromagnetic spectrum-Absorption of Electromagnetic radiation-Types of energy present in molecules-Molecular spectra-Energy level diagfram-Ultraviolet (UV) and visible spectroscopy-Infra red spectroscopy.

**TOTAL PERIODS** — **45**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Understand the basic principles of water quality parameters, and analyse the various water treatment processes for domestic and industrial applications. |
| **CO2** | Understand the basic knowledge on the basic concepts of thermodynamics and can be able to recognize the different energy storage devices. |
| **CO3** | Develop a deep knowledge on understanding of the basic concepts of phase rule and nannomaterial's with its applications. |
| **CO4** | Apply the basic principles of electrochemistry and execute the applications in industries. |
| **CO5** | Have a thorough knowledge on sensors and spectroscopy with its vast applications. |

**TEXT BOOKS**


1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.

2. H.K. Chopra, A. Parmer, "Chemistry for Engineers", Narosa Publishing House, New Delhi, 110 002, 2016

3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

4. Annalisa Bonfiglo and Danilo De Rossi, Wearable Monitoring Systems, Springer, 2011

5.Zhang and Yuan-Ting, Wearable Medical Sensors and Systems,Springer, 2013

6. Edward Sazonov and Micheal R Neuman, Wearable Sensors: Fundamentals,

7. Mehmet R. Yuce and JamilY.Khan, Wireless Body Area Networks Technology,Implementation applications,Pan Stanford Publishing Pte.Ltd, Singapore, 2012


**REFERENCES**


1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.

2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.

3. Hagen Klauk, "Organic Electronics: Materials, Manufacturing and Applications", Wiley-VCH, 2006.

4. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

5. Sandeep K.S, Gupta, Tridib Mukherjee and Krishna Kumar Venkatasubramanian, Body,Area Networks Safety, Security, and Sustainability, Cambridge University Press, 2013

6. Guang-Zhong Yang, Body Sensor Networks, Springer, 2006


**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 1 | - | 2 | 2 | 2 | - | 3 | 1 | - | 3 | - | - | - |
| **CO2** | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | 1 | 1 | - | 3 | - | - | - |
| **CO3** | 3 | - | 1 | - | 1 | - | 2 | - | 1 | 1 | - | 3 | - | - | - |
| **CO4** | 3 | 1 | 2 | - | 2 | 2 | 2 | - | 2 | 1 | - | 3 | - | - | - |
| **CO5** | 3 | 1 | 2 | - | 1 | 1 | 2 | - | 1 | 1 | - | 3 | - | - | - |
| **AVG** | 3 | 1.3 | 1.2 | 1 | 1.4 | 1.5 | 1.8 | - | 1.6 | 1 | - | 3 | - | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24TA101 | தமிழர்மரபு<br>HERITAGE OF TAMILS | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

| | |
|---|---|
| **அலக ் I மம ி மற்றும ் இலக்கியம ்**<br>**UNIT I LANGUAGE AND LITERATURE** | **3** |

இந்திய மமெ ாழிக் குடும ்பங்கள் - திம◌ெ ாவிட மமெ ாழிகள் - தமிழ் ஒரு ெமம ்மமெ ாழி - தமிழ்
ெமல்விலக்கியங்கள் - ெ ங்க இலக்கியத்தின்ெ மய ெ ெ ாy்பற்ற தன்மம -ெ ங்க இலக்கியத்தில் பகிy்தல் அறம ்- திருக்குறளில் மமெலாண்மம கருத்Fக்கள் - தமிழ்க்
ெகாப்பியங்கள், தமிழகத்தில் - மெண மெபௌத்த மெயங்களின் ெதாக்கம - பக்தி இலக்கிய ம ், ஆழ்ெdாry ்கள் மற்றும ் ெநாயன்மெ ாry ்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் dளy்ெ ்சி - தமிழ் இளகிய dளy்ெ ்சியில் ெபாryதிெயாy மற்றும ெபாryதிெதாெ ன் ஆகிமெயாry ின் பங்களிப்பு

Language Families in India - Dravidian Languages - Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan

| | |
|---|---|
| **அலகு II மரபு - ெ ாறற ஓவியங்கள் முதல் நவீன ஓவியங்கள் வறர - சிற் க் கறல**<br>**UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART - SCULPTURE** | **3** |

நடுகல் முதல் நவீன சிற்பங்கள் dமy - ஐம ்மெபான் சிமலகள் - பழங்குடியினy் மற்றும ் அdy்கள் தெயாryிக்கும மகவிமனப் மெபாருட்கள், மெபாம ்மபகள் - மதy ெமய்யும கமல -
சுடுமண் சிற்பங்கள் - ெநாட்டுப்புற மதய்dங்கள் - குமy ிமுமனயில் திருdள்ளுdy சிமல
- இமக் கருவிகள் - மிருதங்கம ், பமற, வீமண, ெயாழ், ெநாதஸ்dyம ்- தமிழy ்களின் ெ மூக மெபாருெளாெதாryெdாழ்வில் மெகாவில்களின் பங்கு
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils

| | |
|---|---|
| **அலகு III ெ ொநாட்டு ்புறக் கறலகள் மற்றும வீர விறளொயாட்டுகள்**<br>**UNIT III FOLK AND MARTIAL ARTS** | **3** |

மதருக்கூத்F, kyெகாட்டம ், வில்லுப்ெபாட்டு, கணிெயான் கூத்F, ஒயிெலாட்டம ், மெதால்ெபாமdக்கூத்F, சிலம ்ெபாட்டம ், dளy ி, புலிெயாட்டம ், தமிழy ்களின் விமளெயாட்டுகள்

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

| | |
|---|---|
| **அலகு IV தமிழர்களின் திறறக் கொகாட்ெ ொ ாகள்**<br>**UNIT IV THINAI CONCEPT OF TAMILS** | **3** |

தமிழகத்தின் ெதாdyங்களும ், விலங்குகளும ்- மெதால்ெகாப்பியம ் மற்றும ் ெ ங்க இலக்கியத்தில் அகம ் மற்றும ் புறக் மெகாட்ெபாடுகள் - தமிழy ்கள் மெபாற்றிய அறக்மெகாட்ெபாடு - ெ ங்கெகாலத்தில் தமிழகத்தில் எழுத்தறிவும ், கல்வியும - ெ ங்கெகால நகyங்களும ் Fமற முகங்களும ் - ெ ங்கெகாலத்தில் ஏற்றுமதி மற்றும ் இறக்குமதி - கடல் கடந்த ெநாடுகளில் ெெமாழy ்களின் மற்றி

| | |
|---|---|
| Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age<br>- Export and Import during Sangam Age - Overseas Conquest of Cholas | |
| **அலகு V இந்திய கதசிய இயக்கம ்மற்றும ்இந்திய ற ்ெ ாட்டிற்குத் தமிழர்களின் ங்களி ்பு**<br>**UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE** | **3** |
| இந்திய விடுதமலப்மெபாy ில் தமிழy ்களின் பங்கு - இந்தி ெயாவின் பிறபகுதிகளில் தமிழ் பண்ெபாட்டின் ெதாக்கம - சுயம ்y ிெயாமத இயக்கம - இந்திய மருத்Fd த்தில், சித்த மருத்Fd த்தின் பங்கு - கல்மdட்டுகள், மகமயழுத்Fப்படிகள் - தமிழ் புத்தகங்களின் ெஅசு dyெலாறு<br>Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books. | |
| **TOTAL PERIODS** | **15** |

**TEXT BOOK CUM REFERENCE BOOKS**

1. தமிழக dyெலாறு - மக்களும பண்ெபாடும - மக மக பிள்மள (மdளியீடு: தமிழ்ெநாடு ெபாடநூல் மற்றும ்கல்வியியல் பணிகள் கழகம ்)
2. கணினித் தமிழ் - முமனdy இல. சுந்தyம ்(விகடன் பிyசுyம ்)
3.Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
4.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
5.Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies)
6.The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies)
7.Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8.Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
9.Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24EE103 | BASICS OF ELECTRICAL ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives**

| | |
|---|---|
| 1 | To impart knowledge in types,construction and working of DC machines |
| 2 | To impart knowledge in types,construction and working of transformers |
| 3 | To impart knowledge in types,construction and working of AC rotating machines |
| 4 | To introduce the functional elements and working of measuring instruments |
| 5 | To impart knowledge in application of electrical machines and instrumentation |

| **UNIT 1 DC MACHINES** | **9** |
|---|---|

Introduction – Constructional Features- Motor and Generator mode – EMF and Torque equation – Circuit Model – Methods of Excitation- Characteristics – Starting and Speed Control – Universal Motor- Stepper Motors – Brushless DC Motors- Applications.

| **UNIT 2 TRANSFORMER** | **9** |
|---|---|

Introduction – Ideal and Practical Transformer – Phasor diagram-– Per Unit System – Equivalent circuit- Testing- Efficiency and Voltage Regulation- Three Phase Transformers –Applications- Auto Transformers, Advantages.

| **UNIT 3 AC ROTATING MACHINES** | **9** |
|---|---|

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Speed Control – Single phase Induction motors -Construction- Types-starting methods. Alternator: Working principle-Equation of induced EMF – Voltage regulation, Synchronous motors- working principle-starting methods – Torque equation.

| **UNIT 4 MEASUREMENTS AND INSTRUMENTATION** | **9** |
|---|---|

Functional elements of an instrument, Standards and calibration, Operating Principle, types – Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT. DSO- Block diagram- Data acquisition

| **UNIT 5 APPLICATION OF ELECTRICAL MACHINES AND INSTRUMENTATION** | **9** |
|---|---|

Application and ratings of transformer in generation and distribution side , Application of DC motor in traction system, Industrial application of 3 phase and single phase induction motor, Role of energy meter in modern power systems

| **TOTAL PERIODS** | **45** |
|---|---|

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Explain the working principle of DC Machines |
| **CO2** | Analyze the working principle and operation of Transformers |
| **CO3** | Choose the appropriate electrical machines for various applications |
| **CO4** | Explain the types and operating principles of measuring instruments |
| **CO5** | Gain Knowledge on the residential and industrial applications of electrical machines and Instruments. |

**TEXT BOOKS**


1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020

2.S. K, Bhattacharya, “Basic Electrical and Electronics Engineering”, Second Edition, Pearson Education, 2017.

3.A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, New Delhi, 19th edition 2019.

4.C.L.Wadhwa, “Generation, Distribution and Utilisation of Electrical Energy”, New Age International pvt.ltd.,2003


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1. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, Fourth Edition, McGraw Hill Education, 2019

2. Mahmood Nahvi and Joseph A. Administer, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, 2002.

3.H.S. Kalsi, ‘Electronic Instrumentation’, Tata McGraw-Hill, New Delhi, 8th edition ,2012.


**CO/PO, PSO Mapping**
**(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak**
**Programme Outcomes (POs) and Programme Specific Outcomes PSOs'**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |
| **CO2** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |
| **CO3** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |
| **CO4** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |
| **CO5** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |
| **AVG** | 2 | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24CS101 | PROGRAMMING IN C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

**Course Objectives**

| | |
|---|---|
| 1 | To understand the structure and syntax of C Language. |
| 2 | To develop C programs using arrays and strings. |
| 3 | To develop modular applications in C using functions. |
| 4 | To develop applications in C and apply the concept code reusability using pointers and structures. |
| 5 | To do input/output and understand the basics of file handling mechanisms in C . |

**UNIT 1 BASICS OF C PROGRAMMING** — **6+12**

Introduction to Problem Solving: Algorithm, Flowchart, Pseudocode. Programming Basics: Applications of C Language-Structure of C program -Identifiers-Data Types – Variables-Constants – Keywords – Operators - Input/output statements, Decision making statements - Looping statements - Expressions-Precedence and Associativity – Expressions Evaluation, Type conversions.

**Practical:**

1. Algorithm, pseudocode, flowcharts for simple scientific and statistical problems.
2. I/O statements, operators, expressions and decision-making constructs (if, if-else, break, continue).
3. C Programming using Simple statements and expressions.
4. Create Looping statements- for, while, do-while.

**Case Study:** Develop a system to manage student records, including personal information, academic performance, and attendance. Enrich with appropriate Algorithm, a neat Flowchart, Pseudocode.

**UNIT 2 ARRAYS AND STRINGS** — **6+12**

Arrays: Introduction – Declaration of Arrays – Storing Values in Array – Accessing elements of the Array- Calculating the length of the Array – Operations on Array – one dimensional arrays – Two dimensional Arrays -String: Declaring, Initializing, Printing and reading strings, String input and output functions, String handling functions, Arrays of strings.

**Practicals:**

1. Create simple programs for one dimensional and two dimensional arrays.
2. Practice all string handling functions.

**Case Study :** Use arrays for Storing Student Information,for Managing Grades ,for Attendance Tracking .

**UNIT 3 FUNCTION AND STORAGE CLASS** — **6+12**

Library functions: Math functions, other miscellaneous functions such as getchar(), putchar(), malloc(), calloc(). User defined functions - function definition, functions declaration, function call, scope of variables - local variables, global variables. Function parameters: Parameter passing- call by value & call by reference, function return values, Passing arguments to Functions. Recursive functions. Storage classes-auto, register, static, extern, scope rules.

**Practical:**

1.Implementation of C Program using user defined functions (Pass by value and Pass by reference).
2.Implementation of Recursion Function.

**Case Study :** Use functions to add and display more students, calculate average grades, sort students by average grade.

**UNIT 4 STRUCTURES AND POINTERS** — **6+12**

Basics of structures-structure data types, type definition, accessing structures, Structure operations, Complex structures-nested structures, structures containing arrays, Array of structures, Structures and Functions, Unions. Pointers: Understanding Computer Memory -Memory Management-Dynamic memory Allocation-Memory leaks- Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Generic Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays –Use of pointers in self-referential structures, notion of linked list

**Practical:**

1. C Programming using Pointers.
2. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.

**Case Study:** Use complex structures operation in a student management system.

| **UNIT 5 MACROS AND FILE PROCESSING** | **6+12** |
|---|---|

Preprocessor Directives: Introduction to preprocessor directives in Simple macros using `#define`, conditional macros using `#ifdef`, `#ifndef`, `#endif`, `#else`, and `#elif`. Files: Introduction to Files – Opening a file – Reading Data from Files – Writing Data to Files – Detecting the End-of-file –Closing a file – Sequential access file-Random Access Files – Binary Files – Command line arguments.

**Practical:**

1. Programming using macros and storage classes.
2. Implementation of Command line Arguments like argc,argv.
3. Files- reading and writing, file operations, random access.
4. Develop an application for any one of the following scenarios: Student Management System /Stock Management System/ Banking Application / Ticket Reservation System.

**Case Study:** Make a separate file for the student management system to read, write, delete, access data from it.

| **TOTAL PERIODS** | **90** |
|---|---|

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Create simple applications in C using basic constructs |
| **CO2** | Create C programs using arrays and strings |
| **CO3** | Create modular applications in C using functions. |
| **CO4** | Create modular applications in C using structures and pointers. |
| **CO5** | Create applications using macros and file processing |

**TEXT BOOKS**

1. Kernighan, B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

2. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016

**REFERENCES**

1. Paul Deitel and Harvey Deitel, “C How to Program with an Introduction to C++”, Eighth edition, Pearson Education, 2018.

2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020

3. Byron S. Gottfried, “Schaum’s Outline of Theory and Problems of Programming with C”, McGraw-Hill Education, 1996.

4.. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013.

5. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, 1st Edition, Pearson Education, 2013.

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - |
| **CO2** | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | 2 | - |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 2 | 2 | 1 |
| **CO4** | 2 | 2 | 2 | - | 1 | 1 | - | - | 1 | - | 1 | 1 | 2 | 2 | - |
| **CO5** | 2 | - | 2 | 2 | 1 | 1 | - | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| **AVG** | 2 | 2 | 2 | 2 | 1 | 1 | - | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24BS101 | PHYSICS & CHEMISTRY LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1 | This session aims to provide the learners hands-on-training on the practical applications of the concepts learnt in the theoretical sessions on bending of beams, application of laser,. The course will also train the learner to observe good lab practices, record readings and analyse and interpret the results. |
| 2 | This session aims to provide the learners hands-on-training on the practical applications of the concepts learnt in the theoretical sessions on water treatment, electrochemistry, lubricants, composites and nanomaterials using simple chemical methods. The course will also train the learner to observe good lab practices, record readings and graphically represent the results, as well as analyse and interpret the influence of reaction conditions on the results. |

**LIST OF EXPERIMENTS**

| PHYSICS LABORATORY | |
|---|---|
| 1 | Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular objects |
| 2 | Simple harmonic oscillations of cantilever. |
| 3 | Uniform bending – Determination of Young's modulus |
| 4 | Laser- Determination of the wave length of the laser using grating |
| 5 | Ultrasonic Interferometer-Determination of compressibility of given liquid |
| 6 | a) Optical fibre -Determination of Numerical Aperture and acceptance angle<br>b) Compact disc- Determination of width of the groove using laser. |
| 7 | Non-uniform bending - Determination of Young's modulus |

| CHEMISTRY LABORATORY | |
|---|---|
| 1 | Estimation of mixture of acids by conductometric titration |
| 2 | Estimation of iron by potentiometric titration |
| 3 | Conductometric titration of barium chloride against sodium sulphate (precipitation titration) |
| 4 | Determination of alkalinity in a water sample |
| 5 | Estimation of hardness of water by EDTA method |
| 6 | Estimation of hydrochloric acid by pHmetric method |
| 7 | Determination of chloride content of water sample by Argentometric method |
| 8 | Determination of viscosity of a polymer using ostwald's viscometer |
| 9 | Estimation of iron content using spectrophotometer |

| THEORY —-- | TUTORIAL — | PRACTICAL 4 | PROJECT — | TOTAL HR | 60 |
|---|---|---|---|---|---|

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Gain knowledge about torque and rigidity modulus of a material and understand the principles of simple harmonic motion and bending of beams |
| | Estimate the strength of given mixture of acids using conductance measurements under the principle of conductometric titration and Estimate the strength of given iron using EMF measurements with the help of potentiometer and have a knowledge on redox reaction |
| **CO2** | Comprehend the principles of stress,strain & elasticity of the given materials & Gain knowledge about diffraction of laser light. |
| | Estimate the strength of given salt using conductance measurements under the principle of precipitation titration and Determine and estimate the amount of different types of alkalinities in water. |
| **CO3** | Understand how sound waves are traveling in liquid medium and comprehend the light accepting power of given optical fibre and its transmission |
| | Employ complexometric titrations to estimate total hardness of a water sample and Determine the amount of chloride present in water using Argentometric method. |

**TEXTBOOKS**

1. Mechanics Part I and Part II, Narayanamoorthy National Publishing Company, 2001
2. Optics -Dr.Murugesan
3. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Textbook of Quantitative Chemical Analysis.

**REFERENCES**

1. Engineering physics Visvesvaraya Technological Univercity
2. Vogel's Textbook of Quantitative Chemical Analysis (2009)

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes
PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| **CO2** | 3 | - | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| **CO3** | 3 | - | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| **AVG** | 3 | - | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24TP110 | COMMUNICATION SKILLS LABORATORY I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

| Course Objectives | |
|---|---|
| 1 | To improve the communicative competence of learners |
| 2 | To help learners use language effectively in academic /work contexts |
| 3 | To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc. |
| 4 | To use language efficiently in expressing their opinions via various media." |
| 5 | To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts. |

| | |
|---|---|
| **UNIT I** | **6** |
| **Listening:** Listening as a key skill- its importance -Listening for general information-specific details - Introduction to classmates – Audio / video (formal & informal)<br>**Speaking:** Making telephone Calls, Introducing a friend, Making polite requests, polite offers and replying to polite requests - Understanding basic instructions for filling out a bank application | |
| **UNIT II** | **6** |
| **Listening:** Listen to a process information<br>**Speaking:** Small talk on general topics and current scenario | |
| **UNIT III** | **6** |
| **Listening:** Listen to event narration and stories<br>**Speaking:** Picture description- describing locations in workplaces | |
| **UNIT IV** | **6** |
| **Listening:** Listening to discussions and debates<br>**Speaking:** Role Play | |
| **UNIT V** | **6** |
| **Listening:** Listening/watching documentaries<br>**Speaking:** Formal and informal talk -making predictions- talking about a given topic-giving opinions | |
| **TOTAL PERIODS** | **30** |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | To listen and comprehend complex academic texts |
| **CO2** | To speak fluently and accurately in formal and informal communicative contexts |
| **CO3** | To express their opinions effectively in both oral and written medium of communication |
| **CO4** | Ability to listen/view and comprehend different spoken discourses/excerpts different accents and to speak clearly in simple language |
| **CO5** | Ability to read and evaluate texts critically |
| **List of experiments** | |
| **1** | Self-Introduction / Introducing a friend |
| **2** | Small talk |
| **3** | Essay Writing ( descriptive / narrative / issue-based/ argumentative / analytical.) |
| **4** | Listening to TED Talks (Being an active listener: giving verbal and non-verbal feedback) |
| **5** | Developing Hints |
| **ASSESSMENT PATTERN .** | |
| End Semester speaking & Writing will be conducted in the classroom | |
| **TEXT BOOKS** | |
| 1. Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011. | |
| 2. Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010 | |
| **REFERENCES** | |
| 1. Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010 | |
| 2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014 | |
| 3. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014 | |
| 4. English and Soft Skills, Dr. S.P. Dhanavel, Orient BlackSwan, 2013 | |
| 5. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013. | |

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | 2 | 2 | - |
| **CO2** | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | 2 | 2 | - |
| **CO3** | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | 2 | 2 | - |
| **CO4** | - | - | - | - | - | - | - | - | - | 3 | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | 3 | - | - | - | - | - |
| **AVG** | - | - | - | - | - | - | - | - | 1.2 | 3 | - | 1.8 | 1.2 | 1.2 | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24ED111 | DESIGN THINKING - BUILDING INNOVATION SOLUTIONING MINDSET | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |

**Course Objectives**

| | |
|---|---|
| 1 | Expose the students to the fields of innovation and entrepreneurship and strengthen their interest in these fields. |
| 2 | To discuss the relevance and importance of innovation and entrepreneurship to the students to improve their everyday life and future careers. |
| 3 | Illustrate the macro perspective of innovation in entrepreneurship . |
| 4 | To Design the entrepreneurship process. |
| 5 | Develop innovation and entrepreneurship processes to improve students to the skill set . |

| | |
|---|---|
| **UNIT 1** | **1** |
| What is innovation - Why is innovation important -Types of innovation - The Innovation process | |
| **UNIT 2** | **2** |
| Introduction to Problem Solving-The role of problem - solving in innovation and product development -The importance of real-time problem statements- Problem Identification and Definition | |
| **UNIT 3** | **2** |
| What is entrepreneurship (and how is it different from innovation) -Types of entrepreneurship -The Human side of entrepreneurship | |
| **UNIT 4** | **2** |
| Misconceptions about entrepreneurship -The process of developing entrepreneurship - Module building entrepreneurship mindset- Developing a solution thinking mind set to identify tools and techniques | |
| **UNIT 5** | **8** |
| Case study on adoption of new technology for innovation: Perspective of institutional and corporate entrepreneurship - A New Market Through E-Commerce. Case Studies- Promote Learning And Provide Inspiration in Innovate Entrepreneurship. | |
| **TOTAL PERIODS** | **15** |

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Understand basic concepts in the fields of innovation and entrepreneurship |
| **CO2** | Understand what a business model is and the process of problem solving. |
| **CO3** | Summarize the learning in developing an entrepreneurial idea, formed through innovative practices. |
| **CO4** | Model the correct problem solving methodologies with tools and techniques. |
| **CO5** | Design innovative solutions for real time problems. |

**TEXT BOOKS**

1 Lorraine Marchand,"The Innovation Mindset: Eight Essential Steps to Transform Any Industry",Columbia Business School Publishing (13 September 2022)

**REFERENCES**

1. Peter F. Drucker," Innovation and Entrepreneurship" .

2.Martha Corrales-Estrada "Innovation and Entrepreneurship: A New Mindset for Emerging Markets",Emerald Publishing Limited (27 September 2019)

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak

Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO 1 | PO2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 1 | - | 2 | - | 1 | 1 | 1 | - | - | - | 2 | - | 3 | 1 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO2** | 2 | 1 | 1 | - | 1 | - | 1 | - | - | - | 2 | 2 | 3 | 1 | - |
| **CO3** | 2 | 1 | 1 | 2 | - | - | - | 1 | - | - | - | 2 | 1 | - | 1 |
| **CO4** | - | 1 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **CO5** | - | 1 | 1 | 2 | 3 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| **AVG** | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| SEMESTER II | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SL. NO.** | **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **PERIODS PER WEEK** | | | **TOTAL CONTACT PERIODS** | **CREDITS** |
| | | | | **L** | **T** | **P** | | |
| 1. | U24IP201 | **VAC** (Biology for Engineers) | | 0 | 0 | 0 | 24 | 0 |
| **THEORY** | | | | | | | | |
| 1 | U24EN201 | Professional English | HSMC | 2 | 0 | 0 | 30 | 2.0 |
| 2 | U24MA203 | Differential Equations and Transforms | BSC | 3 | 1 | 0 | 60 | 4.0 |
| 3 | U24PH203 | Physics for Electronics Engineering -II | BSC | 3 | 0 | 0 | 45 | 3.0 |
| 4 | U24CS201 | Python Programming | ESC | 3 | 0 | 3 | 90 | 4.5 |
| 5 | U24CY201 | Green and Sustainability Chemistry | BSC | 2 | 0 | 0 | 30 | 2.0 |
| 6 | U24HT201 | தமிழரும் தெதாழில்நுட்பமும/Tamils and Technology | HSMC | 1 | 0 | 0 | 15 | 1.0 |
| 7 | U24CE203 | Engineering Graphics for Electronics and Communication Engineering | ESC | 2 | 0 | 4 | 75 | 4.0 |
| **PRACTICAL** | | | | | | | | |
| 8 | U24ME201 | Engineering Practices Lab | BSC | 0 | 0 | 4 | 60 | 2.0 |
| 9 | U24TP201 | Communication Skills Lab II | EEC | 0 | 0 | 2 | 30 | 1.0 |
| 10 | U24ED211 | Decoding innovation Opportunity | EDI | 0 | 0 | 1 | 15 | 0.5 |
| **TOTAL** | | | | **15** | **1** | **16** | **489** | **24** |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24IP201 | BIOLOGY FOR ENGINEERS | L | T | P | C |
|---|---|---|---|---|---|
| | | | | | 0 |
| **MODULE 1** | | | | **6** | |
| Need to study Biology:-Life Science Studies Significance-Bio Inspired Inventions-Role of Biology in next generation Technology Development-Cell structure-Cell Potential-Action Potential-ECG other common signals- Sodium | | | | | |
| **MODULE 2** | | | | **6** | |
| Potassium Channels-Neuron function-Central Nervous System-Discussion Topics: Evolution of Artificial Neural Networks, Machine Learning techniques. | | | | | |
| **MODULE 3** | | | | **6** | |
| Sensing Techniques-Understanding of sense organs working-Sensing mechanisms-Sensor Devolopment Issues-Discussion Topic: Digital Camera- Eye Comparison, electronic nose, electronic tongue, electronic skin. | | | | | |
| **MODULE 4** | | | | **6** | |
| Physiological Assist Devices: Artificial organ Development: Kidney, Liver, Pancreas, Heart valves-Design Challenges and Technological Developments | | | | | |
| | **TOTAL PERIODS** | | | **24** | |
| **TEXT BOOKS** | | | | | |
| 1 | Biomimicry: Innovation Inspired by Nature, Janine M. Benyus, Harper Collins, 2009 | | | | |
| 2 | Biomechanics: Mechanical Properties of Living Tissues, Y. C. Fung, Springer New York, 2007 | | | | |
| **REFERENCES** | | | | | |
| 1 | Biological Physics: Energy, Information, Life, Philip Nelson, Kevin Chen, Sarina Bromberg, Chiliagon Science, 2020 | | | | |
| 2 | Introduction to Bioengineering - Volume 2 of Advanced series in biomechanics, Yuan-cheng Fung, Shu Chien, World Scientific, 2001 | | | | |
| 3 | Nature's Machines: An Introduction to Organismal Biomechanics, David E. Alexander, Academic Press, 2017 | | | | |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24EN201 | Professional English | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

| Course Objectives | |
|---|---|
| 1 | To engage learners in meaningful language activities to improve their reading and writing skills |
| 2 | To engage learners in meaningful language activities to improve their reading and writing skills. |
| 3 | To enhance learners' vocabulary with a focus on technical terms and enabling them to communicate more effectively in both technical and professional contexts. |
| 4 | To master key grammar concepts and apply those concepts to produce clear and correct written communication |
| 5 | To help learners understand the purpose, audience, contexts of different types of writing |

| | |
|---|---|
| **UNIT 1 APPLIED LANGUAGE SKILLS** | **6** |
| **Reading:** Reading user manuals, brochures, posters, pamphlets<br>**Writing:** Review Writing (Book Review and Movie Review)<br>**Grammar:** Tenses, Prepositional phrases<br>**Vocabulary Development:** Technical vocabulary (synonyms and antonyms) | |
| **UNIT 2 PRACTICAL WRITING AND GRAMMAR SKILLS** | **6** |
| **Reading:** Reading longer technical texts<br>**Writing:** Writing response to a complaint letter<br>**Grammar:** Active and passive voice, Infinitives and Gerunds<br>**Vocabulary Development:** Sequence words, Misspelled words | |
| **UNIT 3 PROFESSIONAL WRITING AND ANALYTICAL READING** | **6** |
| **Reading:** Case Studies, Excerpts from literary texts, news reports etc.<br>**Writing:** Letter to the Editor, Checklists<br>**Grammar:** If Conditionals, Articles<br>**Vocabulary Development:** Collocation, Cause and effect expression | |
| **UNIT4 DEVELOPING WRITING AND LANGUAGE SKILLS** | **6** |
| **Reading:** Reading for detailed comprehension, newspaper articles<br>**Writing:** Essay writing<br>**Grammar:** Reported speech, Modals<br>**Vocabulary Development:** Conjunctions | |
| **UNIT 5 LANGUAGE SKILLS FOR CAREER SUCCESS** | **6** |
| **Reading:** Company profiles, Statement of purpose, an excerpt of interview with professionals<br>**Writing:** Job / Internship application – Cover letter & Resume<br>**Grammar:** Relative Clauses, Numerical adjectives<br>**Vocabulary Development:** Single sentence definition | |
| **TOTAL PERIODS** | **30** |

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Read and comprehend various forms of technical and informational texts and extract the necessary information for application or analysis. |

| | |
|---|---|
| **CO2** | Improve their vocabulary to articulate ideas clearly and effectively in professional and academic contexts. |
| **CO3** | Use grammar accurately in written communication. |
| **CO4** | Demonstrate proficiency in writing clear, structured responses, reviews, essays, and professional documents using appropriate tone, format, and language. |
| **CO5** | Create professional documents as well as communicate effectively in professional scenarios, ensuring success in job and internship applications. |

**TEXT BOOKS**

English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)

English for Science & Technology Cambridge University Press, 2021.

English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

**REFERENCES**


1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.

2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi

3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003

4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.

5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.


**CO-PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO2** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO3** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO4** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO5** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **AVG** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24MA203 | DIFFERENTIAL EQUATIONS AND TRANSFORMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | - | 4 |

**Course Objectives**

| | |
|---|---|
| 1 | To introduce the basic concepts of differential equations and to find its solutions. |
| 2 | To introduce Fourier series analysis which is vital to many applications in engineering apart from its use in solving boundary value problems. |
| 3 | To familiarize the student with Fourier transform techniques used in solving various practical engineering problems. |
| 4 | To understand the basic concept of Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients. |
| 5 | To familiarize the students with Gradient, divergence and curl of a vector point function and related identities |

| **UNIT 1 DIFFERENTIAL EQUATIONS** | **9+3** |
|---|---|
| Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients .Application:All the circuit analysis equations. | |
| **UNIT 2 FOURIER SERIES** | **9+3** |
| Dirichlet's conditions -Necessary and sufficient condition for existence of Fourier series –General Fourier series – Odd and even functions – Half range sine series –Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.. | |
| **UNIT 3 FOURIER TRANSFORMS** | **9+3** |
| Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity. | |
| **UNIT 4 LAPLACE TRANSFORMS** | **9+3** |
| Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.. | |
| **UNIT 5 VECTOR CALCULUS** | **9+3** |
| Differentiation of vectors: Gradient, Divergence, Curl and Directional derivatives – Line, Surface and Volume Integrals - Statement of Greens, Gauss divergence and Stoke's theorem - Simple applications involving rectangular parallelepiped and cubes. | |
| **TOTAL HR** | **60** |

**Course Outcomes**

| At the end of the course, the student will be able to | |
|---|---|
| **CO1** | Apply various techniques in solving differential equations |
| **CO2** | Evaluate Fourier Series of Periodic Functions |
| **CO3** | Illustrate the Fourier transform techniques. |
| **CO4** | Examine the concepts of Laplace transformation and solve differential equations with given boundary conditions.. |
| **CO5** | Estimate vector identities and interpret some integral theorems in a vector field |

**TEXT BOOKS**


1.Veerarajan.T,"Transforms and Partial Differential Equations", Third Edition,Tata Mcgraw Hill Education , private Limited ,2016.

2.Grewal B.S and Grewel J.S .“Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 45th Edition, 2020.

3.Bali. N.P and Manish Goyal, “A Textbook of Engineering Mathematics”, 9th Edition, Laxmi Publications Pvt. Ltd, 2018.


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1.Kandasamy.P.,Thilagavathy.K and Gunavathy.K.,"Engineering Mathematics For First Year B.E/B.Tech,Reprint Edition 2014,S.Chand and Co.,New Delhi.

2.Bali. N.P and Manish Goyal, “A Textbook of Engineering Mathematics,Semester-II”, Fourth Edition, Laxmi Publications Pvt. Ltd, 2010.

3.Dass, H.K., and Er.RajnishVerma, “Higher Engineering Mathematics”, S.Chand Private Ltd.,2011.

4.Peter V.O’Neil, “Advanced Engineering Mathematics”, 7th Edition, Cengage learning,2012


CO/PO, PSO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | - |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO3** | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO5** | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24PH203 | PHYSICS FOR ELECTRONICS ENGINEERING II | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | - | 0 | 3 |

| **Course Objectives** | |
|---|---|
| **1** | To delve into the fundamentals of electrical conductivity in materials, including the free electron theory and explore concepts such as resistivity, conductivity, and mobility of charge carriers |
| **2** | To involve a deep dive into the physics governing semiconductor materials,the band theory of solids, energy bands, and the determination of charge carriers (electrons and holes) in semiconductors |
| **3** | Learn how transistors are used as amplifiers, switches, and building blocks in electronic circuits, and analyze transistor circuits through mathematical modeling and simulation. |
| **4** | To make the students to understand the basics of dielectric materials and insulation. |
| **5** | To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications. |

| **UNIT 1 ELECTRICAL PROPERTIES OF MATERIALS** | **9** |
|---|---|
| Classical free electron theory - Expression for electrical conductivity,Thermal conductivity - Quantum free electron theory : Fermi- Dirac statistics – Density of energy states – Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode -Electron in periodic potential – Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model – tight binding approximation - | |
| **UNIT 2 SEMICONDUCTORS AND TRANSPORT PHYSICS** | **9** |
| 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, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.. | |
| **UNIT 3 TRANSISTORS AND POWER DEVICES** | **9** |
| PN diode, Zener diode, Tranisistor-CE,CC,CB amplifiersJFETs – Drain and Transfer characteristics,- Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage - Channel length modulation MOSFET Characteristics – Comparison of MOSFET with JFET. Power Devices-UJT, SCR, Diac, Triac. | |
| **UNIT 4 DIELECTRICS** | **9** |
| Electrical susceptibility – Dielectric constant – Electronic, ionic, orientation and space charge polarization – Frequency and temperature dependence of polarization – Internal field – Clausius – Mosotti relation (derivation) – Physical significance of Maxwell's equations - Dielectric loss – Dielectric breakdown – Uses of dielectric materials in capacitor and transformer. examples of dielectricmaterials and its applications. | |
| **UNIT 5 PHYSICS OF NANOMATERIALS** | **9** |
| Density of states for solids - Significance between Fermi energy and volume of the material – Quantum confinement – Quantum structures – Density of states for quantum wells, wires and dots – Band gap of nanomaterials –Tunneling – Single electron phenomena – Single electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance –Carbon nanotubes: Properties and applications - Spintronic devices and applications | |
| **TOTAL PERIODS** | **45** |

| **Course Outcomes** | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Gain knowledge on specific material properties like conductivity in metals, insulating properties in ceramics, and the semiconductor behavior of materials like silicon and germanium. Connect these properties to real-world applications such as wiring, insulation, and electronic components. |
| **CO2** | Explore device characteristics, operating regions, and applications in amplifiers, switches, and digital logic circuits. |
| **CO3** | Explore advanced transistor applications such as integrated circuits (ICs), power electronics, and radio frequency (RF) communication systems. |
| **CO4** | Discuss practical applications such as capacitors, insulating coatings, and dielectric resonators in electronic circuits, power systems, and telecommunications. |
| **CO5** | Appreciate the nanodevices such as nanowires, quantum dots, and carbon nanotubes, highlighting their unique properties and potential applications in areas like sensing, computing, and medicine. |

**TEXT BOOKS**


1.S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.

2.R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.

3.G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.


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1.Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.

2.Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Education (Indian Edition), 2019.

3.Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019

4.Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001

5.Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.


CO/PO, PSO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 2** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 3** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 4** | **3** | **3** | **-** | **-** | **-** | **--** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 5** | **3** | **3** | **-** | **-** | **-** | | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24CS201 | Python Programming | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | - | 3 | 4.5 |

| Course Objectives | |
|---|---|
| 1 | To learn to solve problems using Python conditionals and loops. |
| 2 | To define Python functions and use function calls to solve problems. |
| 3 | To use Python data structures - lists, tuples, dictionaries to represent complex data. |
| 4 | To do input/output with files in Python. |
| 5 | To perform operations using python libraries |

**UNIT 1 Introduction to Python** — **9+9**

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**Practicals:**

1. Solving simple real life / scientific / technical problems (Electricity Billing, Retail shop billing, Sine series)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n )

**UNIT 2 CONTROL FLOW, FUNCTIONS, STRINGS** — **9+9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition,Lambda functions, recursion; Strings: string slices, immutability, string functions and methods, string module; Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

**Practicals:**

1. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns)
2.Implementing programs using Functions. (Factorial, largest number in a list, area of shape).
3.Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)

**UNIT 3 LISTS, TUPLES, DICTIONARIES** — **9+9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation

**Practicals:** 1.Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
2.Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)

**UNIT 4 FILES, EXCEPTIONS AND MODULES** — **9+9**

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages, Python Itertools & functools modules, Illustrative programs: word count, copy file, Voter's age validation, Marks range validation.

**Practicals:**

1. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word).

| | |
|---|---|
| 2.Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark Range Validation) | |
| **UNIT 5 LIBRARIES,PACKAGES** | **9+9** |
| Python libraries - NumPy -Array manipulations, numeric ranges, Slicing, indexing, Searching, Sorting, and splitting, Pandas - Data Analysis, Data-frame, Data selection, group-by, Series, sorting, searching, and statistics, dask (pandas wrapper) ,Matplotlib- Data visualization , Line plot, Style properties, multi line plot, scatter plot, PyGame - Elliptical Orbit, Bouncing Ball ..<br>**Practicals:**<br>1. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy) .<br>2. Developing a game activity using Pygame like bouncing ball, elliptic orbit. | |
| **TOTAL PERIODS** | **90** |

| **Course Outcomes** | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Develop and execute simple Python programs using conditionals and loops for solving problems. |
| **CO2** | Decompose a Python program into functions. |
| **CO3** | Represent compound data using Python lists, tuples, dictionaries |
| **CO4** | Read and write data from/to files in Python programs. |
| **CO5** | Perform basic operations using python Libraries |

**TEXT BOOKS**

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS

**REFERENCES**

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

CO/PO, PSO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - |
| **CO2** | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - |
| **CO3** | 2 | - | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 | - |
| **CO4** | 2 | 3 | 2 | 2 | - | -- | - | - | 2 | 1 | 1 | 2 | 3 | 3 | - |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO5 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 1 |
| AVG | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 1 |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24CY201 | GREEN AND SUSTAINABLE CHEMISTRY | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives**

| | |
|---|---|
| 1 | To give the basic knowledge on role of chemistry to mitigate environmental and global challenges. |
| 2 | To understand the global climatic change and the necessity for the preservation of ecosystem. |
| 3 | To become familiar with the safe design of synthesis and to minimize the generation of hazardous substances. |
| 4 | To understand the need of various energy resources for sustainable development. |
| 5 | To integrate the chemistry with environment, technology and public health. |

| **UNIT1 ROLE OF CHEMISTRY - CURRENT CHALLENGES FOR SUSTAINABLE DEVELOPMENT** | **6** |
|---|---|

Role of chemistry in addressing the challenges for sustainable development and solving global issues. Nexus among biosphere environment, human and animal health. Introduction to bio-diversity-threats and conservation of bio-diversity. Millenium development goals (MDG) and sustainable development goals(SDG),clean development mechanism(CDM)..

| **UNIT2 SUSTAINABLE ENVIRONMENTAL CHEMISTRY** | **6** |
|---|---|

Climate change – greenhouse effect - gobal warming - sea level rise - intrusion and inundation, ozone layer depletion, Elnino and LaNina – carbon credits, carbon trading, carbon foot print, legal provision for environmental protection, coastal zone management-soft and hard measures, Ecosystem – estuaries - corals, mangroves, wetlands, sand dunes etc.

| **UNIT3 PRINCIPLES OF SUSTAINABLE GREEN CHEMISTRY** | **6** |
|---|---|

Sources, reactions and effect of chemicals in environments – Factory effluent and treatment, Handling of

Hazards-Design of green pesticides for agriculture.- Introduction to Biocides: types and applications, Organic Insecticides – Carbamates, Chlorinated hydrocarbons, cypermithrin, Pyrethrin,silica gel,rotenone- synthesis properties and practical applications. -reduction of toxicity, improved recycling and improved product performance

| **UNIT4 SUSTAINABLE ENERGY** | **6** |
|---|---|

Present energy challenges and the possible energy solutions - Solar energy- Solar Panel-Solar water heater-solar heat collector and applications- Wind energy- Types – production - advantages and disadvantages-applications. Nuclear energy – production - advantages and disadvantages- applications. Geothermal energy – Production and applications – Bio fuels..

| **UNIT5 GOOD HEALTH AND WELL BEING -WATER-SOIL-AIR** | **6** |
|---|---|

Ground water contamination and contamination of water bodies. The role of chemistry in developing appropriate technological solutions for water treatment using Electrodialysis, Forward osmosis and advanced oxidation using photocatalysis and waste water treatment. Reclamation of soil. Current air pollution situation and trends. Factors responsible for air pollution. Air pollution assessment, monitoring and mitigation.

| **TOTAL PERIODS** | **30** |
|---|---|

**Course Outcomes**

At the end of the course, the student will be able to

| | |
|---|---|
| **CO1** | Understand the ability to face the current challenges across globe with the aid of chemistry.. |
| **CO2** | Identify the climatic challenges and to contribute for sustainable transformation |
| **CO3** | Understand the safe design of products with the principles of green chemistry. |
| **CO4** | Understand to analyze the energy challenges for sustainable resource management |
| **CO5** | Integrate chemistry with environmental science and public health. |

**TEXT BOOKS**

1.Anubha Kaushik and C.P.Kaushik's "Perspectives in Environmental Studies",6thEdition,NewAge International Publishers ,2018.

2.BennyJoseph,'Environmental Science and Engineering',TataMcGraw-Hill,NewDelhi,2016.

3.Gilbert M.Masters,'Introduction to Environmental Engineering and Science',2ndedition,Pearson Education, 2004.

4.Allen,D.T.andShonnard,D.R.,SustainabilityEngineering:Concepts,DesignandCaseStudies, Prentice Hall.

5.Bradley.A.S;Adebayo,A.O.,Maria,P.Engineering applications in sustainable design and development, Cengage learning.

6.Environment Impact Assessment Guidelines,Notification of Government of India,2006.7.Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

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1.Matlack,A.S.Introduction to green chemistry,Marcel Dekker:Newyork,2001.

2.Anastas,P.T:Warner,J.C.Green chemistry:Theory and practice,Oxford univ press:oxford,1998.

3.Fankte,peter,et al."Exposure and toxicity characterization of chemical emissions and chemical in products:Global recommendations and implementation in USEtox"The international journal of life cycle assessment,26.5(2021):899-915.

4.Rajagopalan,R,'EnvironmentalStudies-FromCrisistoCure',Oxford University Press,2005.

5.ErachBharucha"Textbook of Environmental Studies for Undergraduate Courses"Orient BlackswanPvt. Ltd. 2013.

6. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Black swan Pvt. Ltd. 2013

**CO-PO,PSOMapping**
**(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs)andProgrammeSpecificOutcomesPSOs'**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 1 | - | 1 | 1 | 2 | 2 | 1 | 2 | - | 3 | - | - | - |
| **CO2** | 3 | 1 | 1 | - | 1 | 1 | 3 | 1 | 2 | 2 | - | 2 | - | - | - |
| **CO3** | 3 | 1 | 1 | - | 1 | 1 | 2 | 1 | 2 | 2 | - | 2 | - | - | - |
| **CO4** | 3 | - | 1 | - | 2 | 2 | 3 | 2 | 2 | 2 | - | 3 | - | - | - |
| **CO5** | 3 | 1 | 1 | - | 2 | 2 | 3 | 2 | 1 | 2 | - | 3 | - | - | - |
| **AVG** | 3 | 1 | 1 | - | 1.4 | 1.4 | 2.6 | 1.6 | 1.6 | 2 | - | 2.6 | - | - | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24TA201 | தமிழரும் தொதாழில்நுட் மும் /Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

| | |
|---|---|
| **அலகு I ொதசவு மற்றும் ொ றனத் தொதழில்நுட் ம்:** | **3** |
| சங்க ெகாலத்தில் ெதசவுத் தெதாழில் - ெபானனத் தெதாழில்நுட்பம் - கருப்பு சிdப்பு ெபாண்டங்கள் - ெபாண்டங்களில் கீறல் குறியிடுகள் | |
| **அலகு II வடிவனம ்பு மற்றும் கட்டிடக் தொதாழில்நுட் ம்:** | **3** |
| சங்க ெகாலத்தில் dடிdனமப்பு மற்றும் கட்டுெமான ங்கள் & சங்க ெகாலத்தில் வீட்டுப் தெபாருட்களில் dடிdனமப்பு - சங்க ெகாலத்தில் கட்டுெமான தெபாருட்களும் ெ டுகல்லும் - சிலப்பதிெகாரத்தில் மமனட அனமப்பு பற்றிய விdரங்கள் - ெமாமல்லபுரச் சிற்பங்களும், மெகாவில்களும் - மெசாழர் ெகாலத்Fப் தபருங்மெகாவில்கள் மற்றும் பிற dழிெபாட்டுத் தலங்கள் -<br>ெ ெ ாயக்கர் ெகால மெகாவில்கள் - ெமாதிரி கட்டனமப்புகள் பற்றி அறிதல், மFனர மீன ெ ாட்சி அம்மன் ஆலயம் மற்றும் திருமனல ெ ெ ாயக்கர் மெ ால் - தசட்டிெ ெ ாடு வீடுகள்<br>- பிரிட்டிஷ் ெகாலத்தில் தசன்னனயில் இந்மெதா-சமெராதனசிக் கட்டிடக் கனல | |
| **அலகு III உற் த்தித் தொதழில் நுட் ம் :** | **3** |
| கப்பல் கட்டும் கனல - உமெலாகவியல் - இரும்புத் தெதாழிற்ச்ெசானல - இரும்னப உருகுக்குதல், எஃகு - dரெலாற்றுச் ெசான்றுகளாக தசம்பு மற்றும் தங்க ெ ெ ாணயங்கள் -<br>ெ ெ ாணயங்கள் அச்சடித்தல் - மணி உருெdாக்கும் தெதாழிற்ெசானலகள் - கல்மணிகள், கண்ெணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்Fண்டுகள் - தெதால்லியல் ெசான்றுகள் - சிலப்பதிெகாரத்தில் மணிகளின் dனகள் | |
| **அலகு IV வவொளாண்னம மற்றும் ொ ர் ்ெொ றசத் தொதழில் நுட் ம்:** | **3** |
| அனண, ஏரி, குளங்கள், மதகு - மெசாழர்ெகாலக் குமிழித் தூம்பின் முக்கியத்Fdம் - ெகால்ெ னட பெராமரிப்பு - ெகால்ெ னடகளுக்ெகாக dடிdனமக்கப்பட்ட கிணறுகள் - மdெளாண்னம மற்றும் மdெளாண்னமச் ெசார்ந்த தசயல்ெபாடுகள் - கடல்ெசார் அறிவு - மீன்dளம் - முத்F மற்றும் முத்Fக்குளித்தல் - தபருங்கடல் குறித்த பண்னடய அறிவு - அறிவுெசார் சமூகம் | |
| **அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ் :** | **3** |
| அறிவியல் தமிழின் dளர்ச்சி - கணித்தமிழ் dளர்ச்சி - தமிழ் நூல்கனள மின்பதிப்பு தசய்தல் - தமிழ் தமன்தெபாருட்கள் உருெdாக்கம் - தமிழ் இனனயக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இனணயத்தில் தமிழ் அகெராதிகள் - தெசாற்குனdத் திட்டம் | |
| **TOTAL HR** | **15** |

**TEXT BOOKS**

1. தமிழக dரெலாறு - மக்களும் பண்ெபாடும் - மக. மக. பிள்னள (தdளியீடு: தமிழ்ெ ெ ாடு<br>ெபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணின ித் தமிழ் - முனனdர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி - னdனக ெ திக்கனரயில் சங்கெகால ெ கர ெ ெ ாகரிகம் (தெதால்லியல் Fனற தdளியீடு)
4. தெபாருெள - ஆற்றங்கனர ெ ெ ாகரிகம் (தெதால்லியல் Fனற தdளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies

| |
|---|
| 7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies) |
| 8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies) |
| 9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by:Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author) |
| 10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author) |
| 11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) |
| 12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book. |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24CE203 | ENGINEERING GRAPHICS FOR ELECTRONICS AND COMMUNICATION ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

| **Course Objectives** | |
|---|---|
| **1** | Drawing of engineering curves, projection of points & straight lines |
| **2** | Drawing of freehand sketches of simple objects. |
| **3** | Drawing of section of solids and development of lateral surfaces |
| **4** | Drawing of Isometric projections and freehand sketching |
| **5** | Learning of 3D modeling techniques |

| **UNIT 1 PLANE CURVES, PROJECTION OF POINTS AND LINES** | **6 + 9** |
|---|---|
| Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves. Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations. | |
| **UNIT 2 PLANE SURFACE AND PROJECTION OF SOLIDS** | **6 + 9** |
| Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method. Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. | |
| **UNIT 3 PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF LATERAL SURFACES** | **6 + 9** |
| Sectioning of above solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids, cylinders and Cones. | |
| **UNIT 4 ISOMETRIC PROJECTION AND FREEHAND SKETCHING** | **6 + 9** |
| Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. | |
| **UNIT 5 FUNDAMENTALS OF ELECTRONIC CIRCUIT DRAWING** | **6 + 9** |
| Standard Electrical Signs and Symbols used in Electrical and Electronic Practices and trades – Sketch of various components – Wiring diagrams and Layout diagrams – Different Substation layouts from high voltage to domestic three phase distribution networks, Earthing – Plate earthing – pipe earthing, MATLAB – Simulink Basics – Schematic. ORCAD – Simple Schematic. | |
| **TOTAL PERIODS** | **75** |

| **Course Outcomes** | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Understand various concepts like dimensioning, conventions and standards related to Engineering Drawing to construct Conic curves, Projection of Points & straight lines. |
| **CO2** | Impart knowledge on the projection of plane surfaces and Rolling solids. |
| **CO3** | Improve the visualization skills for better understanding of Section of solids and Developments of surfaces |
| **CO4** | Develop the imaginative skills of the students required to understand Isometric projection of & Orthographics projections-Freehand sketching |
| **CO5** | Create proficiency in developing 3D solid models using software. |

**TEXT BOOKS**

Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House,53 Edition, 2019.

| |
|---|
| Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018. |
| Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015 |
| Autodesk Fusion 360: A Power Guide for Beginners and Intermediate Users by John Willis, Sandeep Dogra, and Cadartifex, 4e, CADArtifex |
| **REFERENCES** |
| Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edition, 2019. |
| Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017. |
| Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005. |
| Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015. |
| Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009. |
| Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Ltd, 2008. |
| Autodesk Fusion 360 For Beginners: Part Modeling, Assemblies, and Drawings – Tutorial Book |


| | **CO-PO, PSO Mapping**<br>(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak<br>Programme Outcomes (POs) and Programme Specific Outcomes PSOs' | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 | PSO 3 |
| CO 1 | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | 2 |
| CO 2 | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | 2 |
| CO 3 | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | 2 |
| CO 4 | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | 2 |
| CO 5 | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | 2 |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24ME101 | ENGINEERING PRACTICES LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| **Course Objectives** | |
|---|---|
| The main learning objective of this course is to provide hands on training to the students in: | |
| **CO1** | Draw pipe line plan; layout and connect various pipe fittings used in common household plumbing work |
| **CO2** | To make wood joints commonly used in household wood. |
| **CO3** | To make various electrical connections in typical household electrical wiring installations |
| **CO4** | Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipment; Make a tray out of metal sheet using sheet metal work. |
| **CO5** | Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB. |

| **PART I CIVIL ENGINEERING PRACTICES** | |
|---|---|
| **PLUMBING WORK** | |
| | **Theory** |
| 1 | a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household. |
| 2 | b) Connecting pipes of different materials: Metal, plastic and flexible pipes |
| | **Experiment** |
| 1 | c) Preparing plumbing line sketches. |
| 2 | d) Laying pipe connection to the suction side of a pump |
| 3 | e) Laying pipe connection to the delivery side of a pump. |
| | **Demo** |
| **1** | **in campus -**<br>**-Water supply lines (RO plant)**<br>**- Drainage systems**<br>**-Water Harvesting** |
| | **Selfstudy** |
| 1 | household appliances.- pipes of different materials: Metal, plastic and flexible pipes are utilized in various applications, such as:<br>- Water supply lines<br>- Drainage systems<br>- Gas lines(if any)<br>- Heating and cooling systems<br>-Solar water heating (if any)<br>-chimney |
| | **WOOD WORK** |
| | **Theory** |
| 1 | a) Tools used in Carpentry & safety measures. |
| 2 | b) Studying common industrial trusses - https://www.youtube.com/watch?v=-1w4_4Sr2kg |
| | **Experiment** |
| 1 | a) Sawing, |

| | |
|---|---|
| 2 | b) Planing and |
| 3 | c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint. |
| | **Demo** |
| 1 | a) Studying joints in door panels and wooden furniture |
| 2 | b) Study of truss in workshop |
| | **self study** |
| 1 | a) In house- Types of joints used in window, door, chair, table,specific type of furniture or fixture |
| **ELECTRICAL ENGINEERING PRACTICES 15** | |
| | **Theory** |
| 1 | a) Electrical Installation tools, equipment & safety measures. |
| 2 | b) Introduction and application of switches, fuses,boards, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket |
| | **Demo** |
| 1 | a)Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box, |
| 2 | b)electrical wiring system from the Electricity Board (EB) to a classroom on a campus |
| 3 | C) Earthpit & its maintainance in campus |
| 4 | d)Hands-on session of electrical connections for Motors & Uninterruptible Power Supply. |
| **5** | **e)Bringing Renewable Energy to the Classroom: A Solar Smart Grid Demonstration** |
| | **Experiment** |
| 1 | d) Fluorescent Lamp wiring with introduction to CFL and LED types. |
| 2 | e) Energy meter wiring and related calculations/ calibration |
| 3 | f) Iron Box wiring and assembly |
| 4 | g) Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac) |
| 5 | h) emergency lamp wiring/Water heater |
| | **self study** |
| 1 | i)House - electrical wiring system from the Electricity Board (EB) to a dining Room |
| 2 | j)Building (Common area)- electrical wiring system from the Electricity Board (EB) to a straircase of the building & water pump |
| 3 | k)Types of fuse / MDB/ MCB/RCD/CU/Switchboard |
| 4 | l)Earthpit at house |
| **MECHANICAL ENGINEERING PRACTICES** | |
| | **Theory** |
| 1 | Tools and its handling techniques & safety measures. |
| 2 | Welding Procedure, Selection & Safety Measures. |
| 3 | types of Welding joints Butt Joints, Lap Joints, and Tee Joints |

| | |
|---|---|
| 4 | Basic of foundry operations-<br>- Various types of casting processes<br>- Types of patterns used in casting processes<br>- Types of moulding sand and materials used for pattern making |
| 5 | Making of a cone using sheet metal |
| | **Demo** |
| 1 | Demonstrating basic foundry operations.- Mold Cavity, Air Vents, Liquid Passages Gates,Runners, Sprues |
| 2 | Demonstrating components made out of casting at workshop |
| 3 | Demonstration of shaft in gearbox of lathe machine |
| 4 | Demonstration of screws RH, LH (Turning, Facing and Thread) |
| 5 | Demonstration of Bolted joint |
| 6 | Demonstration of sheet metal fabricated components |
| 7 | Making of a cone using sheet metal |
| | **Experiment** |
| 1 | Dis-assembly and assembly of a centrifugal pump. |
| 2 | Dis-assembly and assembly of a household mixer /Grinder Mixer |
| 3 | Dis-assembly and assembly of an airconditioner. |
| 4 | Dis-assembly and assembly of a Ceiling Fan/Table Fan |
| 5 | (simple)Turning. |
| 6 | Drilling & Tapping in Plate (Simple Bolted joint) |
| 7 | Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. |
| 8 | Making of a square tray |
| **1** | **Self-Study**<br>**- list examples of sheet metal fabricated component used in house**<br>**- Application of shaft**<br>**- list examples of welded components commonly used in a house**<br>**- list components made by foundry - casting process** |
| **ELECTRONIC ENGINEERING PRACTICES 15** | |
| | **Theory** |
| 1 | Electronic components, equipment & safety measures. |
| 2 | a) Soldering simple electronic circuits and checking continuity. |
| | **Demo** |
| 1 | a)Study an elements of smart phone |
| 2 | b)Assembly and dismantle of LED TV |
| | **Experiment** |
| 1 | a) Soldering simple electronic circuits and checking continuity. |
| 2 | b)Hands-on session of Soldering Practices in a Printed Circuit Breaker. |
| 3 | c) Assembling and testing electronic components on a small PCB |
| 4 | d)Assembly and dismantle of computer/ laptop |

| | |
|---|---|
| 5 | e)Hands-on session of integration of sensors and actuators with a Microcontroller. |
| 6 | f)Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier. |
| | **Self-Study (mini Project)** |
| 1 | Sensor-based projects: Create projects using sensors like temperature, humidity, or motion sensors |
| 2 | Automatic Fan Controller: Create a system that turns on a fan when the temperature exceeds a certain limit |
| 3 | Automatic Night Light: Design a circuit that turns on an LED light when it gets dark. |
| 4 | Water Level Indicator |
| 5 | Door Alarm: Create a simple alarm system that triggers when a refrigerator door is open for a more than a one minute |

| **Upon completion of this course, the students will be able to:** | |
|---|---|
| **CO1** | To practice and experience the plumbing work |
| **CO2** | To gain practical experience in carpentry by crafting a variety of joints. |
| **CO3** | To acquire knowledge in the methodology and techniques of wiring for electrical connections. |
| **CO4** | To gain knowledge in welding, sheet metal fabrication, and lathe operations. |
| **CO5** | To learn about electronic components, equipment, and their functions–such as resistors, color coding, measuring AC signal parameters, gates, circuits, and more. |

| | **CO-PO, PSO Mapping** (3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs' | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **CO2** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **CO3** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **CO4** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **CO5** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **AVG** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24TP210 | COMMUNICATION SKILLS LAB II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

| Course Objectives | |
|---|---|
| 1 | To enhance their ability to understand spoken English in various contexts and take part in effective discussions in a professional context. |
| 2 | To enhance speaking and presentation skills |
| 3 | To identify varied group discussion skills and apply them to take part in effective discussions in a professional context. |
| 4 | To develop students' critical thinking skills |
| 5 | To prepare for real-life communication situations and workplace discussions through the practice of mock interviews. |

| | |
|---|---|
| **UNIT I** | **6** |
| **Listening:** Listening to voicemail & messages, Audio texts, for writing short answers<br>**Speaking:** Conversation between the interlocutor and each candidate | |
| **UNIT II** | **6** |
| **Listening:** Listening to podcasts, anecdotes and identifying topics, context etc..<br>**Speaking:** Presentation on any given topic (Non - Technical) | |
| **UNIT III** | **6** |
| **Listening:** One extended conversation or monologue - interview, discussion, lectures and educational videos<br>**Speaking:** Group Discussion. | |
| **UNIT IV** | **6** |
| **Listening:** Listening to presentation and 5 min informal talk<br>**Speaking:** Presentation on any given topic (Technical) | |
| **UNIT V** | **6** |
| **Listening:** Listening to interview skills<br>**Speaking:** Mock interview | |
| **TOTAL PERIODS** | **30** |

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Understand accurately and respond to a variety of spoken content to showcase their ability to capture both main ideas and supporting details. |
| **CO2** | Enhance the students to make effective presentations. |
| **CO3** | Speak effectively in group discussions held in a formal/semi-formal context. |
| **CO4** | Ability to interpret different genres of texts, infer implied meanings and evaluate it for ideas as well as for methods of presentation relevant in different situations |
| **CO5** | Motivate and prepare the students to attend job interviews and be successful in their pursuit. |
| **List of experiments** | |
| **1** | Conversation |
| **2** | Presentation on any given topic ( Non - Technical) |
| **3** | Group Discussion |
| **4** | Presentation on any given topic ( Technical) |
| **5** | Mock interview |

# Meenakshi Sundararajan Engineering College

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**Department: Electronics and Communication Engineering, R2024, CBCS**

| ASSESSMENT PATTERN |
|---|
| End Semester speaking & Writing will be conducted in the classroom |
| **TEXT BOOKS** |
| 1. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011 |
| 2. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011 |
| **REFERENCES** |
| 1. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012 |
| 2. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004 |
| 3. English and Soft Skills, Dr. S.P. Dhanavel, Orient BlackSwan, 2013 |
| 4.Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015 |
| 5.Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016 |
| 6 E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015 |
| 7.Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014 |
| 8.S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010. |

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO2** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO3** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | 2 | 2 | - |
| **CO4** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **CO5** | - | - | - | - | - | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **AVG** | - | - | - | - | - | - | - | - | 1.8 | 3 | - | 2 | 2 | 2 | - |

# Meenakshi Sundararajan Engineering College

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Department: Electronics and Communication Engineering, R2024, CBCS**

| U24ED211 | DESIGN THINKING – DECODING INNOVATION OPPORTUNITY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |

**Course Objectives**

| | |
|---|---|
| 1 | Understand and apply the five phases of the Stanford Design Thinking Framework (Empathize, Define, Ideate, Prototype, and Test) to identify user needs and create innovative solutions. |
| 2 | Gain knowledge of the five stages of the IDEO Design Thinking Framework (Discover, Interpret, Ideate, Experiment, and Evolve) and explore how to iteratively refine solutions through a human-centered approach. |
| 3 | Learn the application of Design Thinking tools such as visualization, journey mapping, value chain analysis, brainstorming, and rapid prototyping to generate and refine ideas that meet customer needs. |
| 4 | Apply Design Thinking methodologies to identify opportunities for innovation, scope projects, conduct research, generate ideas, and create business case studies and prototypes for real-world problem-solving. |
| 5 | Analyze and clarify innovation opportunities by understanding the problem, stakeholders, and solution context through frameworks like Doblin's Ten Types of Innovation and RACI, focusing on the 'Who', 'What', 'How', and 'Why' aspects of problem-solving. |

**UNIT – 1: STANFORD DESIGN THINKING FRAMEWORK** — **3**

- How To `Empathize'?
- How To `Define'
- How To `Ideate'?
- How To `Prototype'?
- How To `Test'?

**UNIT – 2: IDEO DESIGN THINKING FRAMEWORK** — **3**

- How To `Discover'?
- How To `Interpret'?
- How To `Ideate'?
- How To `Experiment'?
- How To `Evolve'?

**UNIT – 3: DESIGN THINKING & DESIGN DOING** — **2**

- `What Is'? - Overview About Visualization, Journey Mapping, Value Chain Analysis & Mind Mapping
- `What If'? - Overview About BrainStorming & Concept Development
- `What Wows'? - Overview About Assumption Testing & Rapid Prototyping
- `What Works'? - Overview About Customer Co-Creation & Learning Launch

**UNIT – 4: DESIGN THINKING IN PRACTICE – Identify An Opportunity & Becoming Aware Of Next Steps For Innovation – Overview** — **2**

- Before You Begin: Identify An Opportunity – Scope Your Project – Draft Your Design Brief – Make Your Plans
- `What Is' Focus: Do Your Research – Identify Insights – Establish Design Criteria
- What If' Focus: BrainStorm Ideas – Develop Concepts – Create Business Case Studies
- `What Wows' Focus: Surface Key Assumptions – Make Prototypes
- `What Works' Focus: Get Feedback From Stakeholders – Run Learning Launches – Design The On-Ramp

| **UNIT – 5: CLARIFYING PROBLEM STATEMENT & PRIORITIES BY IDENTIFYING & DECODING THE INNOVATION OPPORTUNITY** | **5** |
|---|---|

- Overview Of Doblin's Ten Types Of Innovation With Brief-Cases Towards Identifying Innovation Opportunity & Clarifying Problem Statement and Priorities
- Opportunity / Problem Clarity About `Who'? (Who're we solving the problem for?)
- Opportunity / Problem Clarity About `What'? (What is the Problem Or EGO – Expectation, Goal & Objective?)
- Opportunity / Problem Clarity About `HOW'? (How's the Overall Problem Solving Approach Help Highlighting RACI – Who's Responsible, Accountable, Consulted & Informed?)
- Opportunity / Problem Clarity About `WHY'? (Why's this Solution or Product or Service or Process beneficial to the stakeholders?)

| **TOTAL PERIODS** | **15** |
|---|---|

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Apply Design Thinking frameworks, tools, and techniques to real-world problems, identifying opportunities for innovation and creating effective solutions. |
| **CO2** | Empathize with users, define problems, ideate solutions, prototype, and test, ensuring that solutions meet customer needs and are feasible, viable, and desirable. |
| **CO3** | Analyze problems, stakeholders, and solution contexts using frameworks like Doblin's Ten Types of Innovation and RACI, focusing on the 'Who', 'What', 'How', and 'Why' aspects of problem-solving. |
| **CO4** | Generate and refine ideas using Design Thinking tools like visualization, journey mapping, value chain analysis, brainstorming, and rapid prototyping, creating innovative solutions that meet customer needs. |
| **CO5** | Develop effective problem-solving skills, including the ability to scope projects, conduct research, generate ideas, and create business case studies and prototypes, preparing them to tackle complex real-world problems.. |

**TEXT BOOKS**


| | |
|---|---|
| 1 | Tim Brown, "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", Harper Publications, 2009 |
| 2 | Don Norman, "The Design of Everyday Things", Basic Books, 2013 |
| 3 | Tom Kelley, David Kelley, "Creative Confidence: Unleashing the Creative Potential Within Us All", Currency, 2013 |


**REFERENCES**

| | |
|---|---|
| 1 | Hasso Plattner, Christoph Meinel, Larry Leifer, “Design Thinking: Understand – Improve – Apply (Understanding Innovation)”, Springer, 2011 |
| 2 | Jakob Schneider, Marc Stickdorn, “This Is Service Design Thinking: Basics, Tools, Cases”, John Wiley & Sons, 2011 |
| 3 | Tom Kelley, The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm, Currency, 2001 |


**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak
Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |
| **CO2** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |
| **CO3** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |
| **CO4** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |
| **CO5** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |
| **AVG** | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | | | |

**SEMESTER III**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | TCP | PERIODS PER WEEK | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| | | **VAC** | | 30 | | | | |
| **THEORY** | | | | | | | | |
| 1 | U24MA303 | Random Process and Linear Algebra | BSC | 60 | 3 | 1 | 0 | 4 |
| 2 | U24EC301 | Signals and Systems | PCC | 60 | 3 | 1 | 0 | 4 |
| 3 | U24EC302 | Basic Electric Circuit Analysis | PCC | 45 | 3 | 0 | 0 | 3 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 4 | U24EC303 | Electronic Devices and Circuits | PCC | 75 | 3 | 0 | 2 | 4 |
| 5 | U24EC304 | Digital System Design | PCC | 75 | 3 | 0 | 2 | 4 |
| 6 | U24CS302 | Data Structures and Design | ESC | 75 | 3 | 0 | 2 | 4 |
| **PRACTICAL** | | | | | | | | |
| 7 | U24TP310 | General Aptitude & Logical Reasoning | EEC | 30 | 0 | 0 | 2 | 1 |
| 8 | U24ED311 | Design Thinking Innovation tool kits | EDIC | 15 | 0 | 0 | 1 | 0.5 |
| 9 | U24RM312 | Introduction to Problem Solving | RMC | 15 | 0 | 0 | 1 | 0.5 |
| 10 | U24MC313 | Foreign Language (Japanese/French) | MC# | 30 | 2 | 0 | 0 | 0 |
| **TOTAL** | | | | **510** | **20** | **2** | **10** | **25** |

| U24MA303 | RANDOM PROCESSES AND LINEAR ALGEBRA | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives**

| | |
|---|---|
| 1 | To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering. |
| 2 | To understand the basic concepts of one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon. |
| 3 | To understand the basic concepts of random processes which are widely used in IT fields. |
| 4 | To introduce the basic notions of vector spaces which will then be used to solve related problems. |
| 5 | To understand the concepts of vector space, linear transformations , inner product spaces and orthogonalization. |

**UNIT 1 PROBABILITY AND RANDOM VARIABLES** — **9+3**

Axioms of probability – Conditional probability – Bayes theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable.

**UNIT 2 TWO- DIMENSIONAL RANDOM VARIABLES** — **9+3**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

**UNIT 3 RANDOM PROCESSES** — **9+3**

Classification – Stationary process – Markov process - Poisson process – Random telegraph process.

.

**UNIT 4 VECTOR SPACES** — **9+3**

Vectorspaces–Subspaces–Linearcombinationsandlinearsystemofequations–Linearindependence and linear dependence – Bases and dimensions.

**UNIT 5 LINEAR TRANSFORMATION AND INNER PRODUCT SPACES** — **9+3**

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformation - Inner product - Norms - Gram Schmidt orthogonalization process - Adjoint of linear operations - Least square approximation.

**TOTAL PERIODS** — **60**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Interpret the axiomatic formulation of Probability theory and random variables as an intrinsic need for the analysis of random phenomena |
| **CO2** | Understand the basic concepts of one and two dimensional random variables and apply in engineering applications. |
| **CO3** | Classify the concept of random processes and to demonstrate the specific applications to Poisson and Markov Processes |
| **CO4** | Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts. |
| **CO5** | Demonstrate accurate and efficient use of advanced algebraic techniques. |
| **TEXT BOOKS** | |
| 1.Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4 th Edition, 2004. | |
| 2.Ibe,O.C.," Fundamentals of Applied Probability and Random Processes ", 2nd Edition, Academic press, 2014. | |
| 3.Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", 4th Edition, New Delhi, McGraw Hill Education, 2017. | |
| 4.Veerarajan.T,"Probability, Statistics and Random Process with Queueing Theory and Queueing Networks", Fourth Edition,Tata Mcgraw Hill Education , private Limited . | |
| **REFERENCES** | |
| 1.Kolman. B. Hill. D.R., "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint, 2009. | |
| 2.Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010. | |
| 3.Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition, 2012. | |
| 4.Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random | |
| 5.Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications ", Academic Press, 2004. | |
| 6.Stark. H. and Woods. J.W., "Probability and Random Processes with Applications to Signal Processing ", Pearson Education, Asia, 3rd Edition, 2002. | |

| CO-PO, PSO Mapping<br>(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-<br>Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs' | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |
| **CO2** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |
| **CO3** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |
| **CO4** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |
| **CO5** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |
| **AVG** | 3 | 3 | 3 | 1 | - | - | - | - | 1 | - | - | 1 | 1 | - | - |

| U24EC301 | SIGNALS AND SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | - | 4 |

**Course Objectives- To build a Radio for Communications**

| | |
|---|---|
| 1 | To understand the basic properties of signal & systems |
| 2 | To know the methods of characterization of LTI systems in time domain |
| 3 | To analyze continuous time signals and system in the Fourier and Laplace domain |
| 4 | To analyze discrete time signals and system in the Fourier and Z transform domain |
| 5 | To Apply Fourier series, Laplace transform, Fourier transform, Z-transform and DTFT in signal analysis |

**UNIT 1 CLASSIFICATION OF SIGNALS AND SYSTEMS** — **12**

Continuous time signals (CT signals)&Discrete time signals (DT signals): Step, Ramp, Pulse, Impulse, Exponential- Classification of CT and DT signals: periodic and aperiodic, random signals, CT systems and DT systems- Basic properties of systems, Linear Time Invariant systems and properties.

**UNIT 2 ANALYSIS OF CONTINUOUS TIME SIGNALS** — 12

Fourier series analysis- trigonometric, cosine and Exponential Fourier series, Spectrum of CT signals, Fourier Transform properties, Fourier transform signal analysis, Laplace Transform properties, Laplace transform Signal Analysis.

**UNIT 3 LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS** — **12**

Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, LTI systems analysis using Fourier and Laplace transforms, Block diagram representation, System Connected in series/parallel.

**UNIT 4 ANALYSIS OF DISCRETE TIME SIGNALS** — **12**

Sampling of CT signals and aliasing, DTFT properties, DTFT signal analysis, Z transform properties, Z transform signal analysis, Inverse Z transform

**UNIT 5 LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS** — **12**

Difference equation, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms.

**TOTAL PERIODS** — **60**

| Course Outcomes | |
|---|---|
| **At the end of the course, the student will be able to** | |
| **CO1** | Classify and analyze the types of signals, their responses and properties |
| **CO2** | Analyze the continuous time signals using Fourier series, Fourier transform and Laplace transform and also understand their properties |
| **CO3** | Analyze the continuous time systems using Fourier transform and Laplace transform and to solve the frequency response of LTI-CT systems |
| **CO4** | Analyze the discrete time signals using Fourier transform and Z transform and to understand their properties |
| **CO5** | Analyze the discrete time systems using Fourier transform and Z- transform in order to solve the frequency response of LTI-DT systems. |

**TEXT BOOKS**

1. Oppenheim, Willsky and Hamid, "Signals and Systems", 2nd Edition, Pearson Education, New Delhi, 2015.(Units I - V)

2. Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley, 2002

3. B. P. Lathi, "Principles of Linear Systems and Signals", Third edition, Oxford, 2017

**REFERENCES**

1. B. P. Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford, 2009.

2. M. J. Roberts, "Signals and Systems Analysis using Transform methods and MATLAB", McGraw-Hill Education, 2018

3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007

4.. M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1- Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO 1 | PO 2 | PO3 | PO 4 | PO 5 | PO 6 | PO7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 3 | - | 3 | 2 | - | - | - | - | - | 3 | - | - | 1 |
| **CO2** | 3 | - | 3 | - | - | 2 | - | - | - | - | - | 3 | - | 3 | - |
| **CO3** | 3 | 3 | - | - | 3 | 2 | - | - | - | - | - | 3 | 2 | - | - |
| **CO4** | 3 | 3 | - | - | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| **CO5** | 3 | 3 | - | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |

| U24EC302 | BASIC ELECTRIC CIRCUIT ANALYSIS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | - | 0 | 3 |

**Course Objectives- To build basic measurement circuits**

| | |
|---|---|
| 1 | To learn the basic concepts and behavior of DC and AC circuits |
| 2 | To understand various methods of circuit/ network analysis using network theorems. |
| 3 | To apply the transient and steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations. |
| 4 | To apply the concept of two port networks and the parameters. |
| 5 | To apply transfer function to port network |

**UNIT 1 DC CIRCUIT ANALYSIS** — **9**

Basic electric circuit components: charge, current, voltage,power. Basic Electrical Circuits: Ohm's Law, Kirchoff's current and voltage law. Short and open circuits, Voltage division in series, current division in parallel. Analysis of series and parallel circuits, Nodal and mesh.

**UNIT 2 NETWORK THEOREM AND DUALITY** — **9**

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits. Analysis using dependent current sources and voltage sources.

**UNIT 3 AC ANALYSIS** — **9**

Sinusoidal Steady State analysis, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, Average and RMS values, Power triangle and average power, Resonance, magnetically coupled circuits.

**UNIT 4 TIME DOMAIN ANALYSIS** — **9**

Source free RL and RC circuits, Transient Response of RL and RC circuits for DC excitation and Sinusoidal excitation. Frequency Domain Analysis: Transient Response of RL, RC, RLC circuits for DC and Sinusoidal excitation using Laplace transform, Network functions of single-port network, Driving point and Poles and Zeros of network functions.

**UNIT 5 ANALYSIS OF TWO PORT NETWORK** — **9**

Network parameters-Impedance, admittance, transmission and hybrid, Conversion formulae. Relationships between parameters, Interconnection of two port networks,Transfer function of two port network terminated by a resistance.

**TOTAL PERIODS** — **45**

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Ability to apply the basic laws such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits. |
| **CO2** | Ability to apply Network Theorems in DC and AC circuits. |
| **CO3** | Ability to analyse AC circuits for phase relationship and power calculation. |
| **CO4** | Ability to design and analyse first and second order AC circuits |
| **CO5** | Ability to analyse two port networks. |

**TEXT BOOKS**

1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis",Mc Graw Hill education, 9th Edition, 2018.

2.Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014.

**REFERENCES**

1. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc Graw- Hill, 2nd Edition, 2003. .

2. D.R.Cunningham, J.A. Stuller, "Basic Circuit Analysis", Jaico Publishing House, 2005

3. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7th Edition, 2009

4. Charles.K.Alexander, Mathew N.O.Sadiku," Fundamentals of Electric Circuits", McGraw Hill, 5th Edition, 2012.

. 5. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The Mc Graw Hill companies, 2nd Edition, 2011.

CO/PO, PSO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | 1 | | | | 1 | | 1 | | | | | |
| **CO2** | 3 | 3 | 2 | 2 | | | | 1 | | 1 | | | | | |
| **CO3** | 3 | 3 | 3 | 3 | | | | 1 | | 1 | | | | | |
| **CO4** | 3 | 3 | 3 | 3 | | | | 1 | | 1 | | | | | |
| **CO5** | 3 | 3 | 3 | 2 | | | | 1 | | 1 | | | | | |

| U24EC303 | ELECTRONIC DEVICES AND CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | - | 2 | 4 |

**Course Objectives: To build a regulated power supply and a timer circuit**

| | |
|---|---|
| 1 | To study basics of PN Junction diode |
| 2 | To analyze the frequency response of small signal amplifiers |
| 3 | To analyze multistage BJT and MOSFET amplifier circuits |
| 4 | To understand the analysis and design of feedback amplifiers and Oscillators |
| 5 | To analyze and design of power amplifiers and DC convertors |

**UNIT 1 SEMICONDUCTOR DIODE** **9+6**

PN junction diode, current equations, energy band diagram, diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion capacitances, Switching characteristics, Breakdown in PN junction diodes, Applications of PN junction diode, Zener diode Characteristics, Zener diode as voltage regulator

**PRACTICALS**

1. VI characteristics of PN Junction Diode, Zener Diode.
2. Construction of Zener Diode as voltage regulator

**UNIT 2 AMPLIFIERS** **9+6**

Load line, operating point, biasing methods for BJT and MOSFET, BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model–Analysis of CS, CG and Source follower – Gain and frequency response- Low frequency and High frequency analysis

**PRACTICALS:**

1. Frequency response of BJT Amplifiers (CE, CB, CC)
2. Frequency response of MOSFET Amplifiers (CS)
3. Characteristics of MOSFET (Drain and Transfer)

**UNIT 3 MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER** **9+6**

Cascode amplifier, Differential amplifier – Common mode and Difference mode analysis, CMRR – MOSFET input stages – tuned amplifiers – Gain and frequency response – Neutralization method

**PRACTICALS:**

1. Frequency response of Multistage Amplifiers
2. CMRR measurement for Differential Amplifier

**UNIT 4 FEEDBACK AMPLIFIERS AND OSCILLATORS** **9+6**

Advantages of negative feedback – Voltage / Current, Series , Shunt feedback Amplifiers – positive feedback– Condition for oscillations, RC phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

**Practicals:**

1. Analysis of feedback amplifiers

| **UNIT 5 POWER AMPLIFIERS AND DC/DC CONVERTERS** | **9+6** |
|---|---|

Power amplifiers- class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET –DC/DC converter – Buck, Boost, Buck-Boost analysis and design.

**PRACTICALS:**

1. Testing of Power amplifier circuits
2. Construction of simple power supply circuits (HWR, FWR)

| **TOTAL PERIODS** | **75** |
|---|---|

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Demonstrate the operation and characteristics of the PN junction diode |
| **CO2** | Design and analyze BJT and MOSFET amplifier. |
| **CO3** | Determine the frequency response of BJT and MOSFET amplifiers |
| **CO4** | Analyse Feedback Amplifiers and Oscillators |
| **CO5** | Design the Power Amplifiers and DC Converters |

**TEXT BOOKS**

1. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press, 5 th Edition, 2010

2.Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2008

3.Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", Oxford University Press, 7 th Edition, 2014

3.Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th Edition, , Mc Graw Hill Education (India) Private Ltd., 2017.

**REFERENCES**

1.Donald.A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 3 rd Edition, 2010.

2. D.Schilling and C.Belove, "Electronic Circuits", McGraw Hill, 3 rd Edition, 1989

3.Muhammad H.Rashid, "Power Electronics", Pearson Education / PHI , 2004.

4.Floyd, Electronic Devices, Ninth Edition, Pearson Education, 2012.

| CO/PO, PSO Mapping<br>(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs' | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 3 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **CO2** | 3 | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **CO3** | 3 | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **CO4** | 3 | 3 | 2 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **CO5** | 3 | 2 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **AVG** | **3** | **2.6** | **2.6** | **2.6** | **1.8** | **1.6** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **1** | **1** |

| U24EC304 | DIGITAL SYSTEMS DESIGN | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | - | 2 | 4 |

**Course Objectives : To develop a 7 segment LED system**

| | |
|---|---|
| 1 | To understand the fundamentals of digital circuits and simplification methods |
| 2 | To study and design of various combinational digital circuits using logic gates |
| 3 | To bring out the analysis and design procedures for synchronous Sequential circuits |
| 4 | To bring out the analysis and design procedures for asynchronous Sequential circuits |
| 5 | To study semiconductor memories and related technology |

**UNIT 1 BASIC CONCEPTS** — **9+6**

Review of number systems-representation-conversions, Review of Boolean algebra- theorems, sum of product and product of sum simplification, canonical forms min term and max term, Simplification of Boolean expressions-Karnaugh map, completely and incompletely specified functions, Implementation of Boolean expressions using universal gates ,Tabulation methods.

**Practical:**1.Verification of Logic Gates.

**UNIT 2 COMBINATIONAL LOGIC CIRCUITS** — **9+6**

Problem formulation and design of combinational circuits - Code-Converters, Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/Demux, Case study: Digital trans-receiver / 8 bit Arithmetic and logic unit, Parity Generator/Checker, Seven Segment display decoder

**Practical:** 1. Design and implemention of adders ,subtractors & code converters.

**2.**. Simulation using HDL of adders ,subtractors & code converters.

**UNIT 3 SYNCHRONOUS SEQUENTIAL CIRCUITS** — **9+6**

Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment,lock - out condition circuit implementation - Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register. Model Development: Designing of rolling display/real time clock

**Practical** : Design and implementation of counters using flip-flops.

Simulation using HDL of counters using flip-flops.

**UNIT 4 ASYNCHRONOUS SEQUENTIAL CIRCUITS** — **9+6**

Stable and Unstable states, output specifications, cycles and races, state reduction, race free

assignments, Hazards, Essential Hazards, Fundamental and Pulse mode sequential circuits, Design of Hazard free circuits

**Practical** : Design of Magnitude Comparators.

Simulation using HDL of Magnitude Comparators

| **UNIT 5 LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES** | **9+6** |
|---|---|

Logic families- Propagation Delay, Fan - In and Fan - Out - Noise Margin - RTL ,TTL,ECL, CMOS - Comparison of Logic families - Implementation of combinational logic/sequential logic design using standard ICs, PROM, PLA and PAL, basic memory, static ROM,PROM,EPROM,EEPROM EAPROM.

**Practical:** Design of Multiplexers & Demultiplexers.

| **TOTAL PERIODS** | **75** |
|---|---|

**Course Outcomes**

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Design various combinational digital circuits using logic gates. |
| **CO2** | Analyse and design synchronous sequential circuits. |
| **CO3** | Analyse and design asynchronous sequential circuit |
| **CO4** | Build logic gates and use programmable devices |
| **CO5** | Design various combinational digital circuits using logic gates. |

**TEXT BOOKS**

1. M. Morris Mano and Michael D. Ciletti, 'Digital Design', Pearson, 5th Edition, 2013.(Unit - I - V)

2. Charles H.Roth. "Fundamentals of Logic Design", 7th Edition, Thomson Learning, 2014.

**REFERENCES**

1.Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011.

2.John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008

3.John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

PO/PSO

CO/PO, PSO Mapping
(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1- Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PS O1** | **PS O2** | **PS O3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | 3 | 3 | 3 | 3 | 2 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | | | | | | | | | | | | | | | |
| **CO 2** | - | - | - | - | - | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 |
| **CO 3** | - | 3 | 3 | 2 | - | 2 | - | - | - | - | 2 | 2 | 3 | 3 | 2 |
| **CO 4** | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 | 3 | 1 |
| **CO 5** | - | 3 | 3 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | 3 | 2 |
| **AVG** | 3 | 2.6 | 2.6 | 2.3 | - | 2 | - | - | - | - | 2 | 2 | 3 | 3 | 2 |

| U24AD302 | OOPS AND DATA STRUCTURES DESIGN | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objectives: To apply data structures and OOP principles to solve real-world problems in AI and Data Science contexts.**

| | |
|---|---|
| 1 | To learn the fundamental concepts of Object-Oriented Programming (OOP) paradigms. |
| 2 | To familiarize oneself with the concept of Polymorphism and Inheritance. |
| 3 | To design and implement linear data structures. |
| 4 | To design and implement various tree structures. |
| 5 | Comprehend various graph representations and construct solutions for problems. |

**UNIT 1 INTRODUCTION TO OOP** — **9+6**

Procedural vs. Object-Oriented Programming, Core OOP Concepts, Overview of C++, data types, operators, Objects and Classes**:** Definition, creating objects, instance variables, methods. Constructors and Destructors: Default, parameterized, copy constructors; destructor concepts. Static Members: Static variables and methods. this or self-Keyword, control flow statements (if-else, loops), Functions.

**Practical:**

1.Implementation of Constructors & Destructors, Copy Constructor
2.Implementation of Friend Function & Friend Class.

**UNIT 2 POLYMORPHISM AND INHERITANCE** — **9+6**

Overloading: Function overloading and Operator Overloading, Types of Inheritance, Base Classes and Derived Classes – Protected Members, Access Specifiers, Constructors and Destructors in Inheritance, method overriding, Virtual Functions, This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding, Exception Handling: Try-catch blocks, throwing and handling exceptions.

**Practical:**

3.Implement Polymorphism Concept- Function and Operator overloading.
4.Implement the concept of inheritance.

**UNIT 3 LINEAR DATA STRUCTURE** — **9+6**

Linked list implementation - Singly Linked List, Doubly Linked List, Circular Linked List. Queue ADT - Queue Implementation -Circular Queue – Priority Queue, Application of Queues. Stack ADT - Implementation of Stack using list- Applications: Evaluate expressions, Convert infix to postfix.

**Practical:**

5.Implementation of Single Linked List (Insertion, Deletion and Display).
6.Implementation of Doubly Linked List (Insertion, Deletion and Display).
7.Implementation of Stack using Linked List.
8.Implementation of Queue using Linked List

**UNIT 4 TREES** — **9+6**

Tree ADT – Binary Tree ADT- Operations – Tree Traversals – Binary Search Tree-Red Black Trees – Operations – Expression tree-AVL Tree: Single and double rotations – Trie Data Structure, Properties and Basic Operations on Trie Data Structure, Applications of Trie data structure.

**Practical:**

9. Implementation of a Binary Search Tree.
10. Implement the operations of Trie data structures

**UNIT 5 GRAPHS** **9+6**

Representation of Graphs, Topological Sort, Depth First Search and Breadth-First Search, Minimum Spanning Tree – Prim's Algorithm, Shortest path algorithm – Dijikstra's Algorithm-Bellman-Ford-Graph connectivity – Applications of Graph

**Practical:**

11. Implement Minimum Spanning Trees
12. Implement Shortest Path Algorithms

**Total Periods: 45+30**

COURSE OUTCOMES:

**At the end of the course, the student will be able to**

| | |
|---|---|
| **CO1** | Implement fundamental C++ programming constructs. |
| **CO2** | Apply core Object-Oriented Programming (OOP) principles. |
| **CO3** | Implement and analyze various linear data structures. |
| **CO4** | Implement and traverse various Tree data structures. |
| **CO5** | Apply graph algorithms for connectivity and optimization. |

**TEXT BOOKS**

| | |
|---|---|
| **1.** | Data Structures and Algorithms in C++" by Michael T. Goodrich, Roberto Tamassia, David M. Mount,3rd Edition (2024) |
| **2.** | Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss,4th Edition (2014) |

**REFERENCES**

| | |
|---|---|
| **1.** | C++ Primer" by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo,5th Edition (2012) |
| **2.** | Programming -- Principles and Practice Using C++" by Bjarne Stroustrup, 2nd Edition (2014) |

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcomes PSOs'

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | 3 | - | - | - | 2 | 1 | - | 2 | 2 | 1 | - |
| **CO2** | 3 | 3 | 3 | 1 | 3 | 1 | - | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| **CO3** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 1 | 1 | 2 | 2 | 3 | - |
| **CO4** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 1 | 1 | 2 | 3 | 3 | - |
| **CO5** | 3 | 3 | 3 | 2 | 3 | 1 | - | - | 2 | 1 | 1 | 2 | 3 | 3 | - |
| **AVG** | 3 | 2.8 | 2.8 | 1.8 | 3 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 2.6 | 2.4 | 1 |