Meenakshi Sundararajan Engineering College

(An Autonomous Institution)

Managed by I.I.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(B) status

B.Tech ARTIFICIAL INTELLIGENCE AND DATA SCIENCE 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)

Prof. K. R. Sundararajan, a well-known educationalist, established the Indian Institute of Engineering Technology (I.I.E.T) society in the year 1947 in 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 10 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)** - established in 2001 & affiliated to Anna University offering engineering programs with about 2000 plus students.
- **Meenakshi Sundararajan School of Management(MSSM)** - established in 2000 & affiliated to 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

Meenakshi Sundararajan Engineering college, Chennai constantly strives to be a Centre 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 ensure a high standard of quality education and to meet the ever-changing needs of the society
- Constant interaction with its stakeholders
- Linkage with other educational institutions and industries at the national and international level for mutual benefit
- Provision of research facilities and infrastructure in line with global trends
- Adequate opportunities and exposure to the students through suitable programs, to mould their character and to 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 OF HUMANITIES AND 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 Technologies from 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

The department of Information Technology was started in the year 2001 with an intake of 60 students focusing on the area. The department has won laurels to 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 create a supportive and inclusive educational environment that empowers students to succeed in their academic, personal, and professional lives. 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:

Individual Counseling: One-on-one sessions with RCI registered counselors or psychologists to address personal issues such as stress, anxiety, depression, 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 and placement cell is committed to providing exceptional placement opportunities for its students. The 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.

The Placement Cell functions under the leadership of Placement 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

MSEC Students Clubs were initiated with the objective to provide a platform for students to discover, showcase 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.

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Department : AI&DS , R2024, CBCS

Vision of the department	Mission of the department
To achieve academic excellence by imparting state of the art technical education to mould engineers who contribute to the society through innovation and research in the field of Artificial intelligence and Data science.	**Mission 1:** To empower staff and students with the in depth knowledge of concepts in Artificial intelligence and data science **Mission 2:** To develop products and solutions through Innovation and research through constant interaction with Society and stakeholders **Mission 3:** To inculcate the practise of ethical and moral standards.

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	Design and implementing AI-driven solutions to complex problems by using appropriate AI tools and platforms to create intelligent systems.
PSO2	Develop data analytics and data visualization skills pertaining to knowledge acquisition, knowledge representation and knowledge Engineering
PSO3	Demonstrate an understanding of the ethical considerations and societal impacts of AI and data science

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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		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	U24PH102	Physics for Information Science I	BSC	45	3	0	0	3
4	U24CY102	Chemistry for Information Science	BSC	45	3	0	0	3
5	U24TA101	தமிழர்மரபு / Heritage of Tamils	HSMC	15	1	0	0	1
THEORY CUM PRACTICAL								
6	U24CS101	Programming in C	ESC	90	2	0	4	4
7	U24CE102	Engineering Graphics and Computer Application	ESC	75	3	0	2	4
PRACTICAL								
8	U24ME101	Engineering Practices Laboratory	BSC	60	0	0	4	2
9	U24TP110	Communication Skill 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**	**13**	**24.5**

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SEMESTER II								
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**TCP**	**PERIODS PER WEEK**			**CREDITS**
					L	**T**	**P**	
	U24IP201	Value Added Course – II (Biology for AI Engineers)	VAC	24	0	0	0	0
THEORY								
1	U24EN201	Professional English	HSMC	30	2	0	0	2
2	U24MA202	Probability and Statistics	BSC	60	3	1	0	4
3	U24PH202	Physics for Information Science II	BSC	45	3	0	0	3
4	U24TA201	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	15	1	0	0	1
5	U24EC202	Basics of Electrical and Electronics Engineering	ESC	45	3	0	0	3
6	U24CY201	Green and Sustainable Chemistry	BSC	30	2	0	0	2
THEORY CUM PRACTICAL								
7	U24CS201	Python Programming	ESC	90	3	0	3	4.5
PRACTICAL								
8	U24BS101	Physics and Chemistry Laboratory	BSC	60	0	0	4	2
9	U24TP210	Communication Skill Lab - II	HSMC	30	0	0	2	1
10	U24ED211	Design Thinking - Decoding Innovation Opportunity	EDIC	15	0	0	1	0.5
TOTAL				**420**	**17**	**1**	**12**	**23**

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SEMESTER III								
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**TCP**	**PERIODS PER WEEK**			**CREDITS**
					L	**T**	**P**	
		VAC		30				
THEORY								
1	U24MA302	Discrete Mathematics	BSC	60	3	1	0	4
2	U24AD301	Fundamentals of Data Science and Analytics	PCC	45	3	0	0	3
3	U24MC313	Foreign Language (Japanese / French / German)	MC#	30	2	0	0	0
THEORY CUM PRACTICAL								
4	U24AD302	Data Structures Design	ESC	75	3	0	2	4
5	U24AD303	Database Design and Management	PCC	75	3	0	2	4
6	U24EC310	Digital Principles and Computer Organization	PCC	75	3	0	2	4
PRACTICAL								
7	U24AD304	Data Science and Analytics Laboratory	PCC	45	0	0	3	1.5
9	U24TP310	General Aptitude & Logical Reasoning	EEC	30	0	0	2	1
10	U24ED311	Innovation Tool Kits	EDIC	15	0	0	1	0.5
11	U24RM312	Research Overview	RMC	15	0	0	1	0.5
TOTAL				**465**	**17**	**1**	**13**	**22.5**

#Mandatory Course is a Non-credit.

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Department : AI&DS , R2024, CBCS

SEMESTER IV								
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**TCP**	**PERIODS PER WEEK**			**CREDITS**
					L	**T**	**P**	
		VAC		30				
THEORY								
1	U24MA401	Linear Algebra and Numerical Methods	PCC	60	3	1	0	4
2	U24AD401	Artificial Intelligence	PCC	45	3	0	0	3
3	U24AD402	Machine Learning	PCC	45	3	0	0	3
4	U24MC413	Indological Studies	MC#	30	2	0	0	0
THEORY CUM PRACTICAL								
5	A24AD403	Operating Systems	PCC	75	3	0	2	4
6	U24AD404	Data Exploration and Visualization	PCC	75	3	0	2	4
PRACTICAL								
7	U24AD405	Artificial Intelligence Laboratory	PCC	45	0	0	3	1.5
8	U24AD406	Machine Learning Laboratory	PCC	45	0	0	3	1.5
9	U24TP410	Critical and Creative Thinking Skills	EEC	30	0	0	2	1
10	U24ED411	Idea and Simulation Lab	EDIC	15	0	0	1	0.5
11	U24RM412	Conceptualization	RMC	15	0	0	1	0.5
TOTAL				**480**	**17**	**1**	**14**	**23**

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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	U24AD501	Deep Learning	PCC	45	3	0	0	3
2		Open Elective I	OEC	45	3	0	0	3
THEORY CUM PRACTICAL								
3	U24AD502	Big Data Analytics	PCC	75	3	0	2	4
4		Professional Elective I	PEC	60	2	0	2	3
5		Professional Elective II	PEC	60	2	0	2	3
6		Professional Elective III	PEC	60	2	0	2	3
PRACTICAL								
7	U24AD503	Deep Learning Lab	PCC	60	0	0	4	2
8	U24TP510	Analytical and Logical Thinking Skills	EEC	30	0	0	2	1
9	U24AD504	Summer Internship*	EEC					1
10	U24RM512	Data Exploration	RMC	15	0	0	1	0.5
11	U24ED511	Prototype & Market Validation	EDIC	15	0	0	1	0.5
12	U24MC513	Fitness for Life-Yoga, Food Nutrition	MC#	30	0	0	2	0
TOTAL				**495**	**15**	**0**	**18**	**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.**

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SEMESTER VI								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**TCP**	**PERIODS PER WEEK**			**CREDITS**
					L	**T**	**P**	
		VAC		30				
THEORY								
1	U24AD601	Theory of Computation	PCC	45	3	0	0	3
2		Open Elective II	OEC	45	3	0	0	3
3	U24MC613	Integrated Disaster management	MC#	30	2	0	0	0
THEORY CUM PRACTICAL								
4	U24EC610	Embedded Systems and IOT	PCC	75	3	0	2	4
5	U24AD602	Computer Networks	PCC	75	3	0	2	4
6		Professional Elective IV	PEC	60	2	0	2	3
7		Professional Elective V	PEC	60	2	0	2	3
PRACTICAL								
8	U24RM612	Design & Modelling	RMC	30	0	0	2	1
9	U24TP610	Employability Skills & Problem Solving Techniques	EEC	30	0	0	2	1
10	U24ED611	Building a Business Model, GTM & Startup Journey	EDIC	15	0	0	1	0.5
TOTAL				**465**	**18**	**0**	**13**	**22.5**

#Mandatory Course is a Non-credit.

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SEMESTER VII								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**TCP**	**PERIODS PER WEEK**			**CREDITS**
					L	**T**	**P**	
		VAC		**30**				
THEORY								
1	U24AD701	Information Security	PCC	45	3	0	0	3
2	U24MG701	Engineering Economics and Finance Management	HSMC	45	3	0	0	3
3		Open Elective - III	OEC	45	3	0	0	3
4		Open Elective -IV	OEC	45	3	0	0	3
5		Constitution of India	MC#	30	2	0	0	0
THEORY CUM PRACTICAL								
6		Professional Elective VI	PEC	60	2	0	2	3
PRACTICAL								
7	U24AD702	Summer Internship*	EEC					1
8	U24RM712	Testing	RMC	15	0	0	1	0.5
TOTAL				**285**	**16**	**0**	**3**	**16.5**

***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.**

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SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	TCP	PERIODS PER WEEK			CREDITS
					L	T	P	
		VAC		30				
PRACTICAL								
1	U24AD801	Project Work	EEC	240	0	0	16	8
TOTAL				240	0	0	16	8
OVERALL TOTAL								**164**

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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	10	11	4						25
3	ESC	10	7.5	4						21.5
4	PCC			12.5	21	9	11	3		56.5
5	PEC					9	6	3		18
6	OEC					3	3	6		12
7	EEC			1	1	2	1	1	8	14
8	Non-Credit / (Mandatory)			√	√	√	√	√		0
9	EDIC	0.5	0.5	0.5	0.5	0.5	0.5			3
10	RMC			0.5	0.5	0.5	1	0.5		3
Total		24.5	23	22.5	23	24	22.5	16.5	8	**164**

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 (EDIC)

RMC - Research Methodology Courses

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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 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	

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

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 and 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	2	2	-
AVG	-	-	-	-	-	-	-	0.4	1.6	2.6	-	0.4	1.8	1.8	-

Meenakshi Sundararajan Engineering College

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Department: AI&DS , 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.	

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.	

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.	

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.	

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.	

TOTAL PERIODS	**60**

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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 lm, "Engineering Mathematics with MATLAB" CRC Press Publishers , I st Edition , 2017.

4. Engineering Mathematics: First year.Calculus and analytical geometry,volume 2, M.K.Venketaraman,,National Publishing company,1965.

REFERENCES

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

.2.Kandasamy.P.,Thilagavathy.K and Gunavathy.K.,"Engineering Mathematics For irst Year BB.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

REFERENCE LINKS

https://youtube.com/playlist?list=PLpklqhIbn1jpBog00CBB-OjKyxVxXqqFc&si=NV-LiY6Cdqu1s-92

https://youtube.com/playlist?list=PLpklqhIbn1jrUYbLgaOayAnT4i95g5Ibj&si=GbGA9cmWgvoJiVla

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	1	1	-	-	-	-	-	-	-	1	-	-

Meenakshi Sundararajan Engineering College

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U24PH102	PHYSICS FOR INFORMATION SCIENCE I	L	T	P	C
		3	0	0	3

Course Objectives

1	To comprehend and identify different crystal structures and their imperfections.
2	To explain the elastic properties of materials and understand their significance.
3	To develop knowledge about the sound waves
4	To develop an understanding of quantum mechanical phenomena and their applications.
5	To explain the origin of laser action, production of laser, fibre optics and their applications.

UNIT 1 CRYSTAL PHYSICS — **9**

Single crystalline, polycrystalline and amorphous materials– single crystals -Seven type of crystal system- Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures ,Crystal growth-Bridgmann technique,Czochralski technique.

UNIT 2 PROPERTIES OF MATTER — **9**

Properties of matter: Elasticity- Hooke's law - Relationship between three moduli of elasticity– stress - strain diagram– Poisson's ratio –Factors affecting elasticity– Torsional stress & deformations – Twisting couple – Torsion pendulum- theory and experiment– bending of beams -bending moment– uniform and nonuniform bending: theory and experiment.

UNIT 3 ULTROSONICS — **9**

Ultrasonics: Production of ultrasonics by Magnetostriction and piezoelectric methods - acoustic grating - Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C – scan displays.Applications of ultrasonic waves: SONAR.

UNIT 4 QUANTUM PHYSICS — **9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton Effect. Theory and Experiential verification - Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box and extension to three dimensional box – Degeneracy of electron energy states.

UNIT 5 PHOTONIC AND FIBRE OPTICS — **9**

Photonics: Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients – Conditions for Laser action - Types of lasers – Nd YAG and CO_2 lasers. Laser applications: Laser welding ,laser marking,surface texturing.Fibre optics: Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Losses in fibers - attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- pressure and displacement.

TOTAL PERIODS — **45**

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Course Outcomes	
At the end of the course, the student will be able to	
CO1	Analyze crystal structures and the influence of imperfections on their properties.
CO2	Demonstrate and explain the general concepts of elastic properties of materials.
CO3	Analyze the applications of ultrasonics to engineering and medical disciplines.
CO4	The quantum concepts and its use to explain black body radiation, Compton effect and wave equation for matter waves.
CO5	Elucidate the principle and working of lasers and their applications in the field of industry, medicine and telecommunication

TEXT BOOKS

1. Gaur R K, Gupta S L, “Engineering Physics”, Dhanpat Rai Publishers, 2012.
2. Serway R A, Jewett J W, “Physics for Scientists and Engineers”, Cengage Learning, 2010

REFERENCES

1.Halliday D, Resnick R, Walker J, “Principles of Physics”, Wiley, 2015.

2.Tipler P A, Mosca G, “Physics for Scientists and Engineers with Modern Physics”, WH Freeman,2007

3.Avadhanulu M N, Kshirsagar P G, “A Textbook of Engineering Physics”, S Chand & Co Ltd, Ninth Revised 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	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-
CO2	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-
CO3	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-
CO4	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-
CO5	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-
AVG	3	2	-	1	1	-	1	-	-	2	-	-	-	-	-

Meenakshi Sundararajan Engineering College

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U24CY102	CHEMISTRY FOR INFORMATION SCIENCE	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 impart knowledge to the students on the basic concepts and properties of polymeric materials for various engineering applications
3	To develop an understanding of the basic concepts of energy storage devices and Nano materials with its applications.
4	To develop a thorough understanding of phase rule and spectroscopy with its applications.
5	To acquire the basic knowledge on sensors along with photochemistry which is essential for the software engineers for developing new devices.

UNIT 1 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.

UNIT 2 POLYMER CHEMISTRY — **9**

Polymers and Polymerization: definition, classification - types of polymerization: addition and condensation–mechanism of addition polymerization (cationic, anionic, free radical and coordination polymerization)- Moulding of polymers into articles-injection-Properties: Glass Transition temperature.- Thermoplastic and thermosetting polymers-conducting polymers-definition,types and applications.

UNIT 3 ENERGY STORAGE DEVICES AND NANOMATERIALS — **9**

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

UNIT 4 PHASE RULE AND SPECTROSCOPY — **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

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 diagram-Ultraviolet (UV) and visible spectroscopy-Infrared spectroscopy.

UNIT 5 SENSORS AND PHOTOCHEMISTRY — **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-Photochemical reaction-Laws of photochemistry-Grothus-Draper law-Stark-Einstein law and Lambert-Beer Law-Photo physical processes Internal Conversion-Intersystem crossing-Fluorescence and Phosphorescence –Chemiluminescence and Photosensitization.

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, their analysis and various water treatment processes for domestic and industrial applications.
CO2	Interpolate the properties and applications of important polymers.
CO3	Describe the preparation and applications of nano materials and illustrate the methods of harnessing energy from non-conventional energy sources.
CO4	Utilize the thorough knowledge on phase rule to form a system and various applications of spectroscopy.
CO5	Acquire the knowledge on sensors along with photochemistry to develop an interdisciplinary approach among the students which is essential for the software engineers.

TEXT BOOKS

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

2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.

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

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

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

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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. 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.

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

5.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'

Meenakshi Sundararajan Engineering College

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Department: AI&DS , R2024, CBCS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	2	3	2	-	2	2	-	2	-	-	-
CO2	3	-	-	-	1	2	1	-	1	1	-	3	-	-	-
CO3	3	1	1	-	2	1	2	-	1	1	-	2	-	-	-
CO4	3	1	1	-	2	1	2	-	1	1	-	2	-	-	-
CO5	3	1	2	-	2	2	2	-	2	1	-	3	-	-	-
AVG	3	1	1.25	-	1.8	1.8	1.8	-	1.4	1.2	-	2.4	-	-	-

Meenakshi Sundararajan Engineering College

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Department: AI&DS , R2024, CBCS

U24TA101	தமிழர்மரபு / HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

அலகு I மொழி மற்றும் இலக்கியம் **UNIT I LANGUAGE AND LITERATURE**	**3**
இந்திய மொழிக் குடும்பங்கள் – திரொவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செல்விலக்கியங்கள் - சங்க இலக்கியத்தின்சமய சார்பற்ற தன்மை –சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மை கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் - சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இளகிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் 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 - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை **UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART - SCULPTURE**	**3**
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்பைகள் - தேர் செய்யும் கலை சுடுமண் சிற்பங்கள் - நாட்டுப்புற தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் 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 நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் **UNIT III FOLK AND MARTIAL ARTS**	**3**
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள் Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	
அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள் **UNIT IV THINAI CONCEPT OF TAMIL**	**3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி

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
- Export and Import during Sangam Age - Overseas Conquest of Cholas

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு **UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு

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 வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2.கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

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

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Department: AI&DS , 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.

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.

Practical:

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

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.

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.

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.

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.

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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

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Department: AI&DS , R2024, CBCS

U24CE102	ENGINEERING GRAPHICS AND COMPUTER APPLICATION	L	T	P	C
		3	0	2	4

Course Objectives

1	To learn the construction of engineering curves and projection techniques for constructing conic curves, points, and lines.
2	To understand the techniques for projecting and visualizing surfaces and solids in various orientations.
3	To determine the true shape of sectioned solids and develop their lateral surfaces.
4	To develop skills in 3D projection and perspective projection techniques for simple solids
5	To introduce the role of simulations in engineering graphics and perform geometric transformations.

UNIT 1 PLANE CURVES , PROJECTION OF POINTS AND STRAIGHT LINES	**6+9**

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method. Orthographic projection- principles-Principal planes-First angle projection-projection of points and straight lines inclined to both the principal planes

UNIT 2 PROJECTION OF PLANES AND SOLIDS	**6+9**

Projection of planes inclined to both the principal planes -. Projection of simple solids like prisms, pyramids, cylinder, and cone. 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 SURFACES	**6+9**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the 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 AND PERSPECTIVE PROJECTION	**6+9**

Principles of isometric projection — isometric scale —Isometric projections of simple solids - Freehand sketching of multiple views from pictorial views of objects. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

UNIT 5 GEOMETRIC MODELLING	**6+9**

Role of simulations in engineering graphic, Introduction to Blender and Sketch, basic operations and commands, creating 2D drawings and 3D models: 2D Geometric transformations -2D viewing – Line, Polygon clipping, 3D Viewing – 3D Object representations – 3D Transformations.

TOTAL PERIODS	**75**

Course Outcomes

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

CO1	Construct engineering curves and apply projection techniques for conic curves, points, and lines.
CO2	Effectively project and visualize surfaces and solids in various orientations.
CO3	Determine true shapes and develop lateral surfaces of sectioned solids.
CO4	Apply 3D and perspective projection techniques to model simple solids in various views.
CO5	Understand the role of simulations in engineering graphics and perform geometric transformations

TEXT BOOKS

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

2. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.

3. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

4.Introduction to Blender 3.0:Learn Organic and Architectural Modeling,Lighting,Materials,Painting, Rendering and Compositing with Blender Gianpiero Moioli Apress,Year :2022

REFERENCES

1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edition, 2019.

2. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.

3. 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.

4. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

5. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.

6. Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Limited, 2008.

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

Meenakshi Sundararajan Engineering College

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Department: AI&DS , 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:					
1	Draw pipe line plan; layout and connect various pipe fittings used in common household plumbing work				
2	To make wood joints commonly used in household wood.				
3	To make various electrical connections in typical household electrical wiring installations.				
4	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.				
5	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.				
PART I CIVIL ENGINEERING PRACTICES					
PLUMBING WORK					
	Theory				
1	Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in households.				
2	Connecting pipes of different materials: Metal, plastic and flexible pipes				
	Experiment				
1	Preparing plumbing line sketches.				
2	Laying pipe connection to the suction side of a pump				
3	Laying pipe connection to the delivery side of a pump.				
	Demo				
1	**In-Campus -** - Water supply lines (RO plant) - Drainage systems - Water Harvesting				
	Self Study				
1	Household Appliances.- pipes of different materials: Metal, plastic and flexible pipes are utilized in various applications, such as: - Water supply lines - Drainage systems - Gas lines(if any) - Heating and cooling systems - Solar water heating (if any) - Chimney				
WOOD WORK					
	Theory				
1	Tools used in Carpentry & safety measures.				
2	Studying common industrial trusses - https://www.youtube.com/watch?v=-1w4_4Sr2kg				
	Experiment				
1	Sawing,				

2	Planing and
3	Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.
	Demo
1	Studying joints in door panels and wooden furniture
2	Study of truss in workshop
	Self study
1	In house- Types of joints used in window, door, chair, table,specific type of furniture or fixture
ELECTRICAL ENGINEERING PRACTICES 15	
	Theory
1	Electrical Installation tools, equipment & safety measures.
2	Introduction and application of switches, fuses,boards, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
	Demo
1	Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box,
2	Electrical wiring system from the Electricity Board (EB) to a classroom on a campus
3	Earth Pit & its maintenance in campus
4	Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.
5	Bringing Renewable Energy to the Classroom: A Solar Smart Grid Demonstration
	Experiment
1	Fluorescent Lamp wiring with introduction to CFL and LED types.
2	Energy meter wiring and related calculations/ calibration
3	Iron Box wiring and assembly
4	Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
5	emergency lamp wiring/Water heater
	Self Study
1	House - electrical wiring system from the Electricity Board (EB) to a dining Room
2	Building (Common area)- electrical wiring system from the Electricity Board (EB) to a staircase of the building & water pump
3	Types of fuse / MDB/ MCB/RCD/CU/Switchboard
4	Earth Pit 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- Various types of casting processes Types of patterns used in casting processes 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 air conditioner.
4	Dis-assembly and assembly of a Ceiling Fan/Table Fan
5	Simple Turning using Lathe machine
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 2 3 4	**Self-Study** List examples of sheet metal fabricated component used in house Application of shaft List examples of welded components commonly used in a house List components made by foundry - casting process
ELECTRONIC ENGINEERING PRACTICES 15	
	Theory
1	Electronic components, equipment & safety measures.
2	Soldering simple electronic circuits and checking continuity.
	Demo
1	Study an elements of smart phone
2	Assembly and dismantle of LED TV
	Experiment
1	Soldering simple electronic circuits and checking continuity.
2	Hands-on session of Soldering Practices in a Printed Circuit Breaker.
3	Assembling and testing electronic components on a small PCB
4	Assembly and dismantle of computer/ laptop
5	Hands-on session of integration of sensors and actuators with a Microcontroller.
6	Hands-on session of Bridge Rectifier, Op-Amp and Trans impedance 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
Course Outcomes	
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: AI&DS , R2024, CBCS

U24TP110	COMMUNICATION SKILLS LAB 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 1	6
Listening: Listening as a key skill- its importance -Listening for general information-specific details - Introduction to classmates – Audio / video (formal & informal) **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 **Speaking:** Small talk on general topics and current scenario	
UNIT III	**6**
Listening: Listen to event narration and stories **Speaking:** Picture description- describing locations in workplaces	
UNIT IV	**6**
Listening: Listening to discussions and debates **Speaking:** Role Play	
UNIT V	**6**
Listening: Listening/watching documentaries **Speaking:** Formal and informal talk -making predictions- talking about a given topic-giving opinions	
TOTAL PERIODS	**30**

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	Narrating an event or story.
4	Discussion/debate on a given topic.
5	Listening to TED Talks (Being an active listener: giving verbal and non-verbal feedback)
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

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Department: AI&DS , 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**

• 5 Hours: 60 Students * 5 Minutes Each – Team of Three Students (15 Minutes Per Team) – Collaborative Work To Research & Present 20 Case Studies:
  ○ Design Thinking (8 Case Studies),
  ○ Innovation (4 Case Studies) &
  ○ Entrepreneurship (8 Case Studies)
• 3 Hours: Faculty Facilitated `Design Thinking' Case Studies	

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)

Meenakshi Sundararajan Engineering College

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Department: AI&DS , R2024, CBCS

	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	-	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: AI&DS, R2024, CBCS

U24IP201	BIOLOGY FOR AI ENGINEERS	
Course Objectives		
1	Understand biological systems.	
2	Recognize biological inspiration in AI.	
3	Apply biological concepts to AI.	
4	Analyse the intersection of biology and AI.	
5	Communicate with biologists and domain experts.	
UNIT 1 INTRODUCTION TO BIOLOGY AND AI		**8**
Overview of biology and its importance for engineers - Biological Systems-Cells, genetics and evolution - Health Care standards and Protocols, AI fundamentals, Neural Network, Artificial Neural Network. Practical: 1. Biological Data import. 2. Plotting and exploring biological data.		
UNIT 2 MACHINE LEARNING AND BIOLOGY		**8**
Introduction to machine learning - Supervised and Unsupervised learning - Applications in genomics, proteomics and transcriptomics. Practical: 1. Classification (e.g., cancer diagnosis) using SVM 2. Clustering (e.g., gene expression) using K-means and hierarchical clustering.		
UNIT 3 AI APPLICATIONS IN BIOLOGY		**8**
Image analysis for biomedical imaging - Predictive modeling for disease diagnosis and treatment. Practical: 1. Tumor detection using image segmentation. 2. Predicting gene expression or protein levels.		
	TOTAL PERIODS	**24**

Course Outcomes	
At the end of the course, the student will be able to	
CO1	Explain the fundamental principles of biology and their relevance to AI.
CO2	Design and develop bio - inspired AI solutions.
CO3	Analyze the intersection of biology and AI, including ethics and challenges.
CO4	Communicate effectively with biologists and domain Experts.
CO5	Apply biological concepts to develop innovative AI solutions.
TEXT BOOKS	
1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig.	
2. "Bioinformatics and Computational Biology" by Jonathan Pevsner.	
REFERENCES	
1. “Python for Biologists” by Martin O. Jones	
2. ”Deep learning for Life sciences” by Bharath Ramasundar et al.	

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Department: AI&DS, R2024, CBCS

	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	-	-	-	-	1	-	2	1	-	1
CO2	3	2	3	2	3	-	-	-	2	2	-	3	1	-	1
CO3	2	3	3	3	3	-	1	-	2	2	1	3	1	1	1
CO4	3	3	3	2	3	2	3	2	2	3	2	3	1	1	1
CO5	3	2	3	3	3	2	3	3	3	3	3	3	1	1	1
AVG	2.8	2.6	2.8	2.5	2.8	2	2.3	2.5	2.25	2.2	2	2.8	1	1	1

Meenakshi Sundararajan Engineering College

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Department: AI&DS, 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 enhance learners' vocabulary with a focus on technical terms and enabling them to communicate more effectively in both technical and professional contexts.
3	To master key grammar concepts and apply those concepts to produce clear and correct written communication.
4	To help learners understand the purpose, audience, contexts of different types of writing.
5	To demonstrate an understanding of job applications and interviews for internship and placements.

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

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

2.English for Science & Technology Cambridge University Press, 2021.

3.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, New Delhi

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

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Department: AI&DS, R2024, CBCS

U24MA202	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

Course Objectives	
1	This course aims at providing the required skill to apply the statistical tools in engineering problems.
2	To introduce the basic concepts of probability and random variables.
3	To introduce the basic concepts of two-dimensional random variables.
4	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
5	To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT 1 PROBABILITY AND RANDOM VARIABLES	9+3
Axioms of probability – Conditional probability – Baye's 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 TESTING OF HYPOTHESIS	9+3
Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.	
UNIT 4 DESIGN OF EXPERIMENTS	9+3
One way and Two-way classifications - Completely randomized design – Randomized block design – Latin square design - Two square factorial design.	
UNIT 5 STATISTICAL QUALITY CONTROL	9+3
Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.	
TOTAL PERIODS	60

Course Outcomes	
At the end of the course, the student will be able to	
CO1	Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon.
CO2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
CO3	Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

TEXT BOOKS

1.Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata Mc Graw Hill,4th Edition, 2007.

2.Johnson, R.A., Miller, I and Freund J., “Miller and Freund’s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

3.John E. Freund, "Mathematical Statistics", Prentice Hall, 5th Edition, 1992.

4.Won Y, Yang, Young K, Choi, Jaekwon Kim, Man Cheol Kim, H.Jin Kim, Taeho lm, "Engineering Mathematics with MATLAB" CRC Press Publishers , Ist Edition , 2017.

REFERENCES

1.Gupta. S.C. and Kapoor. V. K., “Fundamentals of Mathematical Statistics”, Sultan Chand &Sons, New Delhi, 12th Edition, 2020.

2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.

3.Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier, 2014.

4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum’s Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.

5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 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	3	2	1	-	-	-	-	-	-	-	1	1	-	-
CO2	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
AVG	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-

Meenakshi Sundararajan Engineering College

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Department: AI&DS, R2024, CBCS

U24PH202	PHYSICS FOR INFORMATION SCIENCE II	L	T	P	C
		3	0	0	3

Course Objectives

1	To understand the electrical properties of materials including free electron theory, applications.
2	To enable the students to gain knowledge in semiconductor physics.
3	To instill knowledge on magnetic properties of materials.
4	To establish a sound, grasp of knowledge on different optical properties of materials, optical displays and applications.
5	To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

UNIT 1 ELECTRICAL PROPERTIES OF MATERIALS

Conductors – Classical free electron theory of metals – Expression for Electrical and Thermal conductivity – Wiedemann – Franz law – Lorentz number – Success and failures of classical theory – Quantum theory – electron in periodic potential -Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentrations in metals- Electron effective mass-concept of hole.

UNIT 2 SEMICONDUCTOR PHYSICS

Properties of semi-conductor -Direct and indirect band gap semiconductors - Intrinsic semi-conductor – Carrier concentration in intrinsic semiconductors – Extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Hall effect-determination of P&N type materials and Hall co efficient -Experiment.

UNIT3 MAGNETIC PROPERTIES OF MATERIALS

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses-– Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT4 OPTICAL PROPERTIES OF MATERIALS

Classification of optical materials – Absorption emission and scattering of light in metals, insulators and semiconductors (quantitative) – Carrier generation and recombination - photocurrent in a P-N diode – Principle and working of solar cell - LED – Organic LED – Laser diodes - Photo diode – Determination of V-I Characteristics -Photoconductors - Optical data storage techniques.

UNIT 5 PHYSICS OF NANOMATERIALS

Nano materials –Preparations, Properties, Applications, -Density of states in quantum well, quantum wire and quantum dot structures – Quantum confinement-Quantum well and Quantum dot lasers- CNOT gate--Quantum Confined Stark effect - Tunneling-resonant tunneling diode – Coulomb Blockade-Single electron phenomena-single electron transistor.

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Department: AI&DS, R2024, CBCS

Course Outcomes	
At the end of the course, the student will be able to	
CO1	Gain knowledge on classical and quantum electron theories, and energy band structures.
CO2	Acquire knowledge on basics of semiconductor physics and its applications in various devices.
CO3	Get knowledge on magnetic properties of materials and their applications in data storage.
CO4	Have the necessary understanding on the functioning of optical materials for optoelectronics.
CO5	Understand quantum mechanics of nanostructures and their application to Nano electronics.

TEXT BOOKS

1. Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007

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

3. Progress in Nanoscale and Low-Dimensional Materials and Devices, Hilmi Unlu and Norman J M. Horing, Springer Link, 2022.

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

REFERENCES

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

2.Y.B. Band and Y. Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.

3.Yoshinobu Aoyagi and Kotaro Kajikawa, Optical Properties of Advanced Materials, Springer, 2013.

4.Charles P. Poole Jr., Frank J. Owens, Introduction to nano technology, Wiley, 2003

5.Principles of Electronic Materials and Devices, S.O. Kasap, McGraw Hill Education, 2017.

6.Fundamentals of Nanoelectronics, G.W. Hanson, Pearson Education, 2009.

7.Optoelectronics. Pearson Education, J. Wilson and J.F.B. Hawkes, 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'

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1					-	-	-	-	-	-	-	-	-
CO2	3	1	2				-	-	-	-	-	-	-	-	-
CO3	3	-		1	2	1	1	-	-	-	-	-	-	-	-
CO4	3	-	2	1	3		1	-	-	-	-	-	-	-	-
CO5	3	2	2	2	2	1	2	-	-	-	-	2	-	-	-
AVG	3	1.3	2	1.3	2.3	1	1.3	-	-	-	-	2	-	-	-

Meenakshi Sundararajan Engineering College

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Department: AI&DS, R2024, CBCS

U24TA201	தமிழரும் தொழில் நுட்பமும் / TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

UNIT I/ நெசவு மற்றும் பானைத் தொழில்நுட்பம்/WEAVING AND CERAMIC TECHNOLOGY	**3**

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியிடுகள்

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries

UNIT II வடிவமைப்பு மற்றும் கட்டிடக் தொழில்நுட்பம்: / DESIGN AND CONSTRUCTION TECHNOLOGY	**3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோவில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் கால கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சரோசெனிக் கட்டிடக் கலை

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III உற்பத்தித் தொழில் நுட்பம் / MANUFACTURING TECHNOLOGY	**3**

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருகுக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram

UNIT IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம் /AGRICULTURE AND IRRIGATION TECHNOLOGY	**3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society

UNIT V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்/SCIENTIFIC TAMIL & TAMIL COMPUTING	**3**
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இனையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம். Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	
TOTAL PERIODS	**15**

TEXT BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

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 Civilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

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

U24EC202	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

1	To introduce the basics of electric circuits and analysis.
2	To impart knowledge in the basics of working principles and application of electrical machines.
3	To introduce analog devices and their characteristics.
4	To educate on the fundamental concepts of digital electronics.
5	To introduce the functional elements and working of measuring instruments.

UNIT I ELECTRICAL CIRCUITS	9

DC Circuit Components: Conductor, Resistor, Inductor, Capacitor Ohm's Law - Kirchhoff's Laws Independent and Dependent Sources – Simple problems Nodal Analysis, Mesh analysis with independent sources only (Steady state). Introduction to AC Circuits: sinusoidal Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Simple problems in series RLC circuits. Introduction to three phase circuits:(star- delta conversion).

UNIT II ELECTRICAL MACHINES	9

DC generator- Construction and Working principle, types, EMF equation. DC motor - Working Principle, types, Torque Equation. Applications. Single phase Transformer- construction, working principle and applications. Three Phase and Single-Phase Induction Motor- construction and working principle. Special Machines- Servo Motor and BLDC motor.

UNIT III ANALOG ELECTRONICS	9

Overview of Semiconductor Materials: Silicon &Germanium – PN Junction Diode - Characteristics Applications – Zener Diode - Characteristics Applications – Bipolar Junction Transistor – JFET - configurations - I-V Characteristics and Applications, Rectifier and Inverters. applications of Operational amplifiers, Ideal op amp characteristics, Inverting and Non-inverting amplifier.

UNIT IV DIGITAL ELECTRONICS	9

Review of number systems, conversion of number systems, binary codes, error detection and correction codes,study of logic gates. Combinational logic Circuits - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).

UNIT V MEASUREMENTS AND INSTRUMENTATION	9

Functional elements of an instrument, Standards and calibration, overview of Moving Coil and Moving Iron meters (Ammeters and voltmeters), DSO, Block diagram of Data acquisition systems. Electrical Safety – Fuses and Earthing.

TOTAL PERIODS	45

Course Outcomes	
At the end of the course, the student will be able to	
CO1	Compute the electric circuit parameters for simple problems.
CO2	Explain the working principle and applications of electrical machines.
CO3	Analyze the characteristics of analog electronic devices.
CO4	Explain the basic concepts of digital electronics.
CO5	Explain the operating principles of measuring 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”, Pearson Education, Second Edition, 2017.

3. Sedha R.S., “A textbook book of Applied Electronics”, S. Chand & Co., 2008.

4. James A Svoboda, Richard C. Dorf, “Dorf’s Introduction to Electric Circuits”, Wiley, 2018.

5. A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, 2015.

REFERENCES

1. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, Fourth Edition, McGraw Hill 2. Education, 2019.

2. Thomas L. Floyd, ‘Digital Fundamentals’, 11th Edition, Pearson Education, 2017.

3. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition, 2017.

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

5. H.S. Kalsi, ‘Electronic Instrumentation’, Tata McGraw-Hill, New Delhi, 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	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO2	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO3	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO5	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
AVG	2	1	1	-	-	-	-	2	-	-	-	-	-	-	-

Meenakshi Sundararajan Engineering College

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Department: AI&DS, 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.

UNIT 1 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).	
UNIT 2 SUSTAINABLE ENVIRONMENTAL CHEMISTRY	**6**
Climate change – greenhouse effect - global 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 panels- 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 “Perspectives in Environmental Studies”,6thEdition,NewAge International Publishers ,2018.

2.Benny Joseph, ‘Environmental Science and Engineering’, Tata McGraw-Hill, NewDelhi,2016.

3.Gilbert M Masters, ‘Introduction to Environmental Engineering and Science’,2nd edition, Pearson Education, 2004.

4.Allen, D.T. Shonnard, D.R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.

5.Bradley. A.S, Adebayo, A.O.,Maria, 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.

REFERENCES

1.M.Karpagam ,Geetha Jaikumar,”Green Management Theory and Application”, ANE Publisher, First Edition, 2010

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

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

4.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.

5.Rajagopalan.R, ‘Environmental Studies – From Crisis to Cure’, Oxford University Press,2005.

6.ErachBharucha “Textbook of Environmental Studies for Undergraduate Courses” Orient Blackswan 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

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Department: AI&DS, R2024, CBCS

U24CS201	PYTHON PROGRAMMING	L	T	P	C
		3	0	3	4.5

Course Objectives

1	To understand the basics of python programming.
2	To define Python functions and strings.
3	To use Python data structures - lists, tuples, dictionaries to represent complex data.
4	To perform file operations in Python.
5	To learn & use 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: circulate the values of n variables, distance between two points.

Practical:

1.Implement a python program to print an Electricity Bill. (for domestic usage.)

2.Implement a Python program to exchange the values of two variables. (Using simple statements and expressions).

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, sum of individual digits of a number.

Practical:

1.Implement a Python program to print a Number series & Number Patterns. (Using Iterative loops).

2.Implement a Python program to find Factorial and largest number in a list (using Functions.).

3.Implement a Python program to perform operations on strings like string reverse, string concatenation & substring. (use match case).

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: linear search, binary search, Students marks statement.

Practical:

1.Implement a Python program using Lists & Tuples. (Operations of list & tuples - Book Catalogue)

2.Implement a Python program using Sets, Dictionaries. (operations of Sets - Product Categories, operations on Dictionaries - Product Categories)

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: Marks range validation. .

Practical:

1. Implement a Python program to perform file operations (copy from one file to another, word count, longest word).

2. Implement a Python program to handle Exceptions. (voter's age validity).

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. **Practical:** 1.Implement a Python program to create a weather data chart using Python Standard Libraries (pandas, numpy. Matplotlib, scipy) .	
TOTAL HOURS	**90**

Course Outcomes	
At the end of the course, the student will be able to	
CO1	Develop and execute simple Python programs
CO2	Learn to handle strings and functions in python.
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 Ed, 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'

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

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Department: AI&DS, R2024, CBCS

U24BS101	PHYSICS AND 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 analyses 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 analyses 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 fiber -Determination of Numerical Aperture and acceptance angle 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.
	TOTAL PERIODS 60

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 fiber 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.
TEXT BOOKS	
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 University.	
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: AI&DS, 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 **Speaking:** Conversation between the interlocutor and each candidate	
UNIT II	**6**
Listening: Listening to podcasts, anecdotes and identifying topics, context etc. **Speaking:** Presentation on any given topic (Non - Technical)	
UNIT III	**6**
Listening: One extended conversation or monologue - interview, discussion, lectures and educational videos **Speaking:** Group Discussion.	
UNIT IV	**6**
Listening: Listening to presentation and 5 min informal talk **Speaking:** Presentation on any given topic (Technical)	
UNIT V	**6**
Listening: Listening to interview skills **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

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, Orient BalckSwan: 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: AI&DS, 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	**2**

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

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

- 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 HOURS	**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

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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	1	1	1
AVG	2	3	3	3	1	3	2	1	3	3	3	3	1	1	1

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