B.E. COMPUTER SCIENCE AND ENGINEERING

(CYBER SECURITY)

REGULATION - 2025

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

I - Department Vision

- To produce globally competent technical professionals for digitized society.

II - Department Mission

- To establish conducive academic environment by imparting quality education and value-added training
- To encourage students to develop innovative projects to optimally resolve the challenging social Problem.

III - Program Name: Computer Science and Engineering

IV - Program Educational Objectives

Graduates of Computer Science and Engineering Program will be able to

PEO1: Develop into the most knowledgeable professional to pursue higher education and research or have a successful career in industries.

PEO2: Successfully carry forward domain knowledge in computing and allied areas to solve complex and real-world engineering Problems.

PEO3: Meet the technological revolution they are continuously upgraded with the technical knowledge.

PEO4: Serve the humanity with social responsibility combined with ethics

V - Program Outcomes

Engineering Graduates will be able to:

Engineering Graduates will be able to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving

complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

VI - Program Specific Outcomes

Graduates of the Computer Science and Engineering will have

1. **PSO 1**: The ability to deal with real time Problems by understand, the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments.
2. **PSO 2**: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, pursue lifelong professional development in computing and also to act as a good citizen by inculcating in them moral values & ethics.
3. **PSO 3**: Achieve additional expertise through add-on programs.

VII - Mapping of PEOs, POs, and PSO - Tabular Format

POs PEOs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
PEO1	✓	✓	✓	✓	-	✓	-	-	-	✓	✓	✓	✓	-
PEO2	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓
PEO3	✓	✓	✓	✓	-	✓	-	-	✓	✓	✓	✓	✓	✓
PEO4	✓	✓	✓	-	-	-	✓	✓	✓	-	✓	✓	✓	-

VIII - Program Scope

- Computer Science is a very vast discipline. The course trains the students of the basics and different aspects of computer engineering. It includes foundations of computer systems, computer architecture & organization, networking, the theory of computation, database systems, electronics, operating systems, programming and website designing, e-commerce & multimedia applications, principles of programming languages, software engineering, hardware engineering, etc.
- Students also have an option of appearing for GATE exam whose scorecard is evaluated by various government organizations for recruitment. Computer engineers can also get numerous jobs in the private firms and top companies like TCS, Wipro, Microsoft, Google, Infosys, Accenture, HCL, Facebook, Cognizant, Adobe, Oracle, Sun Microsystems, Flipkart, IBM, etc

IX - Program Specific Criteria

Core Technical Knowledge: The curriculum should cover fundamental areas of CSE including algorithms, data structures, programming languages, computer organization and architecture, operating systems, databases, software engineering principles, computer networks and theory of computation.

Mathematics and Science Foundation: The program should provide a strong foundation in mathematics, including calculus, discrete mathematics and linear algebra, as well as relevant scientific principles that underpin computer science, information technology, such as logic and probability theory.

Breadth of Computer Science and Engineering: The curriculum should offer a broad range of elective courses that allow students to explore various areas of computer science such as artificial intelligence, machine learning, data science, computer graphics, human-computer interaction, cyber security and software development.

Laboratory and Project Experience: The Program should provide hands-on-laboratory experiences to reinforce theoretical concepts and develop practical skills. Project based courses or capstone projects that require students to apply their knowledge and skills to solve real- world Problems are also essential.

Professional skills and ethics: CSE Program should emphasize the development of professional skills, including communication, teamwork, Problem-solving, critical thinking and ethical considerations. Students should understand the ethical and social implications of computing and prepared to adhere to professional standards.

Continuous Improvement and Assessment: CSE Program should have mechanisms in place for continuous improvement and assessment of student learning outcomes. This involves regular evolution of the curriculum, feedback from industry professionals, alumni and students, and incorporation of emerging trends and technologies.

X – Curriculum I Semester to VIII Semester

SEMESTER I

SL. NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	25IP100	Induction Programme	-	-	-	-	-	0
THEORY								
2	25HS101	Technical Communication	HSMC	2	0	0	2	2
3	25MA101	Engineering Mathematics	BSC	3	1	0	4	4
4	25PH101	Engineering Physics	BSC	3	0	0	3	3
5	25CH101	Engineering Chemistry	BSC	3	0	0	3	3
6	25BE101	Fundamentals of Computing	ESC	3	0	0	3	3
7	25BEC02	Basics of Electronics Engineering	ESC	2	0	2	4	3
8	25HS102	தமிழர்மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
9	25BS111	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10	25HS111	English Laboratory -I	EEC	0	0	2	2	1
11	25BE111	Basic Computing and Problem Solving Laboratory	ESC	0	0	2	2	1
			TOTAL	**17**	**1**	**10**	**28**	**23**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25HS201	Professional Communication	HSMC	2	0	0	2	2
2	25MAC01	Probability and Statistics	BSC	3	1	0	4	4
3	25PH201	Physics of Materials	BSC	3	0	0	3	3
4	25BS201	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
5	25BEC01	Basics of Electrical Engineering	ESC	2	0	2	4	3
6	25BE202	Python Programming	PCC	3	0	2	5	4
7	25HS202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
8		NCC Credit Course Level 1#	-	2	0	0	2	2#
PRACTICALS								
9	25HS211	English Laboratory - II	EEC	0	0	2	2	1
10	25BE211	Engineering Practices Laboratory	ESC	0	0	4	4	2
			TOTAL	**16**	**1**	**10**	**27**	**22**

NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER III

SL.NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25MA301	Discrete Mathematics	BSC	3	1	0	4	4
2	25IT301	Data Structures and Algorithms	PCC	3	0	2	5	4
3	25CS301	JAVA Programming	PCC	3	0	2	5	4
4	25CS302	Object Oriented Software Engineering	PCC	3	0	2	5	4
5	25AD301	Python for Data science	PCC	3	0	2	5	4
6	25HSC01	Human Values and Ethics	HSMC	2	0	0	2	2
PRACTICALS								
7		Skill Development Course-I	EEC	1	0	2	2	1
			TOTAL	**18**	**1**	**10**	**28**	**23**

SEMESTER IV

SL. NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25CY401	AI &ML for Cyber Security	PCC	3	0	2	5	4
2	25CS402	Database Management Systems.	PCC	3	0	0	3	3
3	25CS403	Operating Systems	PCC	3	0	0	3	3
4	25CS404	Theory of Computation	PCC	3	1	0	4	4
5	25CS405	Standards in CSE	PCC	1	0	0	1	1
6	25IT401	Web Essentials	PCC	3	0	2	5	4
PRACTICALS								
7	25CS411	Database Management Systems Laboratory	PCC	0	0	3	3	1.5
8	25CS412	Operating Systems Laboratory	PCC	0	0	3	3	1.5
9		Skill Development Course-II	EEC	1	0	2	2	1
TOTAL				**17**	**1**	**12**	**29**	**23**

SEMESTER V

SL. NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25CS501	Computer Networks	PCC	3	0	2	5	4
2	25CY501	Cyber Security	PCC	3	0	2	5	4
3	25CY502	Cyber laws and Ethics	PCC	3	0	2	5	4
4		Open Elective – I	OEC	3	0	0	3	3
5		Professional Elective I	PEC	2	0	2	4	3
6		Professional Elective II	PEC	2	0	2	4	3
PRACTICALS								
7	25CY511	Mini Project	EEC	0	0	2	4	2
TOTAL				**16**	**0**	**12**	**30**	**23**

SEMESTER VI

SL. NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25CY601	Cyber Threat Intelligence	PCC	3	0	0	3	3
2	25CY602	Network Defense	PCC	3	0	2	5	4
3	25IT601	Full Stack Development	PCC	3	0	2	5	4
4	25EC605	Internet of Things	PCC	3	0	2	5	4
5		Professional Elective III	PEC	2	0	2	4	3
6		Professional Elective IV	PEC	2	0	2	4	3
PRACTICALS								
7	25CY611	Internship-I	EEC	0	0	0	0	2
8		Self-Learning Course	EEC	0	0	0	0	1
TOTAL				**16**	**0**	**10**	**26**	**24**

SEMESTER VII

SL. NO	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	25CY701	Cryptocurrency and Blockchain Technologies	PCC	3	0	2	5	4
2	25CY702	Ethical Hacking	PCC	3	0	2	5	4
3		Elective - Management	HSMC	3	0	0	3	3
4		Professional Elective V	PEC	2	0	2	4	3
5		Professional Elective VI	PEC	2	0	2	4	3
PRACTICALS								
6	25CY711	Internship-II	EEC	0	0	0	0	2
TOTAL				**13**	**0**	**8**	**21**	**19**

SEMESTER VIII

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICAL								
1	25CY811	Project Work	EEC	0	0	16	16	10
TOTAL				**0**	**0**	**16**	**16**	**10**

TOTAL CREDITS: 165

XI - Elective - Management

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25GE701	Principles of Management	HSMC	3	0	0	3	3
2.	25GE702	Total Quality Management	HSMC	3	0	0	3	3
3.	25GE703	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	25GE704	Human Resource Management	HSMC	3	0	0	3	3
5.	25GE705	Knowledge Management	HSMC	3	0	0	3	3
6.	25GE706	Industrial Management	HSMC	3	0	0	3	3

XII - Mandatory Courses

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25MC901	English for Communication (Swayam)	MC	3	0	0	3	0
2.	25MC902	Introduction to Women and Gender Studies	MC	3	0	0	3	0
3.	25MC903	Disaster Risk Reduction and Management	MC	3	0	0	3	0
4.	25MC904	History of Science and Technology in India	MC	3	0	0	3	0
5.	25MC905	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
6.	25MC906	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
7.	25MC907	State, Nation Building and Politics in India	MC	3	0	0	3	0
8.	25MC908	Industrial Safety	MC	3	0	0	3	0
9.	25MC909	Indian Constitution	MC	3	0	0	3	0
10.	25MC910	Elements of Literature	MC	3	0	0	3	0

XIII - Professional Elective Courses

Professional Elective Courses: Verticals

Vertical I Data Science	**Vertical II Full Stack Development**	**Vertical III Cloud Computing andData CenterTechnologies**	**Vertical IV Cyber Security and Data Privacy**	**Vertical V Emerging Technologies**	**Vertical VI Internet of Things and Smart Applications**	**Vertical VII Artificial Intelligence and Security**
Exploratory Data Analysis	Web Technologies	Cloud Computing Fundamentals	Ethical Hacking	Augmented Reality/Virtual Reality	Dynamic Paradigm for IoT	Natural Language Processing
Recommender Systems	App Development	Virtualization	Digital and Mobile Forensics	Robotic Process Automation	Smart IoT Architecture	AI in cyber Security
Neural Networks and Deep Learning	Cloud Services Management	Cloud Services Management	Social Network Security	Neural Networks and Deep Learning	Wearable Computing	Generative AI and Prompt Engineering
Text and Speech Analysis	UI and UX Design	Data Warehousing	Modern Cryptography	Cyber security	Wireless Sensor Networks	Ethical and Legal Implication of AI
Business Analytics	Software Testing and Automation	Storage Technologies	Engineering Secure Software Systems	Quantum Computing	IoT in 5G Networks	Reactive Machines and Self-aware AI
Image and Video Analytics	Web Application Security	Software Defined Networks	Crypto currency and Block chain Technologies	Crypto currency and Block chain Technologies	IoT and Smart Cities	Explainable AI (XAI)
Computer Vision	DevOps	Stream Processing	Network Security	Game Development	Cyber Security for IoT Systems	Open AI Prompt Engineering Best Practices
Optimization Techniques	Principles of Programming Languages	Security and Privacy in Cloud	Security and Privacy inCloud	3D Printing andDesign	Industrial Internet of Things(IIoT)	Computer Vision

Registration of Professional Elective Courses from verticals:

Professional Elective Courses will be registered in Semesters V, VI and VII. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled one Semester and another one course in another semester. The registration of courses for B.E. / B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2023, Clause 18.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: DATA SCIENCE

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PAD02	Exploratory Data Analysis	PEC	2	0	2	4	3
2.	25PAD06	Recommender Systems	PEC	2	0	2	4	3
3.	25PAD05	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	25PAD07	Text and Speech Analysis	PEC	2	0	2	4	3
5.	25PAD01	Business Analytics	PEC	2	0	2	4	3
6.	25PAD04	Image and Video Analytics	PEC	2	0	2	4	3
7.	25AD902	Computer Vision	PEC	2	0	2	4	3
8.	25PAD10	Optimization Techniques	PEC	2	0	2	4	3

VERTICAL 2: FULL STACK DEVELOPMENT

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PIT01	Web Technologies	PEC	2	0	2	4	3
2.	25PIT02	App Development	PEC	2	0	2	4	3
3.	25PIT03	Cloud Services Management	PEC	2	0	2	4	3
4.	25PIT04	UI and UX Design	PEC	2	0	2	4	3
5.	25PIT05	Software Testing and Automation	PEC	2	0	2	4	3
6.	25PIT06	Web Application Security	PEC	2	0	2	4	3
7.	25PIT07	DevOps	PEC	2	0	2	4	3
8.	25PIT08	Principles of Programming Languages	PEC	3	0	0	3	3

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VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PAM02	Cloud Computing Fundamentals	PEC	2	0	2	4	3
2.	25PCS01	Virtualization	PEC	2	0	2	4	3
3.	25PIT03	Cloud Services Management	PEC	2	0	2	4	3
4.	25PCS02	Data Warehousing	PEC	2	0	2	4	3
5.	25PCS03	Storage Technologies	PEC	3	0	0	3	3
6.	25PCS04	Software Defined Networks	PEC	2	0	2	4	3
7.	25PCS05	Stream Processing	PEC	2	0	2	4	3
8.	25PCS06	Security and Privacy in Cloud	PEC	2	0	2	4	3

VERTICAL 4: CYBER SECURITY AND DATA PRIVACY

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PCS07	Ethical Hacking	PEC	2	0	2	4	3
2.	25PCS08	Digital and Mobile Forensics	PEC	2	0	2	4	3
3.	25PCS09	Social Network Security	PEC	2	0	2	4	3
4.	25PCS10	Modern Cryptography	PEC	2	0	2	4	3
5.	25PCS11	Engineering Secure Software Systems	PEC	2	0	2	4	3
6.	25PCS12	Crypto currency and Block chain Technologies	PEC	2	0	2	4	3
7.	25PCS13	Network Security	PEC	2	0	2	4	3
8.	25PCS06	Security and Privacy in Cloud	PEC	2	0	2	4	3

VERTICAL 5: EMERGING TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PCS14	Augmented Reality/Virtual Reality	PEC	2	0	2	4	3
2.	25CS906	Robotic Process Automation	PEC	2	0	2	4	3
3.	25PAD05	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	25PCS21	Cyber security	PEC	2	0	2	4	3
5.	25PCS22	Quantum Computing	PEC	2	0	2	4	3
6.	25PCS12	Crypto currency and Block chain Technologies	PEC	2	0	2	4	3
7.	25PCS19	Game Development	PEC	2	0	2	4	3
8.	25PCS23	3D Printing and Design	PEC	2	0	2	4	3

VERTICAL 6: Internet of Things and Smart Applications

S. NO.	COURSECODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PAM01	Dynamic Paradigm for IoT	PEC	2	0	2	4	3
2.	25PAM02	Smart IoT Architecture	PEC	2	0	2	4	3
3.	25PAM03	Wearable Computing	PEC	2	0	2	4	3
4.	25PAM04	Wireless Sensor Networks	PEC	2	0	2	4	3
5.	25PAM05	IoT in 5G Networks	PEC	2	0	2	4	3
6.	25PAM06	IoT and Smart Cities	PEC	2	0	2	4	3
7.	25PAM07	Cyber Security for IoT Systems	PEC	2	0	2	4	3
8.	25PAM08	Industrial Internet of Things(IIoT)	PEC	2	0	2	4	3

Vertical 7: Artificial Intelligence and Security

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25PCY01	Natural Language Processing	PEC	2	0	2	4	3
2.	25PCY03	AI in cyber Security	PEC	2	0	2	4	3
3.	25PCY04	Generative AI and Prompt Engineering	PEC	2	0	2	4	3
4.	25PCY05	Ethical and Legal Implication of AI	PEC	2	0	2	4	3
5.	25PCY06	Reactive Machines and Self-aware AI	PEC	2	0	2	4	3
6.	25PCY07	Explainable AI (XAI)	PEC	2	0	2	4	3
7.	25PCY08	Open AI Prompt Engineering Best Practices	PEC	2	0	2	4	3
8.	25PCY09	Computer Vision	PEC	2	0	2	4	3

XV – Skill Development courses

SKILL DEVELOPMENT COURSES

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	25CYSD1	Full Stack Development	EEC	0	0	2	2	1
2.	25CYSD2	Devops	EEC	0	0	2	2	1
3.	25CYSD3	Networking	EEC	0	0	2	2	1
4.	25CYSD4	Deep Learning	EEC	0	0	2	2	1
5.	25CYSD5	Quantum Computing	EEC	0	0	2	2	1
6.	25CYSD6	Augmented Reality (AR) & Virtual Reality (VR)	EEC	0	0	2	2	1
7.	25CYSD7	Robotics & Automation	EEC	0	0	2	2	1
8.	25CYSD8	UI/UX Design using Figma	EEC	0	0	2	2	1
9.	25CYSD9	Internet of Things (IoT)	EEC	0	0	2	2	1
10.	25CYSD10	Cyber security	EEC	0	0	2	2	1
11.	25CYSD11	Java Programming	EEC	0	0	2	2	1
12.	25CYSD12	Reinforcement Learning	EEC	0	0	2	2	1

COURSE COMPONENTS	CREDITS PER SEMESTER								TOTAL CREDITS	NO. OF SUBJECTS	CREDIT WEIGHTAGE
	I	II	III	IV	V	VI	VII	VIII			
HSMC	3	3	2				3		11	6	**6.67%**
BSC	12	9	4						25	8	**15.15%**
ESC	7	9							16	6	**9.70%**
PCC			16	22	12	15	8		73	21	**44.24%**
PEC					6	6	6		18	6	**10.91%**
OEC					3				3	1	**1.82%**
EEC	1	1	1	1	2	3	2	8	19	9	**11.52%**
TOTAL	23	22	23	23	23	24	19	8	165	57	**100%**

I SEMESTER

I - Course Name: 25HS101 TECHNICAL COMMUNICATION

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	HSMC	**3**	**0**	**0**	**2**

II - Course Objectives

1	To Enhance consciousness regarding grammar in both spoken and written communication
2	To Augment verbal capabilities in both formal and casual settings
3	To Elevate reading fluency and expand vocabulary.

III - Course Content

Preamble:
The Technical communication course aims to establish a solid groundwork in the English language for students ranging from beginner to intermediate levels. This course emphasizes the critical skills of reading, writing, listening, and speaking, allowing participants to express themselves clearly and with confidence in both every day and professional contexts.

Unit – I	**ENGLISH FOR COMMUNICATION**	**6 Periods**
Introduction to communication- Parts of speech- Questions & its types -Tenses- Be Verbs-Subject Verb Agreement-Reading Comprehension.		
Unit – II	**VOCABULARY BUILDING**	**6 Periods**
Vocabulary-Formation of words- Articles- Sentence Completion-Types of Sentences-Jumbled Sentences/Paragraph- Paragraph writing.		
Unit – III	**FORMAL CORRESPONDENCE**	**6 Periods**
Active & Passive Voice-Conjunction-Punctuation-Formal letters/emails: Business Letters –One-word Substitution.		
Unit – IV	**DESCRIPTIVE WRITING**	**6 Periods**
Prepositions-Adjectives-Idioms and Phrases- Homophones/Homonyms-Picture/Process Description.		
Unit – V	**EFFECTIVE WRITING**	**6 Periods**
Modal verbs-Simple, Compound & Complex- Sentence Pattern- Note Making/Note Taking- Spot the Error-Writing Instructions.		
		Total: 30 Periods

Text Books:	1. Murphy, Raymond. English Grammar in Use: A Self-Study Reference and Practice Book for Intermediate Students: with Answers. Cambridge: Cambridge University Press, 1985. 2. Prasad, Hari Mohan. A Handbook of Spotting Errors. McGraw Hill Education, 2010. 3. Reynolds, John. Cambridge IGCSE, First Language English. 2018th ed., Hodder Education, 2018.
Reference:	1. Wren & Martin – High School English Grammar & Composition, S. Chand Publishers, 2023.

	2. Michael Swan – Practical English Usage, Oxford University Press, 4th Ed., 2016.
MOOC/Web Platforms:	https://swayam.gov.in https://www.edx.org https://learnenglish.britishcouncil.org https://www.futurelearn.com

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Demonstrate proficiency in basic language skills.	Apply (K 3)
CO2	Apply grammatical structures correctly	Apply (K 3)
CO3	Improve vocabulary and word usage.	Analyze (K4)
CO4	Develop reading comprehension skills.	Understand (K 2)
CO5	Write coherent and structured texts.	Apply (K 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	-	-	-	-	-	-	-		2	3	2	-	-	-
CO-2	-	-	-	-	-	-	-		2	3	2	-	-	-
CO-3	-	-	-	-	-	-	-		2	3	2	-	-	-
CO-4	-	-	-	-	-	-	-		2	3	2	-	-	-
CO-5	-	-	-	-	-	-	-		2	3	2	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25MA101 ENGINEERING MATHEMATICS

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B. E / B. TECH. COMMON TO ALL BRANCHES**	I	BSC	3	1	0	4

II - Course Objectives

1	To impart mathematical modeling to describe and explore real-world phenomena and data.
2	To provide basic understanding on Linear, quadratic, power and polynomial, exponential, and multi variable models.
3	Summarize and apply the methodologies involved in framing the real world problems related to fundamental principles of polynomial equations.

III - Course Content

Preamble:
This course covers mathematical modeling with linear, quadratic, polynomial, power, exponential, and multivariable functions. It blends theoretical foundations such as vector spaces, eigen values, orthogonality, and series convergence—with practical methods like least squares, regression, and optimization. The focus is on applying these models to solve real-world problems in engineering, science, and related fields.

Unit – I	**MATHEMATICAL MODELING OF LINEAR FUNCTIONS**	**12 Periods**

The geometry of linear equations - Formation of linear equations for the given data (x_i, y_i): Method of least squares and method of regression - Vector spaces: Basic concepts with examples - Linear Transformation- Eigen values and vectors.

Unit – II	**MATHEMATICAL MODELING OF QUADRATIC FUNCTIONS**	**12 Periods**

General form of a quadratic function - Basic relationships between the equation and graph of a quadratic function - Sum of squares error and the quadratic function of best fit - Quadratic forms: Matrix form - Orthogonality - Canonical form and its nature.

Unit – III	**MATHEMATICAL MODELING OF POWER AND POLYNOMIAL FUNCTIONS**	**12 Periods**

Characteristics of the graphs of power and polynomial functions - Fitting of power and polynomial functions using the method of least squares - Local maxima and local minima of power and polynomial functions - Tests of convergence for series of positive terms - comparison test, ratio test - Power series of functions with real variables, Taylors series, radius and interval of convergence

Unit – IV	**MATHEMATICAL MODELING OF EXPONENTIAL FUNCTIONS**	**12 Periods**

Concept of exponential growth - Graphs of exponential functions - Relationship between the growth factor and exponential growth or decline - Exponential equations have a variable as an exponent and take the form $y = ab^x$ through least square approximation - Calculus of exponential functions - Exponential series.

Unit – V	**MATHEMATICAL MODELING OF MULTIVARIABLE FUNCTIONS**	**12 Periods**

Graphing of functions of two variables - Partial derivatives - Total derivatives - Jacobians - Optimization of multivariable functions without constraints- Optimization of multivariable functions with constraints – Lagrangian multipliers method.

Total: 60 Periods

Text Books:	1. Erwin Kreyszig, Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited, New Delhi 2016 2. B. S. Grewal, Numerical Methods in Engineering & Science: With Programs in C, C++ & MATLAB, Khanna, 2014 3. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons 2020
Reference:	1. Thomas and Finney, Calculus and analytic Geometry, Fourteenth Edition, by Pearson Paperback, 2018. 2. S.S. Sastry, Introductory Methods of Numerical Analysis, 5th edition, 2012, PHI Publication.
MOOC/Web Platforms:	https://youtu.be/h5urBuE4Xhg?si=i9bDuZp0O1OnOdzA https://youtu.be/2DX8Vp1Q2-0?si=2mD7I_QewwqIOoBK https://youtu.be/h23P5lrlrYU?si=nu59KGFxuA-bGB91 https://youtu.be/O9okvkNlB1Y?si=XGnll_SB3MoZScWn https://youtu.be/6aRiifsZGns?si=Fnsp5aMk68Mo3mWl

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Implement the concepts of mathematical modeling based on linear functions in Engineering.	Apply (K 3)
CO2	Formulate the real-world problems as a quadratic function model.	Apply (K 3)
CO3	Apply integral calculus and multiple integral tools in solving various application Problems.	Apply (K3)
CO4	Apply the concept of mathematical modeling of exponential functions in Engineering.	Apply (K 3)
CO5	Develop the identification of multivariable functions in the physical dynamical problems.	Analyse (K4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table- Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	2	3	-	-	-	-	-	-	-	-	2	-	-	-
CO-2	2	3	-	-	-	-	-	-	-	-	2	-	-	-
CO-3	2	3	-	-	-	-	-	-	-	-	2	-	-	-
CO-4	2	3	-	-	-	-	-	-	-	-	2	-	-	-
CO-5	2	3	-	-	-	-	-	-	-	-	2	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25PH101 ENGINEERING PHYSICS

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	BSC	**3**	**0**	**0**	**3**

II - Course Objectives

1	To Understand the concept and principle of energy possessed by mechanical system.
2	To Exemplify the propagation and exchange of energy.
3	To Identify the properties of materials based on the energy possession.

III - Course Content

Preamble:
The aim of the Engineering Physics course is to offer students a solid background in the fundamentals of Physics and to impart that knowledge in engineering disciplines. The program is designed to develop scientific attitudes and enable the students to correlate the concepts of Physics with the core programmes.

Unit – I	**MECHANICS AND ENERGY CONSERVATION**	**9 Periods**
Concept of energy - types of energy-conservation of energy - mechanical energy: - translation - rotation - vibration – kinetic energy and potential energy - conservation of linear momentum, angular momentum and energy -Newton's laws of motion - minimization of potential energy - equilibrium - dissipative systems – friction- static and kinetic.		
Unit – II	**OSCILLATORY MOTION AND RESONANT SYSTEMS**	**9 Periods**
Periodic Motion - simple Harmonic Motion - energy of the Simple Harmonic Motion - pendulum types- simple Pendulum- compound Pendulum -torsional Pendulum – damped and forced oscillations Non-linear Oscillations and Chaos Theory -natural frequency-tuning fork – resonance.		
Unit – III	**PROPAGATION OF ENERGY**	**9 Periods**
Transfer of energy - material medium - transverse wave - longitudinal wave - standing wave – interference - Doppler effect - sound waves and its characteristics-infrasonic sound-audible sound-ultrasonic sound– piezo electric oscillator-SONAR - human voice - reflection - refraction-beats.		
Unit – IV	**PHASE TRANSFORMATION OF THEMODYNAMIC SYSTEM**	**9 Periods**
Energy in transit - heat - temperature - measurement - specific heat capacity of solid and water - thermal expansion –heat transfer processes-thermodynamics: thermodynamic systems and processes - laws of thermodynamics –isothermal and adiabatic change- entropy - entropy on a microscopic scale -maximization of entropy- thermodynamic properties of Gases and Liquids.		
Unit – V	**MATERIAL STRENGTH AND ELASTIC DEFORMATION**	**9 Periods**
Elastic energy - structure and bonding - stress - strain –types of modulus – elasticity in wire- Tension-bending moment of beam-expansion and compression - elastic limit - stress - strain diagram –factors affecting elasticity - ductility – brittleness-plasticity - rubber elasticity and entropy.		
		Total: 45 Periods

Text Books:	1. CJ Fischer, The energy of Physics Part I: Classical Mechanics and Thermodynamics, Cognella Academic Publishing, 2019. 2. PG Hewitt, Conceptual Physics, Pearson education, 2017. 3. RA Serway and JW Jewitt, Physics for Scientists and Engineers, Thomson Brooks / Cole, 2019.

Reference:	1. J Walker, D Halliday and R Resnick, Principles of Physics, John Wiley and Sons, Inc, 2018. 2. HC Verma, Concepts of Physics (Vol I & II), Bharathi Bhawan Publishers & Distributors, New Delhi, 2017.
MOOC/ Web Platforms:	https://onlinecourses.nptel.ac.in/noc25_me167/preview https://onlinecourses.nptel.ac.in/noc25_ch79/preview https://onlinecourses.nptel.ac.in/noc20_mm13/preview https://archive.nptel.ac.in/courses/115/104/115104109/

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply the work-energy theorem to analyze and optimize mechanical system performance.	Apply (K 3)
CO2	Analyze free and forced mechanical oscillations in vibrational energy systems.	Understand (K 2)
CO3	Analyze the propagation of energy in mechanical systems through transverse and longitudinal waves.	Understand (K 2)
CO4	Analyze the exchange of energy and work between the system Using thermodynamic principles.	Apply (K 3)
CO5	Apply the concept of Elasticity and entropy to understand the mechanical properties of materials.	Understand (K 2)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	3	2	1	1	-	-	-	2	-	-	3	-	-	-
CO-2	3	2	1	2	-	-	-	2	-	-	3	-	-	-
CO-3	3	2	2	1	-	-	-	2	-	-	3	-	-	-
CO-4	3	2	2	1	-	-	-	2	-	-	2	-	-	-
CO-5	3	2	2	1	-	-	-	2	-	-	1	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25CH101 ENGINEERING CHEMISTRY

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	BSC	**3**	**0**	**0**	**3**

II - Course Objectives

1	To understand the origin of elements from the universe.
2	To understand the electrochemical cell and its reactions.
3	To understand the origin of elements in the universe.
4	To understand the types, properties and applications of polymers.
5	To learn the different States of Matter and it's applications.

III - Course Content

Preamble:
The aim of the Engineering Chemistry course is to offer students a solid background in the fundamentals of Chemistry and to impart that knowledge in engineering disciplines. The program is designed to develop scientific attitudes and enable the students to correlate the concepts of Chemistry with the core programmes.

Unit – I	**WATER AND ITS TREATMENT**	**9 Periods**

Water: sources and impurities, water quality parameters: colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Desalination of brackish water: reverse osmosis. Boiler troubles: scale and sludge, boiler corrosion, caustic embrittlement, priming & foaming. Treatment of boiler feed water: internal treatment (phosphate, colloidal, and calgon conditioning) and external treatment: ion exchange demineralisation and zeolite process.

Unit – II	**ELECTROCHEMISTRY**	**9 Periods**

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications – standard hydrogen gas electrode - electrochemical series and its significance - Nernst equation derivation

Unit – III	**EVOLUTION OF ELEMENTS**	**9 Periods**

Hydrogen- Isotopes – Properties and Applications – Hydrogen Bonding-The sun and its Elements – fusion – hypernova vs. supernova – A cosmic comparison –Stellar Evolution: The Death Phase – man – made elements – Heavy Water, Hydrogen Peroxide Preparation and Properties- H_2 Fuel Cell - Hydrogen: Fuel of the Future

Unit – IV	**POLYMERS**	**9 Periods**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Condensation and copolymerization. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average. Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon 6,6, and Epoxy resin, Teflon, PVC

Unit – V	**PHASES OF MATTER**	**9 Periods**

Solid – liquid – gas – plasma – Quantum dots –Atomic and Molecular arrangement in different states of matter - Applications of Plasma in Industry - Applications of Quantum Dots in Electronics and Medicine-Liquification of Gases- Critical Temperature-Viscosity

	Total: 45 Periods
Text Books:	1. Rose Marie Gallagher and Author Paul Ingram, Complete Chemistry Cambridge IGCSE, 2nd Edition, Oxford university press, 2020. 2. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17th Edition, 2018. 3. Peter Atkins, Julio D Paula and James Keeler, Atkins' Physical Chemistry, 12thEdition, Oxford University press, 2019.
Reference:	1. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,) Chennai, 4thEdition, 2021. 2. D Tabor, Gases, liquids and solids and other states of matter, 3rd Edition, Oxford University press, 2018. 3. P L Soni, Text book of inorganic chemistry, Chand publishers, New Delhi, 2017. 4. J.D. Lee, Concise inorganic chemistry, 5th edition (Reprint), Blackman Science Ltd, France, Wiley-India, 2016
MOOC/Web Platforms:	https://www.cambridge.org/ https://www.arpansa.gov.au/understanding-radiation/what-is-radiation/ionising-radiation/atomic-structure https://ncert.nic.in/textbook/pdf/kech104.pdf https://www.sciencedirect.com/journal/the-journal-of-chemical-thermodynamics https://www.grc.nasa.gov/www/k-12/airplane/state.html

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Summarize the water related problems in boilers and their treatment techniques.	Apply (K 3)
CO2	Apply the concept Electrochemical Reactions and applications	Apply (K 3)
CO3	Apply the principles of nuclear fusion and stellar evolution to explain the process of hydrogen fusion in stars and the creation of elements	Apply (K 3)
CO4	Discuss the types, properties and applications of polymers	Analyze (K 4)
CO5	Analyze whether the given matter is a solid, liquid, gas, or plasma and interpret the arrangement of atoms.	Analyze (K 4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	2	1	1	-	-	-	-	-	-	-	2	-	-	-
CO-2	2	1	1	-	-	-	-	-	-	-	2	-	-	-
CO-3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
CO-4	2	1	1	-	-	-	-	-	-	-	2	-	-	-
CO-5	3	2	2	-	-	-	-	-	-	-	3	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BE101- FUNDAMENTALS OF COMPUTING

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B. E / B. TECH. COMMON TO ALL**	**I**	ESC	3	0	0	3

II - Course Objectives

1.	To understand the foundational concepts of computer systems, binary codes, and data representation.
2.	To learn how computers perform computations and communicate through input and output devices.
3.	To develop the ability to write and analyze simple programs using assembly language.
4.	To understand the functioning of operating systems, system software components, and application generation.
5.	To apply software development methodologies and basic web technologies for solving real-world problems.

III - Course Content

Preamble: This course enables the student to learn the fundamental principles of computing and the way computers process, store, and represent information. Students will be able to understand binary codes, computational operations, and the interaction between hardware and software components. Concepts of assembly language, operating systems, and software development equip them to design simple programs and apply basic computing methods to real-world problem solving.		
Unit – I	**CODES AND COMBINATIONS**	**8 Periods**
Communication using Mores and Braille binary codes - Digitizing letters, numbers and objects using binary codes - Performing simple operations: addition through binary codes		
Unit – II	**COMPUTATIONUSING COMPUTER**	**9 Periods**
Communication to computing devices through various input sources - Computational operation - flow, functions and controls - Communication to output devices - Basic communication protocol		
Unit – III	**ASSEMBLY LANGUAGE PROGRAMMING**	**11 Periods**
Little Man Computing (LMC) Model - Instruction Set - Labels - Calculation -Branching - Input - Output - Loops - Simple programs		
Unit – IV	**OPERATING SYSTEM AND APPLICATION GENERATION BIOS**	**9 Periods**
Device Drivers - Resources - Scheduler - Applications Generation and Creation - Stages of Compilation - Linkers, Loaders and Libraries - Case Study		
Unit – V	**SOFTWARE DEVELOPMENT**	**8 Periods**
Phases of application life cycle management - Software Development Methodologies - Web Page development – Case Study		
		TOTAL: 45 Periods

Text Books:	1. Charles Petzold, "Code: The Hidden Language of Computer Hardware and Software", Microsoft Press, 2009. 2. Peter Norton, "Introduction to Computers", McGraw-Hill, 7th Edition.
Reference Book:	1. David D. Riley & Kenny A. Hunt, "Computational Thinking for the Modern Problem Solver", CRC Press, 2014.
MOOC/Web Platforms:	https://www.khanacademy.org/computing

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand how computers use codes and combinations to represent information.	Understand (K2)
CO2	Learn how computers handle data transfer and communicate with input/output devices	Understand (K2)
CO3	Solve simple problems by writing and using assembly language programs.	Understand (K2)
CO4	Understand the basic working of operating systems and system software.	Understand (K2)
CO5	Apply software development methods to real-world problems.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	3	2	2	1	-	-	-	2	-	-	-	-	-	-
CO-2	3	3	2	1	-	-	-	2	-	-	-	-	-	-
CO-3	2	3	3	2	-	-	-	2	-	-	-	-	-	-
CO-4	3	2	2	1	-	-	-	2	-	-	-	-	-	-
CO-5	2	2	3	2	-	-	-	3	-	-	-	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I-Course Name: 25BEC02-Basics of Electronics Engineering

Prerequisite	Programme Name	Sem	Category	L	T	P	C
NIL	All Programmes except Civil and Mech	I/II	ESC	2	0	2	3

II-Course Objectives

1	To understand the concept of energy transmission through mechanical, electrical and electromagnetic means.
2	To understand the use of PN Junction Diode and BJT for signal conditioning.
3	To familiarize with the working principle of PN Junction Diode and BJT for the design of basic Digital Logic.
4	To learn the working and characteristics of Special Purpose Semiconductor Electronic Devices.

III-Course Content

Preamble:
This course provides an introduction to signal transmission and conditioning using mechanical, electrical, and electromagnetic means. It emphasizes the role of diodes, transistors, and special-purpose devices in amplification, switching, energy conversion, and digital logic, forming a foundation for advanced studies in electronics and communication.

Unit -I	**ENERGY TRANSFER AND SIGNALS**	**6 PERIODS**

Energy Transmission through Mechanical, Electrical and Electromagnetic means - Signal as Energy Transmission - Complexity in signal transmission (Volume of Information - Distance and Time taken) - Limitations of Mechanical Energy Transmission, Electrical and Electromagnetic Signal Transmission - Need for Conversion between Electrical and Mechanical Signals.

Unit -II	**SIGNAL CONDITIONING USING DIODE**	**6 PERIODS**

Semiconductor Materials - Flow of electrical energy through PN Junction Diode - Signal Clipping - Signal Clamping and Rectification using PN Junction Diode - Limitations of PN Junction Diode – Zener Diode - Voltage Regulation using Zener Diode

Unit -III	**SIGNAL CONDITIONING USING TRANSISTOR**	**6 PERIODS**

Need for controlling electrical signals - Principle of Bipolar Junction Transistor operation - Signal Switching and Amplification using BJT - Limitations of BJT - Principle of Field Effect Transistor operation.

Unit -IV	**LOGIC SYNTHESIS USING DIODE AND TRANSISTORS**	**6 PERIODS**

Logic Gates - PN Junction and BJT as electronic switches - Digital Logic Synthesis using Diode and Transistor: Diode Logic - Resistor Transistor Logic - Diode Transistor Logic - Transistor Logic.

Unit -V	**SPECIAL PURPOSE SEMICONDUCTOR DEVICES**	**6 PERIODS**

Variable Capacitance using Varactor Diode – Voltage triggered switch using Uni-Junction Transistor – Current-controlled Swich using Silicon Controlled Rectifier - Electrical Energy to Light Energy conversion using Light Emitting Diode - Light Energy to Electrical Energy conversion using Solar Cell.

EXPERIMENT 1
Design a voltage multiplier to convert the low voltage from the mains power supply to the high voltage to operate the microwave oven.
EXPERIMENT 2
Design and construct regulated DC power supply for Mobile phone charger
EXPERIMENT 3
Design and construct an audio amplifier circuit to play the mobile music in a huge speaker.
EXPERIMENT 4
Design and construct Switching circuit for the Pump to control over flow and drain condition for overhead tank using PN junction diode.
EXPERIMENT 5
Design and construct BJT based circuit to implement two-way connection for stair case light application.
Total: 30 + 30 = 60 PERIODS

Text Books:	1.David A. Bell, Electronic Devices and Circuits, Oxford Higher Education press, 5th Edition, 2010. 2.Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th, Edition, Pearson Education / PHI, 2008. 3.Adel .S. Sedra, Kenneth C. Smith, Micro Electronic Circuits, Oxford University Press, 7th, Edition, 2014.
Reference Books:	1.Thomas L. Floyd, Electronic Devices: Electron Flow Version, Nineth Edition, Prentice Hall, 2012. 2.J Millman, C. Halkias & Satyabrata JIT, Electronic Devices and Circuits, Tata McGraw-Hill, 2007. 3.L Robert Boylestead, Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education 2006. 4.Behzad Razavi, Microelectronics, Wiley India Pvt. Ltd.; 2nd edition (2018)
MOOC/WEB Platforms:	https://onlinecourses.nptel.ac.in/noc24_ee17/preview https://iipseries.org/assets/docupload/rsl20248EE30140CB96C2A.pdf https://en.wikipedia.org/wiki/Light-emitting_diode

IV-Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the need for electrical and electromagnetic signal transmission.	Understand (K2)
CO2	Analyze the working principle and characteristics of PN junction diode and Zener diode.	Analyze (K4)
CO3	Analyze the working principle and characteristics of Bipolar Junction Transistor.	Analyze (K4)
CO4	Apply the working principle of PN Junction diode and BJT for designing basic Digital Logic functions	Apply (K3)
CO5	Analyze the energy conversion needs and working principle of special purpose electronic devices.	Analyze (K4)

V-Mapping Table Mapping of Cos with Pos and PSOs

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

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25HS102 HERITAGE OF TAMILS - தமிழர்மரபு

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	HSMC	**1**	**0**	**0**	**1**

II - Course Objectives

1	Appreciate Tamil art, culture and literature Learn the history and culture of Tamil language
2	Relate to various art forms and their relevance to development
3	Acknowledge the rich heritage and significant achievements of the Tamils
4	Tamils Appreciate the contribution of Tamils to nation building
5	Summarize the contribution of Tamil in Indian culture.

III - Course Content

Preamble:

This course provides an overview of the rich cultural, literary, artistic, and historical heritage of the Tamil people. It introduces the evolution of the Tamil language within the Dravidian family, the ethical foundations in Sangam literature, and the management principles found in the Thirukkural. It explores Tamil epics, the influence of Jain and Buddhist traditions, the rise of Bhakti literature, and the contributions of poets like Bharathi and Bharathidasan to modern Tamil writing. The course further examines traditional and modern art forms, sculpture, folk arts, heroic games, and the socio-economic role of temples. It also highlights ancient landscapes (thinai) and their cultural significance. trade, education, and maritime achievements of the Sangam age.

Unit – I	**மொழி மற்றும் இலக்கியம்: Language And Literature**	**3 Periods**

Language Families in India - Dravidian Languages - Tamil as a Classical 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.

இந்திய மொழிக் குடும்பம்-திரவிடமொழி-சங்க இலக்கியம்-அறம்-சமயச் சார்பற்ற நதன்மை-திருக்குறலளில் மேலாண்மைக் கருத்துக்கள்-தமிழ் காப்பியங்கள்-சமண பௌத்த சமயங்களின் தாக்கம்-பக்தி இலக்கியம்-ஆழ்வார்கள் நாயன்மார்கள்-சிற்றிலக்கியங்க்கள்-நவீன இலக்கியத்தின் வளர்ச்சி-தமிழ் இலகியவளர்ச்சியில் பாரதியார் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

Unit – II	**மரபு-பாறை ஓவியங்கள் முதல் நவீனஓவியங்கள் வரை:சிற்பக்கலை: Rock Art Paintings To Modern Art – Sculpture**	**3 Periods**

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 sMridhangam, Parai, Veenai, Yazh and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils.

நடுகல் முதல் நவீன சிற்பங்கள் வரை-ஐம்பொன்சிலைகள்-பழங்குடியினர் தயாரிக்கும்கைவினைப் பொருட்கள்-பொம்மைகள்-தேர் செய்யும் கலை-சுடுமண் சிற்பங்க்கள்-நாட்டுப்புறத் தெய்வங்கள்-திருவள்ளுவர் சிலை-இசைக்கருவிகள்-தமிழர்களின் சமூக பொருளாதர வாழ்வில் கோயில்களின் பங்கு.

Unit – III	**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: Folk And Martial Arts**	**3 Periods**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils. தெருக்கூத்து-கரகாட்டம்-வில்லுப்பாட்டு-கணியன் கூத்து-ஒயிலாட்டம்-தோல்பாவைக்கூத்து-சிலம்பாட்டம்-வளரி-புலியாட்டம்-தமிழர்களின் விளையாட்டு.		
Unit – IV	**தமிழர்களின் திணைக் கோட்பாடுகள்:** **Thinai Concept Of Tamils**	**3 Periods**
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. தமிழகத்தின் தாவரங்களும் விளங்குகளும்-தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள்-தமிழர்கள் பொற்றிய அறக்கோட்பாடுகள்-சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும்,கல்வியும்-சங்ககால நகரங்களும் துறைமுகங்களும் சங்க இலக்கியத்தில் ஏற்றுமதி மற்றும் இறக்குமதி-கடல் கடந்த நாடுகளின் சோழர்களின் வெற்றி.		
Unit – V	**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்க்குத் தமிழர்களின் பங்களிப்பு:** **Contribution Of Tamils To Indian National Movement And Indian Culture**	**3 Periods**
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. இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு-இந்தியாவின்பிற்பகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம்-சுயமரியாதை இயக்கம்.-இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு-கல்வெட்டுகள்-கையெழுத்துப்படிகள்-தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.		
		Total: 15 Periods
Text Books:	1. தமிழர்மரபு / Heritage of Tamils- Poobalan - VRB Publishers Pvt. Ltd. 2. பொருநை- ஆற்றங்கரை நாகரிகம்.(தொல்லியல் துறை வெளியீடு.) 3. கீழடி-வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்(தொல்லியல் துறை வெளியீடு.) 4. JourneyofCivilizationIndustoVaigai(R.Balakrishnan)(Publishedby:RMRL) –	
Reference:	1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 2. The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. 3. Historical Heritage of the Tamils(Dr.S.V.Subatamanian,Dr.K.D.Thirunavukkarasu)(Publishedby :InternationalInstituteof Tamils Studies). 4. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)	
MOOC/Web Platforms:	https://www.tnarch.gov.in/ta/epigraphy/ https://www.tamildigitallibrary.in/admin/assets/book https://www.tamilhistory.co.in/2020/05/heroic-games-ancient-tamils-jallikattu-silambam.html https://www.tamilvu.org/ta/courses-degree-a061-a0611-html-a0611313-10334	

	https://tamil.samayam.com/others-news/independence-day-2016/news/freedom-fighters-of-india/articleshow/53666058.cms https://www.tamildigitallibrary.in/admin/assets/book https://www.scribd.com/document/646362880/Text-book

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the significance of Tamil as a classical language	Apply (K 1)
CO2	Relate the art and culture in Tamil language	Apply (K 2)
CO3	Explain the importance of music, dance and martial arts that were derived from Tamil Culture	Apply (K 2)
CO4	Understand the poetic mode or theme of classical language	Analyze (K 2)
CO5	Relate the contribution of Tamils to Nation building	Analyze (K 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO-2	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO-3	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO-4	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO-5	-	-	-	-	-	1	1	-	-	-	1	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BS111 PHYSICS AND CHEMISTRY LABORATORY

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	BSC	**0**	**0**	**4**	**2**

II - Course Objectives

1	To learn the correct usage of several types of physics lab equipment.
2	To learn, how to gather, present, and understand facts in a simple and succinct manner.
3	To learn Physics-related problem-solving abilities and experimental data interpretation.
4	To identify experimental measurement error and the methods used to reduce it
5	To encourage active participation from the learner in all aspects of the lab exercises.

III - Course Content

Preamble:

This course aims to provide practical training in the estimation of physical parameters like band gap, ultrasound velocity, liquid compressibility, thin wire thickness, Young's modulus, and knowledge of the operation of the photoelectric effect, Michelson interferometer, laser, and fibre optics as well as to provide project-based skills development.

PHYSICS LABORATORY: (Any seven experiments to be conducted)

1. Torsional pendulum – Determination of rigidity modulus of wire and moment of inertia of disc.
2. Uniform bending (or) Non-uniform Bending– Determination of young's modulus.
3. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
4. Laser- Determination of the wave length of the laser using grating.
5. (a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   (b) Compact disc- Determination of width of the groove using laser.
6. Air wedge – Determination of thickness of a thin sheet/wire.
7. Determination of Band gap of a semiconductor.
8. Particle size determination using LASER.
9. Simple harmonic oscillations of cantilever.
10. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

IV - Course Outcome (Physics Laboratory)

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apprehend the concepts of interference, diffraction of light and recognize the resonance concept of waves.	Understand (K 2)
CO2	Apply the principles of operations of optical fibers, semiconductor using simple circuits and interaction of electromagnetic waves and crystalline solids.	Apply (K 3)
CO3	Measure the elastic moduli and moment of inertia of given materials with the help of suggested procedures.	Apply (K 3)

CO4	Experiment the relationship between the light and matter & properties of liquids.	Analyze (K 4)
CO5	Estimate the velocity of sound and compressibility of liquid.	Understand (K 2)

II - Course Objectives (CHEMISTRY LABORATORY)

1	To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
2	To induce the students to familiarize with electroanalytical techniques such as, pH metry and potentiometry
3	To make the student to acquire practical skills conductometry in the determination of impurities in aqueous solutions.
4	To demonstrate the analysis of metals and alloys.
5	To demonstrate the synthesis of nanoparticles

III - Course Content

Preamble:

This course aims to provide the students, a basic practical knowledge in chemistry. The objective of this course is to develop intellectual and psychomotor skills of the students by providing hands on experience in quantitative, electrochemical and photo-chemical analysis.

CHEMISTRY LABORATORY:

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by EDTA method.
6. Determination of strength of acids in a mixture of acids using conductivity meter.
7. Conductometric titration of strong acid vs strong base.

Reference Books:	1. Vogel's Textbook of Quantitative Chemical Analysis (8^{th} edition, 2014).
MOOC/Web Platforms:	https://www.youtube.com/watch?v=5b2LNdsfQdQ https://www.youtube.com/watch?v=k8GDv-uhlyU

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	Analyze (K 4)
CO2	Determine the amount of metal ions through volumetric and spectroscopic techniques.	Apply (K3)

CO3	Analyse and determine the composition of alloys.	Analyze (K 4)
CO4	Learn simple method of synthesis of nanoparticles	Understand (K 2)
CO5	Quantitatively analyse the impurities in solution by electroanalytical methods.	Analyze (K 4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	1	-	-	-	-	1	3	2	-	-	-	-	-
CO-2	3	1	-	-	-	-	1	2	1	-	-	-	-	-
CO-3	3	3	-	-	-	-	2	2	1	-	-	-	-	-
CO-4	3	2	-	-	-	-	1	3	2	-	-	-	-	-
CO-5	3	2	-	-	-	-	2	1	2	-	-	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25HS111 ENGLISH LABORATORY I

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	I	EEC	**0**	**0**	**2**	**1**

II – Course Objectives

1	To implement English Vocabulary at command and ensure language proficiency.
2	To achieve better technical writing and Presentation skills.
3	Identify the common errors in speaking and writing English.

III – Course Content

List of Experiments:

1. Listening for data, for specific information, for opinion.
2. Listening to Ted Talks-Listening for specific information.
3. Self-Introduction - Recreating interview scenarios -Haptics - Gestures -Proxemics- Facial expressions-Paralinguistic / Vocalic- Body Language- Appearance-Eye Contact-Artefacts.
4. Short Speeches - Making short formal and informal speeches
5. Speaking: Tendering verbal apologies, and explanations, persuading a listener/ audience-Hierarchy in Business correspondence.
6. Active reading- Newspaper, short paragraphs, excerpts, articles, magazines and editorials
7. Identifying the central themes/ crux-Interpreting tone - formal/informal/semi-formal-Note-taking
8. Narrative Expression- Travelogue and Story Telling Technique
9. Summary writing, selective summary, paraphrasing, opinion pieces-Finding synonyms in the context Paraphrasing
10. Descriptive Expression-Process Description and Blog Writing

Total: 15 Periods

Text Books:	1. Sasikumar, V, et.al. A Course in Listening & Speaking Foundation Books, 2005. 2. Murphy, Raymond. English Grammar in Use: A Self-Study Reference and Practice Book for Intermediate Students: with Answers. Cambridge: Cambridge University Press, 1985. 3. Prasad, Hari Mohan. A Handbook of Spotting Errors. Mcgraw Hill Education, 2010.
Reference Books:	1. Reynolds, John. Cambridge IGCSEA, First Language English. 2018th ed., Hodder Education, 2018. 2. Wiggins, Grant P., and Jay McTighe. Understanding by Design. Association for Supervision and Curriculum Development, 2008

Web Sources	www.studyladder.com www.fluentu.com www.esl-lab.com www.wordsworthelp.com

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Demonstrate improved listening comprehension skills.	Apply (K3)
CO2	Practice correct pronunciation, stress, rhythm and intonation	Analyze (K4)
CO3	Engage in oral communication tasks	Apply (K3)
CO4	Deliver short Oral Presentation	Create (K6)
CO5	Use Language lab tools, software and digital resources	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO1	3	1	-	-	-	-	-	3	2	-	3	-	-	-
CO2	3	1	-	-	-	-	-	3	2	-	3	-	-	-
CO3	3	3	-	-	-	-	-	3	2	-	3	-	-	-
CO4	3	2	-	-	-	-	-	3	2	-	3	-	-	-
CO5	3	2	-	-	-	-	-	3	2	-	3	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BE111 - BASIC COMPUTING AND PROBLEM SOLVING LAB

Prerequisites	Program Name	Sem	Category	L	T	P	C
Nil	**B.E./B.TECH. COMMON TO ALL**	I	ESC	0	0	2	1

II - Course Objectives

1.	To enable students to understand the basics of programming constructs such as input/output operations, expressions, and decision-making.
2.	To develop logical thinking through hands-on implementation of iterative structures and pattern-generation problems.
3.	To provide the ability to handle arrays and strings for real-time data processing applications.
4.	To Introduce modular programming concepts using functions to design structured programs.
5.	To familiarize students with dynamic data handling and memory management using pointers.

III – List of Experiments

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. Basic Calculator Using Input/Output and Expressions
2. Simple Voting System Using Decision Making Constructs
3. Number Pattern Generator Using Loops
4. Student Marks Management Using Arrays
5. Text Processing Tool Using String Handling
6. Library Management System Using Functions
7. Contact Management System Using Pointers

LIST OF EQUIPMENTS:

Tools: Turbo C/Turbo C++/GCC

TOTAL: 30 PERIODS

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Demonstrate knowledge on C programming concepts using input and output expressions.	Understand (K2)
CO2	Develop programs in C using basic constructs	Apply (K3)
CO3	Develop programs in C using loops	Apply (K3)
CO4	Develop applications in C using arrays	Apply (K3)
CO5	Develop applications in C using string handling and pointers	Apply (K3)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	3	2	2	1	1	1	-	-	-	1	1	1	-	-
CO-2	3	2	2	1	1	1	-	-	-	1	1	1	-	-
CO-3	3	2	2	1	1	1	-	-	-	-	1	1	-	-
CO-4	3	2	3	1	2	1	-	-	1	-	1	1	-	-
CO-5	3	2	3	2	2	1	-	-	1	1	1	1	1	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

SEMESTER II

I - Course Name: 25HS201 – PROFESSIONAL COMMUNICATION

Prerequisites	Program Name	Sem	Category	L	T	P	C
-	**B.E./B.TECH. COMMON TO ALL**	II	HSC	**2**	**0**	**0**	**2**

II - Course Objectives

1.	Develop advanced reading skills that enable students to comprehend, infer and critically analyze academic, technical and professional texts.
2.	Strengthen grammar proficiency and vocabulary range through systematic practice in word-building, collocations, sentence structures, conditional clauses and discourse markers.
3.	Enhance students' ability to write clear, concise and well-structured professional documents such as emails, memos, minutes, agendas, business letters, brochures and manuals.
4.	Equip learners with the skills to interpret data, identify trends and accurately express information using graph-specific and technical vocabulary.
5.	Cultivate academic writing competencies, including summarizing, proofreading, reviewing research papers and composing argumentative, cause-effect and persuasive writing.

III - Course Content

Preamble:
This course equips engineering students with essential communication skills through advanced reading, writing, grammar and vocabulary training. It prepares learners to handle academic, technical and workplace communication with clarity, accuracy and confidence.

Unit – I	**Reading & Professional Communication**	**6 Periods**
Reading- Importance of Good Communication- Inference and Reading for facts vs opinions -**Grammar and Vocabulary**- Conditional clauses- Hypothetical questions and Answers Synonyms and Antonyms, Selecting Words, **Writing**-Email Etiquette- Email Writing- Responding to Emails.		
Unit – II	**Vocabulary Expansion & Academic Writing**	**6 Periods**
Prefixes and Suffixes- Numerical Adjectives, Collocations, Compound Nouns, **Writing** – Recommendations-Suggestions- Writing- Cause and Effect, Argumentative, Persuasive. Checklist.		
Unit – III	**Reading Skills & Workplace Documentation**	**6 Periods**
Reading – Skimming – Reading to Summarize- Abbreviations, Acronyms and Short-forms- Phrasal Verbs-Cloze test using verbs-**Writing** -Memorandum - Minutes of Meeting- Agenda-Transcoding – Identifying Trends and Patterns in Graphs and Expressing with Graph Specific Vocabulary		
Unit – IV	**Applied Reading & Business Correspondence**	**6 Periods**
Reading - Case Studies- Winning Strategies excerpts from *You Can Win*-Determiners-**Writing-**Business letters- Call For Quotation- creating brochures-catalogues-manuals-		
Unit – V	**Academic & Career Communication**	**6 Periods**
Reading Newspaper Articles- Interpreting and Analyzing a Research Paper- Approaches to Review paper-Discourse Markers- Job Application letters-Resume building.		
		Total 30 Periods
Text Books:	1. Raman, Meenakshi and Sangeeta Sharma. *Technical Communication: Principles and Practice*. Oxford University Press, 2015.	

	2. Rizvi, M. Ashraf. *Effective Technical Communication*. Tata McGraw Hill Education, 2017. 3. Murphy, Raymond. *English Grammar in Use: A Self-Study Reference and Practice Book for Intermediate Students with Answers*. Cambridge University Press, 2019.
Reference Books:	1. Lewis, Norman. *Word Power Made Easy*. Goyal Publishers / Penguin Random House, 2014. 2. Khera, Shiv. *You Can Win: A Step-by-Step Tool for Top Achievers*. Bloomsbury India, 2014.
MOOC/Web Platforms:	https://swayam.gov.in https://www.edx.org https://learnenglish.britishcouncil.org https://www.futurelearn.com

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Interpret and analyze academic, technical and professional texts using suitable reading strategies.	Analyse (K4)
CO2	Apply appropriate grammatical structures and discourse markers for accurate and coherent communication.	Apply (K3)
CO3	prepare professional documents such as emails, memos, minutes, agendas, business letters, brochures and manuals.	Understand (K2)
CO4	Use an enhanced range of vocabulary, collocations and word-formation techniques in professional contexts.	Apply (K3)
CO5	Compose structured essays, summaries, reviews, job applications and resumes using effective writing techniques.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**
CO-1	-	-	-	-	-	-	-	2	3	-	2	-	-
CO-2	-	-	-	-	-	-	-	2	3	-	2	-	-
CO-3	-	-	-	-	-	-	-	2	3	-	2	-	-
CO-4	-	-	-	-	-	-	-	2	3	-	2	-	-
CO-5	-	-	-	-	-	-	-	3	3	-	3	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25MAC01 PROBABILITY AND STATISTICS

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B. E / B. TECH. COMMON FOR CSE, CSE (AI & ML), CYBER SECURITY & IT**	II	BSC	3	1	0	4

II - Course Objectives

1.	To provide necessary basic concepts in probability.
2.	To understand the basic concepts of one - dimensional random variable and to introduce some standard distributions applicable in engineering which can describe real life phenomenon.
3.	To understand 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 Design of Experiments concepts using ANOVA of solving real-world engineering problems in manufacturing and quality.

III - Course Content

Preamble:
This course is enabled to apply drawn inferences to difference machine learning models, exposing to data clustering, data classification, data validation and data fitting.

Unit – I	**PROBABILITY AND RANDOM VARIABLES**	**12 Periods**
Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Mean and variance of random variables - Moments – Moment generating functions.		
Unit – II	**PROBABILITY DISTRIBUTIONS**	**12 Periods**
Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Transformation of a random variable.		
Unit – III	**TWO DIMENSIONAL RANDOM VARIABLES**	**12 Periods**
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of two random variables.		
Unit – IV	**TESTING OF HYPOTHESIS**	**12 Periods**
Statistical hypothesis – Small sample Tests based on t -test, F - test – Chi square test for goodness of fit – Independence of attributes - large sample tests based on Normal distribution for single mean and difference of means.		
Unit – V	**DESIGN OF EXPERIMENTS**	**12 Periods**
One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.		
	Total : 60 Periods	

Text Books:	1. Johnson. R.A., Miller. I and Freund. J., "Miller and Freunds Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016. 2. Grewal.B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 44th Edition, 2018.
Reference Books:	1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014. 2. Ross . S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier, 2014. 3. Spiegel. M.R., Schiller. J. and Srinivasan . R.A., "Schaums Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.

MOOC/Web Platforms:	https://onlinestatbook.com/2/probability/basic.html https://www.youtube.com/watch?v=b5VUnapu-qs https://www.youtube.com/watch?v=q01b-lV6y5Q https://webspace.maths.qmul.ac.uk/b.bogacka/MS_NotesWeek4.pdf

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the fundamental concepts of probability.	Understand (K2)
CO2	Apply the knowledge of one - dimensional random variables to standard distributions which can describe real life phenomenon.	Apply (K3)
CO3	Understand the basic concepts of two-dimensional random variables and apply in engineering applications.	Understand (K2)
CO4	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply (K3)
CO5	Apply the basic concepts of classifications of design of experiments using ANOVA of solving real-world engineering problems in manufacturing and quality.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**
CO-1	3	3	-	-	-	-	-	-	2	-	-	-	-
CO-2	3	3		-	-	-	-	-	2	-	-	-	-
CO-3	3	3		-	-	-	-	-	2	-	-	-	-
CO-4	3	3	1	1	1	-	-	-	2	-	2	-	-
CO-5	3	3	1	1	1	-	-	-	2	-	2	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25PH201 PHYSICS OF MATERIALS

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO EEE, CSE, CSE (AI & ML), CYBER SECURITY/IT & AI & DS**	II	BSC	**3**	**0**	**0**	**3**

II - Course Objectives

1	To provide fundamental knowledge on electrical conduction mechanisms in metals and conductors.
2	To understand semiconductor physics, carrier transport, and the working principles of basic semiconductor devices.
3	To introduce magnetic and super conducting material properties of materials and their applications in modern devices.
4	To enable the students to gain knowledge of electromagnetic waves and its applications.
5	To make the students to enrich the knowledge of making device in nano materials.

III – Course Content

Preamble:
Students who complete this course will have a broader understanding of conducting, semiconducting, magnetic, superconducting, electromagnetic wave and nanomaterials as well as an understanding of how different fields of knowledge are interconnected.

Unit – I	**CONDUCTING MATERIALS**	**9 Periods**
Free electron theory – Electrical and thermal conductivity – Wiedemann–Franz law – Fermi–Dirac statistics – Density of states – Energy bands – Effective mass of electron – Applications of conducting materials.		
Unit – II	**SEMICONDUCTING MATERIALS**	**9 Periods**
Intrinsic and extrinsic semiconductors – Direct and indirect bandgap materials – Carrier concentration and Fermi level – Drift – diffusion – mobility – Hall effect – Ohmic and Schottky contacts – LED and solar cell.		
Unit – III	**MAGNETIC MATERIALS AND SUPER CONDUCTORS**	**9 Periods**
Types of magnetic materials: diamagnetic – paramagnetic – ferromagnetic – antiferromagnetic – ferrimagnetic – Magnetic domains – B–H curve – Hysteresis – Hard and soft magnetic materials – Maglev Train – Meissner effect – Type-I and Type-II superconductors – Josephson effect- SQUID.		
Unit – IV	**ELECTROMAGNETIC FIELD AND WAVES**	**9 Periods**
The Maxwell's wave equations – plane electromagnetic waves in vacuum – conditions on the wave field – properties of electromagnetic waves – energy and momentum in EM waves- intensity – waves from localized sources – momentum and radiation pressure – smart phone reception.		
Unit – V	**NANOMATERIALS AND DEVICES**	**9 Periods**
Top down and bottom-up approach – Quantum confinement – Quantum well – wire and dot – Tunneling – Single electron transistor – Carbon nanotubes – sol–gel synthesis – Applications in energy devices – Electric vehicle (EV).		
		Total: 45 Periods

Text Books:	1. Hugh D. Young, Roger A. Freedman, University Physics with Modern Physics, 15th Edition, Pearson, 2022. 2. M.N. Avadhanulu & P.G. Kshirsagar, A Textbook of Engineering Physics, S. Chand, 2010. 3. Gaur R.K. and Gupta S.L, Engineering Physics, Dhanpat Rai Publications, 2018.
Reference Books:	1. S.O. Pillai, Solid State Physics, 10th Edition, New Age Publications, 2022. 2. C.P.Poole and F.J.Owens ,Introduction to Nanotechnology, John- Wiley Publications, New Delhi ,2015. 3. Bhattacharya D.K. & Poonam T., Engineering Physics, Oxford University Press,

	2018. 4. Concept of Modern Physics, Arthur Beiser, Tata McGraw- Hill, New Delhi, 2018
MOOC/ Web Platforms:	1. https://eolss.net/Sample-Chapters/C05/E6-36-02-01.pdf 2. https://www.britannica.com/science/semiconductor 3.https://www.scribd.com/document/577777248/UNIT-1-Conducting-Materials- 4. https://www.britannica.com/science/electromagnetism/Historical-survey 5. https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf

IV – Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply the free electron theory to conducting materials and study the electron behavior.	Apply (K3)
CO2	Analyse semiconductor behavior, carrier transport mechanisms and basic device operation.	Analyse (K4)
CO3	Apply the magnetic and super conducting behaviors of materials through modern engineering applications.	Apply (K3)
CO4	Apply the electromagnetic transmission and reception phenomena in smartphone communication.	Apply (K3)
CO5	Apply the various synthesis methods to evaluate the nano materials for the applications in advanced technologies such as energy devices and electric vehicles.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V – Mapping Table Mapping of Cos with Pos and PSOs

Cos/ Pos	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**
CO-1	3	3	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	3	-	3	-	-	-	-	-	-	-	-	-
CO-3	3	3	-	3	-	-	-	-	-	-	-	-	-
CO-4	3	3	3	-	2	-	-	-	-	-	-	2	-
CO-5	3	3	3	-	3	1	1	-	-	-	-	3	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BS201 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E. /B.TECH. COMMON FOR ALL**	II	BSC	**3**	**0**	**0**	**2**

II - Course Objectives

1.	To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
2.	To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and waste management.
3.	To study the dynamic processes and understand the features of the earth's interior and surface.
4.	To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
5.	To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyzes the role of sustainable urbanization.

III - Course Content

Preamble:
The objective of this course is intended to make the students to understand the basic concepts of environment, ecology and pollution of the current environmental issues and to participate in various activities on conserving and protecting the environment.

Unit – I	**Environment and Biodiversity**	**6 Periods**

Definition, scope and importance of environment – need for public awareness. Eco-system and energy flow – Ecological Pyramids - ecological succession - Types of biodiversity: genetic, species and ecosystem diversity – values of biodiversity - India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss- poaching of wildlife- man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: in-situ and ex-situ.

Unit – II	**Environmental Pollution and waste management**	**6 Periods**

Causes, effects and preventive measures of water pollution, soil pollution, air pollution and noise pollution - Solid waste: Industrial- hazardous- Biomedical and e-waste management- Case studies on occupational health and safety management system (OHASMS) - Environmental protection - environmental protection acts.

Unit – III	**Social issues and the Environment**	**6 Periods**

Water conservation, rain water harvesting, watershed management- Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion-nuclear accidents and holocaust- case studies.

Unit – IV	**Renewable sources of Energy**	**6 Periods**

Solar – Wind – Hydro - Geothermal, Biomass, and Ocean: Tidal -Wave energy - Hydrogen Fuel Cells - principles, applications (electricity, heating, transport) - advantages (clean, sustainable) - challenges (storage, cost) - clean alternatives to fossil fuels - modern energy transition.

Unit – V	**Sustainability Practices**	**6 Periods**

Sustainable Development Goals- targets -Zero waste and 3R and 5R concepts – linear economy - circular economy - ISO 14000 series - material life cycle assessment, environmental impact assessment- Sustainable habitat: green buildings - green materials - energy efficiency - Sustainable transports. Sustainable energy: non-conventional sources- energy cycles carbon cycle - emission and sequestration - green engineering: sustainable urbanization - socio economical and technological change.

	Total: 30 Periods

Text Books:	1. Anubha Kaushik and C. P. Kaushik's 'Perspectives in Environmental Studies', 6th Edition, New Age International Publishers, 2018. 2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2017. 3. Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004. 4. Allen, D. T. and Shonnard, D. R., 'Sustainability Engineering: Concepts, Design and Case Studies', Prentice Hall. 1st Edition, 2011. 5. Bradley. A.S; Adebayo, A.O., Maria, P. 'Engineering applications in sustainable design and development', Cengage learning. 1st Edition, 2015. 6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
Reference Books:	1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media, 2010. 2. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015. 3. Erach Bharucha 'Textbook of Environmental Studies for Under graduate Courses' Orient Blackswan Pvt. Ltd. 2021.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation	Remember (K1)
CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures and waste management in the society.	Understand (K2)
CO3	To identifythe causes, effects of natural disasters and contribute to the preventive measures in the society.	Apply (K3)
CO4	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	Understand (K2)
CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2
CO-1	2	1	-	-	-	2	3	-	1	-	2	-	-
CO-2	3	2	-	-	-	3	3	-	1	-	2	-	-
CO-3	3	1	1	-	-	2	2	-	-	-	2	-	-
CO-4	3	1	1	1	-	2	2	-	1	-	2	-	-
CO-5	3	2	1	-	-	2	2	-	1	-	1	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BEC01 Basics of Electrical Engineering

Prerequisite	Programme Name	Sem	Category	L	T	P	C
Nil	B.E./B.TECH. – Common to all except EEE	II	ESC	2	0	2	3

II - Course Objectives

1	To introduce the basic concepts of DC and AC circuits.
2	To impart knowledge on working principles and applications of electrical machines.
3	To provide understanding of measurements and instrumentation.
4	To introduce the fundamentals of sensors and transducers.
5	To expose students to applications of basic electronics in electrical systems

III - Course Content

Preamble:

This course provides the fundamental knowledge of electrical engineering essential for all branches of engineering. It introduces the principles of DC and AC circuits, working of electrical machines, measurement techniques, sensors, transducers, and the role of basic electronics in electrical and instrumentation systems. The course aims to build a strong foundation for students to understand, analyze, and apply electrical engineering concepts in real-life engineering applications.

Unit – I	**DC Circuits**	**6 Periods**

Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law – Kirchhoff's Laws – Independent and Dependent Sources – Simple problems – Mesh Analysis with Independent sources only (DC Analysis only)

Unit – II	**AC Circuits**	**6 Periods**

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor .-RLC Circuits (Simple Problems)

Unit – III	**Electrical Machines**	**6 Periods**

Construction and Working principle – DC Separately and Self-excited Generators, EMF equation, Types and Applications. Working Principle of DC Motors – Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three-phase Induction Motor.

Unit – IV	**Measurements and Instrumentation**	**6 Periods**

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

Unit – V	**Sensors and Transducers**	**6 Periods**

Transducers -Sensors, solenoids, pneumatic controls with electrical actuator,– Types of valves and applications – Electro-pneumatic systems – Proximity sensors, Limit switches, Piezoelectric, Hall effect, Photo sensors, Strain gauge, LVDT, Optical and Digital transducers, Smart sensors, Thermal Imagers.

TOTAL:30 Periods

Lab Experiments: **(30 Periods)** 1.Staircase Wiring 2.Single lamp controlled by single switch 3. Verification of ohms and Kirchhoff's Laws. 4.Load test on DC shunt motor 5.Load Test on Induction Motor 6.Energy meter wiring and related calculations 7.Miniproject on sensors **Total: 60 Periods**	
Reference Books:	1. Kothari D.P. and I.J. Nagrath, Basic Electrical and Electronics Engineering, 2nd Edition, McGraw Hill, 2020. 2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2019. 3. Sedha R.S., A Textbook of Applied Electronics, S. Chand & Co., 2008. 4. Sawhney A.K. and Puneet Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai, 2015. 5. Albert Malvino, David Bates, Electronic Principles, 7th Edition, McGraw Hill, 2017. 6. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Education, 2017. 7. James A. Svoboda & Richard C. Dorf, Introduction to Electric Circuits, Wiley, 2018. 8. Muhammad H. Rashid, Power Electronics – Circuits, Devices and Applications, Pearson, 2017. 9. H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, 2010.
MOOC/ Web Platforms:	https://nptel.ac.in/courses/108/105/108105159 https://ocw.mit.edu

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Compute and analyze electrical circuit parameters for simple DC/AC problems.	Analyze (K4)
CO2	Explain the working principles and applications of electrical machines.	Understand (K2)
CO3	Demonstrate understanding of measurement systems and instrumentation.	Understand (K2)
CO4	Apply the concepts of sensors and transducers to engineering systems.	Apply (K3)
CO5	Relate basic electronics to electrical and instrumentation applications.	Understand (K2)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table - Mapping of COs with POs and PSOs

COs Vs POs/ PSOs	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**
CO1	3	2	-	2	2	-	-	-	-	-	-	1	-
CO2	3	2	2	2	2	-	-	-	-	-	-	1	-
CO3	2	2	-	3	2	1	-	-	-	-	-	1	-
CO4	3	2	2	2	3	-	-	-	-	-	1	1	-
CO5	3	2	2	-	3	-	-	-	1	-	2	1	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BE202-Python Programming

Prerequisite	Program Name	Sem	Category	L	T	P	C
25BE101- Fundamentals of Computing	B.E/B.Tech. – Common to CSE, IT, AI&DS, CSE(AI&ML), CSE (CYBER SECURITY), ECE, EEE	II	ESC	3	0	2	4

II - Course Objectives

1.	To learn the basic concepts of Python such as data types, expressions, operators, and writing simple programs.
2.	To understand how to use conditions, loops, functions, recursion, and strings to build programs.
3.	To use lists, tuples, dictionaries, and list comprehension to store and work with data.
4.	To learn how to read and write files and use Python libraries like NumPy, Pandas, and Matplotlib for data processing and graphs.
5.	To know how to handle errors and exceptions to make programs work correctly and without interruption.

III - Course Content

Preamble: Python is a high-level, easy-to-learn programming language used for applications such as web development, data analysis, automation, and AI. This course introduces students to basic programming concepts, including variables, control statements, functions, data structures, and file handling. Through practical exercises, students develop problem-solving skills and learn to write clear and efficient Python programs.

Unit – I	**DATATYPES, EXPRESSIONS, STATEMENTS**	**9 Periods**

Python Interpreter and Interactive Mode; Values and Types: Int, Float, Boolean, String and List; Variables, Expressions, Statements, Operators -Precedence of Operators, Comments. Illustrative Programs: Exchange the values of two Variables, Circulate the values of n variables, distance between two points

Unit – II	**CONTROL FLOW, FUNCTIONS, STRINGS**	**9 Periods**

Control Flow Statements- Conditional Statements- Looping Statements- Fruitful Functions: Return Values- Parameters- Local and Global Scope-Modules and Functions-Recursion; Strings: String Slices, Immutability, String Functions and Methods, String Module; Lists as Arrays. Sets -Set Operations, Classes.
Illustrative Programs: Sum an array of numbers.

Unit – III	**LISTS, TUPLES, DICTIONARIES**	**9 Periods**

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

Unit – IV	**FILES, MODULES, PACKAGES**	**9 Periods**

Files and exceptions: text files, reading and writing files, format operator; command line arguments, modules, packages: Numpy and Numpy Operations, Pandas and Pandas operations, Matplotlib: types of plots. Illustrative programs: word count, copy file. Case study: Analyze the academic performance of students and plot a graph.

Unit – V	**EXCEPTIONS**	**9 Periods**
Introduction to Errors and Exceptions-Types of Errors – Syntax Errors and Runtime Errors - Need for Exception Handling - Creating User-defined Exceptions, Built-in Exceptions - Python Standard Libraries, File and Data Handling Libraries. Case Study: Validating marks range and voter's age, Reading student data from a CSV file		

TOTAL: 45+30=75 Periods

List of Experiments:

1. Compute the GCD of two numbers.
2. Find square root of a number (the Newton's method).
3. Exponentiation (power of a number).
4. Find the maximum of a list of numbers.
5. Linear search and Binary search.
6. Selection sort, Insertion sort.
7. First n prime numbers.
8. Multiply matrices.
9. Programs that take command line arguments (word count).
10. File handling and plotting.
11. Mini Project

Text Books:	1. Eric Matthes, "Python Crash Course A Hands-On, Project - Based Introduction to Programming", No Starch Press, Inc. 2nd Edition,2019 2. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language", Pearson Education, 2nd Edition, 2018
Reference Books:	1. Mark Lutz, "Python Pocket Reference", O Reilly, Fifth Edition, 2014 2. Zed Shaw, "Learn Python the Hard Way" Addison-Wesley, 2013. 3. Martin C. Brown, "Python: The Complete Reference ",McGraw Hill,2018.
MOOC/Web Platforms:	1.Python for Everybody Specialization (by University of Michigan) → https://www.coursera.org/specializations/python 2.SWAYAM–Programming in Python (Indian MOOC) → https://onlinecourses.swayam2.ac.in/cec22_cs20/preview 3.Codecademy – https://www.codecademy.com/learn/learn-python 3Codecademy+1

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand Python data types, expressions, statements, and operators to describe the structure and execution of basic programs.	K2 (Understand)
CO2	Explain and use conditional statements, loops, functions, recursion, and string operations to build modular Python programs.	K2 (Understand)
CO3	Understand Python data structures such as lists, tuples, and dictionaries to organize and manage data.	K2 (Understand)

CO4	Apply file handling operations and Python libraries such as NumPy, Pandas, and Matplotlib to analyze and visualize data.	K3 (Apply)
CO5	Apply exception-handling techniques using built-in and user-defined exceptions to develop reliable Python applications.	K3 (Apply)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V- Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO-1	3	2	2	-	2	-	-	-	-	-	2	-	2	2
CO-2	3	3	3	2	2	-	-	-	-	-	2	3	3	2
CO-3	3	3	3	2	2	-	-	-	-	-	2	3	3	2
CO-4	3	2	2	-	3	-	-	-	-	-	2	-	2	2
CO-5	3	3	3	2	3	-	-	-	-	-	2	3	3	2

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25HS202-TAMILS AND TECHNOLOGY

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E./B.TECH. COMMON TO ALL**	II	HSMC	**1**	**0**	**0**	**1**

II - Course Objectives

1	To understand the technological knowledge of ancient Tamils in weaving, pottery, manufacturing, agriculture, irrigation, and maritime activities from the Sangam period onwards.
2	To study the evolution of Tamil architectural and design technologies, including temples, palaces, domestic structures, and Indo-Saracenic buildings across different historical periods.
3	To analyze the production technologies of the Tamils such as shipbuilding, metallurgy, coin minting, bead-making industries, and their archaeological and literary evidences.
4	To examine the agricultural, irrigation, and water-management technologies of the Tamils, along with their knowledge of animal husbandry, fisheries, pearl diving, and ocean science.
5	To explore the growth of Scientific Tamil and Computational Tamil, focusing on digital publishing, Tamil software development, online learning platforms, and electronic Tamil resources.

III - Course Content

Preamble:

The Tamil civilization has demonstrated a profound harmony between knowledge, innovation, and human progress. Rooted in a rich legacy of language, science, mathematics, medicine, architecture, and maritime trade, Tamils have long embraced technology as a means to enhance life while upholding ethical values and social responsibility. The spirit of inquiry found in classical Tamil literature reflects a culture that values learning, adaptation, and forward thinking.

Unit – I	***நெசவு மற்றும் பானைத் தொழில் நுட்பம்***	**3 Periods**
சங்ககாலத்தில் நெசவுத் தொழில்-பானைத் தொழில் நுட்பம்- கருப்பு சிவப்பு பாண்டங்கள்-பாண்டங்களில் கீறல் குறியீடுகள்		
Unit – II	***வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்***	**3 Periods**
சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் -சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்- மாமல்லபுரச் சிற்பங்களும், கோவில்களும்- சோழர்கால பெருங்கோயில்களும் மற்றும் பிற வழிபாட்டுத் தலங்கள்-நாயக்கர் காலக் கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல்,மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றம் திருமலை நாயக்கர் மஹால்-செட்டிநாட்டு வீடுகள்-பிரிட்டிஸ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.		
Unit – III	***உற்பத்தித் தொழில் நுட்பம்***	**3 Periods**
கப்பல் கட்டும் கலை-உலோகவியல்-இரும்புத் தொழிற்சாலை-இரும்பை உருக்குதல்,எஃகு-வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் அச்சடித்தல்- மணி உருவாக்கும் தொழிற்சாலைகள்-கல்மணிகல்,கண்ணாடி மணிகள்-சுடுமணிகள்-சங்கு மணிகள்-எழும்பு துண்டுகள்-தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		
Unit – IV	***வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்***	**3 Periods**
அணை,ஏரி,குளங்கள்,மதகு-சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம்-கால்நடை பராமரிப்பு-கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்தசெயல்பாடுகள்-கடல்சார் அறிவு-மீனவளம் – முத்து மற்றும் முத்துக்குளித்தல்-பெருங்கடல் குறித்த பண்டைய அறிவு-அறிவுசார் சமூகம்.		

Unit – V	அறிவியல் தமிழ் மற்றும் கணித்தமிழ்	**3 Periods**
அறிவியல் தமிழின் வளர்ச்சி-கணித்தமிழ் வளர்ச்சி-தமிழ் நூல்களை மின்பதிப்பு செய்தல்-தமிழ் மென்பொருட்கள் உருவாக்கம்-தமிழ் இணையக் கல்விக்கழகம்-தமிழ் மின் நூலகம்-இணையத்தில் தமிழ் அகராதிகள்-சொற்குவைத் திட்டம்		
		Total: 15 Periods

Text Books:	**1.தமிழக வரலாறு-மக்களும் பண்பாடும்-கே. கே.. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)** **2. கீழடி-வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு.)** **3. பொருநை- ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு.)**
Reference Books:	1. Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 2. The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies. 3. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K. D. Thirunavukkarasu),Published by: International Institute of Tamils Studies. 4. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
MOOC/Web Platforms:	https://www.tnarch.gov.in/ta/epigraphy/ https://www.tamildigitallibrary.in/admin/assets/book https://www.tamilhistory.co.in/2020/05/heroic-games-ancient-tamils-jallikattu-silambam.html https://www.tamilvu.org/ta/courses-degree-a061-a0611-html-a0611313-10334 https://tamil.samayam.com/others-news/independence-day-2016/news/freedom-fighters-of-india/articleshow/53666058.cms

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the significance of Tamil as a classical language	Apply (K1)
CO2	Relate the art and culture in Tamil language	Apply (K2)
CO3	Explain the importance of music, dance and martial arts that were derived from Tamil Culture	Apply (K2)
CO4	Understand the poetic mode or theme of classical language	Analyze (K2)
CO5	Relate the contribution of Tamils to Nation building	Analyze (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2
CO-1	-	-	-	-	-	1	1	-	-	-	1	-	-
CO-2	-	-	-	-	-	1	1	-	-	-	1	-	-
CO-3	-	-	-	-	-	1	1	-	-	-	1	-	-
CO-4	-	-	-	-	-	1	1	-	-	-	1	-	-
CO-5	-	-	-	-	-	1	1	-	-	-	1	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25HS211- ENGLISH LABORATORY II

Prerequisites	Program Name	Sem	Category	L	T	P	C
Nil	B.E./B.TECH. COMMON TO ALL	II	HSC	**0**	**0**	**2**	**1**

II - Course Objectives

1.	Develop students' ability to communicate confidently through structured speaking tasks such as self-introduction, discussions, role plays, and presentations.
2.	Strengthen oral interaction skills required in professional contexts including interviews, group discussions, telephonic conversations, and small talk.
3.	Enhance listening comprehension skills through note-taking from discussions and spoken observations.

III - Course Content

List of Experiments:

1. Speaking: Introducing Oneself- Discussion on Social Media
2. Speaking: Role Play
3. Speaking: Narrating an Incident, Discussing tourist Destinations
4. Writing: Job Application
5. Writing: Report Writing
6. Making an oral presentation
7. Listening : Taking notes From a Discussion
8. Speaking: Small Talk and Telephonic Conversation
9. Mock Interview
10. Group Discussion

Total 30 Periods

Books for study & Reference:	• Sasikumar, V, et.al. A Course in Listening & Speaking Foundation Books, 2005. • Murphy, Raymond. English Grammar in Use: A Self-Study Reference and Practice Book for Intermediate Students: with Answers. Cambridge: Cambridge University Press, 1985. • Prasad, Hari Mohan. A Handbook of Spotting Errors. Mcgraw Hill Education, 2010 • Reynolds, John. Cambridge IGCSEA, First Language English. 2018th ed., Hodder Education, 2018. • Wiggins, Grant P., and Jay McTighe. Understanding by Design. Association for Supervision and Curriculum Development, 2008.
Web Sources	• www.studyladder.com • www.fluentu.com • www.esl-lab.com

IV - Course Outcome

On completion of the course, the students will be able to	Bloom's Level Mapped

CO1	Introduce themselves clearly and participate in discussions on familiar topics such as social media and tourist destinations.	Understand (K2)
CO2	Perform effective role plays, telephonic conversations, and small-talk interactions using appropriate language and tone.	Apply (K3)
CO3	Retell incidents and make structured oral presentations with clarity and coherence.	Apply (K3)
CO4	Write job applications and reports relevant to workplace needs.	Apply (K3)
CO5	Demonstrate listening skills by taking accurate notes from discussions.	Analyse (K4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PSO-1**	**PSO-2**
CO-1	-	-	-	-	-	-	-	-	3	2	3	-	-
CO-2	-	-	-	-	-	-	-	-	3	2	3	-	-
CO-3	-	-	-	-	-	-	-	-	3	2	3	-	-
CO-4	-	-	-	-	-	-	-	-	3	2	3	-	-
CO-5	-	-	-	-	3	-	-	-	3	2	3	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25BE211 - Engineering Practices Laboratory

Prerequisites	Programme Name	Sem	Category	L	T	P	C
NIL	Common to all branches	II	ESC	0	0	4	2

II - Course Objectives

1	To provide the hands-on training for starters.
2	To gain the skills for making fitting joints and household pipe line connections using suitable tools.
3	To develop the skills for making simple electrical wiring connections using suitable tools.
4	To develop the skill for trouble shooting and maintenance of home appliances.

III - Course Content

Preamble:
This laboratory gives basic hands-on experience in mechanical, electrical, and electronic practices used in engineering.

GROUP – A (CIVIL & MECHANICAL)

PART 1	**CIVIL ENGINEERING PRACTICES**	**30 Periods**

Plumbing Work:

a. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b. Preparing plumbing line sketches.
c. Laying pipe connection to the suction side of a pump
d. Laying pipe connection to the delivery side of a pump.
e. Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

Wood Work:

a. Sawing,
b. Planing
c. Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

	MECHANICAL ENGINEERING PRACTICES	

Welding Work:

a. Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b. Practicing gas welding.

Basic Machining Work:

a. Turning.
b. Drilling.
c. Tapping.

Sheet Metal Work:

a. Making of a square tray

Foundry Work:

a. Demonstrating basic foundry operations.

GROUP – B (ELECTRICAL AND ELECTRONICS)

PART 2	**ELECTRICAL ENGINEERING PRACTICES**	**30 Periods**

a. Basic Electrical Components and Safety Devices b. Electrical Lighting Systems c. Staircase Lighting Control d. Introduction to CFL and LED lamps e. Measurement of energy using single phase energy meter. f. Motor Control and Protection using DOL Starter		
	ELECTRONIC ENGINEERING PRACTICES	
a. Study of Electronic components and equipments – Resistor, colour coding b. Soldering Practice c. PCB Assembly and Testing d. Logic gates operations AND, OR, EX-OR and NOT		
		Total: 60 Periods

IV - Course Outcome

On completion of the course, the students will be able to,		
CO1	Use basic workshop tools safely to perform fitting, carpentry, plumbing, and wiring tasks.	Apply K3
CO2	Perform simple house wiring, troubleshoot common electrical faults, and identify electrical components.	Apply K3
CO3	Demonstrate basic machining operations such as turning, drilling, and shaping.	Apply K3
CO4	Build simple electronic circuits using breadboards, devices, and measuring instruments.	Apply K3
CO5	Apply basic engineering practices to create small mechanical/electrical assemblies and solve real-time practical problems.	Apply K3

(Action verb of each CO to be matched with the next mapping table)

V - Mapping Table Mapping of COs with POs and PSOs

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	3	2	2	-	-	2	3	2	2	-	-
CO2	3	2	3	2	2	-	-	2	3	2	2	-	-
CO3	3	2	3	2	2	-	-	2	3	2	2	-	-
CO4	3	2	3	2	2	-	-	2	3	2	2	-	-
CO5	3	2	3	2	2	-	-	2	3	2	2	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

SEMESTER III

I - Course Name: 25MA302 DISCRETE MATHEMATICS

Prerequisites	Program Name	Sem	Category	L	T	P	C
NIL	**B.E / B.TECH. COMMON FOR CSE,CSE (AI &ML) , CYBS / IT AND AI&DS**	III	BSC	3	1	0	4

II - Course Objectives

1.	To extend student's logical and mathematical maturity and ability to deal with abstraction.	
2.	To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.	
3.	To understand the basic concepts of combinatorics and graph theory.	
4.	To familiarize the applications of algebraic structures.	
5.	To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.	

III - Course Content

Preamble:
This course is enabled to apply in programming languages, software development, cryptography, algorithm. The fundamentals of Machine Learning are deeply rooted in discrete mathematics. Digital image processing uses discrete mathematics to merge images or apply filters.

Unit – I	**LOGIC AND PROOFS**	**12 Periods**
Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods.		
Unit – II	**COMBINATORICS**	**12 Periods**
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.		
Unit – III	**GRAPHS**	**12 Periods**
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.		
Unit – IV	**ALGEBRAIC STRUCTURES**	**12 Periods**
Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.		
Unit – V	**LATTICES AND BOOLEAN ALGEBRA**	**12 Periods**
Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Some special lattices – Boolean algebra – Sub Boolean Algebra – Boolean Homomorphism.		

Text Books:	[1] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017. [2] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011
Reference Books:	[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013. [2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006. [3] Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

MOOC/Web Platforms:	https://www.math.cmu.edu/~mradclif/teaching/127S19/Notes/Logic%20and%20Proof.pdf https://math.libretexts.org/Bookshelves/Combinatorics_and_Discrete_Mathematics http://www.cectl.ac.in/images/pdf_docs/studymaterial/cse/s3/dcs4.pdf https://onlinecourses.nptel.ac.in/noc20_cs82/preview

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply the engineering knowledge to solve the logic of a program.	Apply (BL 3)
CO2	Understand and analyze the structures of problems on mathematical induction and counting principle.	Understand (BL 2)
CO3	Apply the fundamentals of graph theory using modern tools in computer networking to manage projects	Apply (BL 3)
CO4	Apply the notion of groups, rings and fields to design and solve the algebraic structures problems.	Apply (BL 3)
CO5	Acquire the knowledge of engineering in real life phenomena by solving Lattices and Boolean algebra	Apply (BL 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO-1	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO-2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	2	-	-	2	-	-	-	3	-	-	-	-
CO-4	-	2	2	2	-	-	-	-	-	-	-	-	-	-
CO-5	-	2	2	2	-	-	-	-	-	2	-	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I - Course Name: 25IT301-Data Structures and Algorithms

Prerequisites	Program Name	Sem	Category	L	T	P	C
-	Common to B.Tech. – IT,CSE,CSE(AI&ML)	III	PCC	3	0	2	4

II - Course Objectives

1	To understand the fundamentals of data structures and algorithm analysis.
2	To develop problem-solving skills using Python programming.
3	To implement linear and non-linear data structures efficiently.
4	To analyze and apply searching, sorting, hashing, tree and graph algorithms.
5	To design real-world applications using suitable data structures and algorithmic techniques.

III - Course Content

Preamble: Data Structures and Algorithms enables students to design efficient computational solutions by applying suitable data structures and algorithm analysis techniques.
The course emphasizes logical thinking, optimization, and practical implementation of algorithms for solving real-world computing problems.

Unit – I	**Foundations of Data Structures and Algorithm Analysis**	**9 Periods**
Introduction to Data Structures – Problem Solving using Python – Object Oriented Programming Concepts – Classes and Objects – Inheritance – Recursion – Time and Space Complexity – Asymptotic Notations – Best, Average and Worst Case Analysis – Divide and Conquer Strategy – Analysis of Recursive Algorithms.		
Unit – II	**Linear Data Structures**	**9 Periods**
Arrays and Lists – Linked Lists: Singly Linked List and Doubly Linked List – Stack ADT – Queue ADT – Circular Queue – Deque – Applications of Stack and Queue – Expression Evaluation – Queue Applications.		
Unit – III	**Searching, Sorting and Hashing**	**9 Periods**
Searching Techniques: Linear Search and Binary Search – Sorting Techniques: Selection Sort, Insertion Sort, Merge Sort and Quick Sort – Analysis of Sorting Algorithms – Hashing – Hash Functions – Collision Handling Techniques – Load Factor – Rehashing – Dictionary and Set Implementations in Python.		
Unit – IV	**Trees and Heaps**	**9 Periods**
Tree Terminologies – Binary Trees – Tree Traversals – Binary Search Trees – Operations on BST – AVL Trees – Heap Data Structure – Heap Sort – Priority Queue using Heaps – Applications of Trees and Heaps		
Unit – V	**Graphs and Algorithm Design Techniques**	**9 Periods**
Graph Terminologies – Representation of Graphs – Graph Traversals: Breadth First Search (BFS), Depth First Search (DFS) – Minimum Spanning Trees: Prim's and Kruskal's Algorithms – Dijkstra's Shortest Path Algorithm – Introduction to Greedy Method and Dynamic Programming.		
		TOTAL: 45 Periods

PRACTICAL EXERCISES:(30 Hours)

1. Implement Object Oriented Programming concepts in Python.
2. Implement recursive algorithms.
3. Implement Array, Linked List, Stack and Queue operations.
4. Implement searching algorithms.
5. Implement sorting algorithms.
6. Implement hashing techniques.
7. Implement Binary Search Tree operations.
8. Implement AVL Tree operations.
9. Implement Heap operations and Priority Queue.
10. Implement Graph Traversal algorithms.
11. Implement Dijkstra's Shortest Path Algorithm.
12. Implement Minimum Spanning Tree algorithms.
13. Mini Project using Data Structures for real-world applications.

Total Hours: 45+30 =75 Periods

Text Books:	1. Data Structures and Algorithms in Python, Wiley India Pvt. Ltd., First Edition, 2021. 2. Data Structures and Algorithms Made Easy, CareerMonk Publications, Second Edition, 2016. 3. Problem Solving with Algorithms and Data Structures Using Python, Franklin, Beedle & Associates Inc., 2011.
Reference Books:	1. Introduction to Algorithms, MIT Press, Fourth Edition, 2022. 2. The Algorithm Design Manual, Springer, Third Edition, 2020. 3. Algorithms, Addison-Wesley Professional, Fourth Edition, 2011. 4. Data Structures and Algorithms using Python, Cambridge University Press, 2023.
MOOC/Web Platforms:	1. NPTEL - Courses on Data Structures, Algorithms and Python Programming offered by IITs 2. Coursera – Software Engineering Specialization Data Structures and Algorithms Specializations from Stanford, UC San Diego and other universities. 3.GeeksforGeeks – Tutorials, coding practice and self-paced DSA courses. Udemy– Industry-oriented courses on Python, Data Structures and Coding Interviews.

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level**
CO1	Apply algorithm analysis techniques and object-oriented programming concepts for problem solving.	K3
CO2	Implement linear data structures such as arrays, linked lists, stacks and queues.	K3
CO3	Analyze and implement searching, sorting and hashing techniques efficiently.	K4
CO4	Construct and apply tree and heap data structures for computational problems.	K3
CO5	Design solutions using graph algorithms and algorithm design techniques for real-world applications.	K5

V - Mapping Table Mapping of COs with POs and PSOs

CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	2	2	-	-	-	-	1	-	3	1
CO2	3	3	2	2	2	-	-	-	1	1	-	3	2
CO3	3	3	2	2	3	-	-	-	-	1	-	3	2
CO4	3	3	3	2	3	-	-	-	1	1	-	3	2
CO5	3	3	3	3	3	-	-	-	2	2	-	3	3
AVG.	3	2.8	2.2	2.2	2.6	-	-	-	0.8	1.2	-	3	2.0

1- low, 2 - medium, 3 - high, '- "- no correlation

I- Course Name: 25CS301 Digital Principles and Computer Organization

Prerequisite	Program Name	Sem	Category	L	T	P	C
NIL	B.E.,CSE(AI&ML)	III	PCC	**3**	**0**	**2**	**4**

II - Course Objectives

1	To understand fundamentals of digital logic and Boolean algebra.
2	To design combinational and sequential circuits.
3	To learn processor organization and instruction execution.
4	To analyze memory hierarchy and I/O systems.
5	To apply concepts in real-time computing systems.

III - Course Content

Preamble: This course introduces the fundamentals of digital logic design and computer organization. It covers combinational and sequential circuits, instruction set architecture, data path and control unit design, pipelining, memory hierarchy, and I/O systems. The course enables learners to understand and design basic digital systems and analyze the internal operation of computers.		
Unit – I	**Combinational Logic**	**9 Periods**
Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers - Demultiplexers		
Unit – II	**Synchronous Sequential Logic**	**9 Periods**
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters		
Unit – III	**Computer Fundamentals**	**9 Periods**
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction		
Unit – IV	**Processor**	**9 Periods**
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards		
Unit – V	**Memory and I/O**	**9 Periods**
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA		
		Total: 45 Periods
Weightage	The **Weightage** for this integrated course is distributed as **50% for Continuous Internal Assessment** (including theory tests and lab experiments) and **50% for the Semester End Evaluation** (comprising theory and project viva-voce).	
Assessment Methodology	The **Assessment Methodology** follows a **project-centric approach** that combines scenario-based theory exams, real-time UML modeling studios, and a final deployment of an AI-assisted software prototype to validate both conceptual and practical mastery.	
Text Books	1. M. Morris Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018. 2. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020	

Reference Books	1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012. 2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016. 3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
MOOC/Web Platforms	• **NPTEL:** Digital Circuits by Prof. S. Srinivasan / Prof. Ankur Gupta. • **NPTEL:** Computer Organization and Architecture. • **Coursera:** Computer Architecture by Princeton University. • **Interactive:** Nand2Tetris (Build a Modern Computer from First Principles).

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. Verification of Boolean theorems using logic gates.

2. Design and implementation of combinational circuits using gates for arbitrary functions.

3. Implementation of 4-bit binary adder/subtractor circuits.

4. Implementation of code converters.

5. Implementation of BCD adder, encoder and decoder circuits

6. Implementation of functions using Multiplexers.

7. Implementation of the synchronous counters

8. Implementation of a Universal Shift register.

9. Simulator based study of Computer Architecture

TOTAL:45 +30=75 Periods

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply Boolean algebra to simplify logic circuits.	Apply (BL 3)
CO2	Design combinational circuits for real-world problems.	Design (BL 3)
CO3	Analyze and implement sequential circuits.	Analyze (BL 4)
CO4	Explain processor architecture and instruction execution.	Explain (BL 2)
CO5	Evaluate memory and I/O organization in computing systems.	Evaluate (BL 4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High OrderThinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	3	2
CO2	3	3	2	-	2	-	-	-	-	-	-	3	3
CO3	3	2	2	2	2	-	-	-	-	-	-	3	3
CO4	3	2	-	2	2	-	-	-	-	-	-	3	2
CO5	3	2	2	2	2	-	-	-	-	-	-	3	3
Avg.	3	2.2	1.2	1.2	2	-	-	-	-	-	-	3	2.6

Mapping: 1-Low, 2-Medium, 3-High

I- Course Name: 25CS302-Object Oriented Software Engineering

Prerequisite	Program Name	Sem	Category	L	T	P	C
NIL	B.E – CSE, CSE(AI&ML)	III	PCC	**3**	**0**	**2**	**4**

II - Course Objectives

1	To understand the software development lifecycle using Object-Oriented (OO) principles and Agile methodologies.
2	To master modeling real-world systems using UML 2.5 and modern diagramming tools.
3	To integrate AI-assisted coding (GitHub Copilot/Cursor) and LLM-based requirements engineering.
4	To design scalable architectures using Design Patterns and SOLID principles.
5	To implement continuous quality through TDD, CI/CD, and automated testing.

III - Course Content

Preamble: The Object-Oriented Software Engineering (Integrated) course focuses on architecting scalable systems by blending OOAD principles with AI-augmented Agile workflows. It empowers students to transition from basic programming to high-level system design using UML 2.5, SOLID principles, and Design Patterns. Through an integrated lab-theory approach, learners master the full lifecycle—from AI-driven requirements to automated CI/CD deployment. This R2025 framework ensures graduates are industry-ready to lead complex software projects in a rapidly evolving, cloud-native IT landscape.

Unit – I	**Agile & AI-Driven Requirements**	**9 Periods**
Software process models: Iterative, Agile (Scrum/Kanban). - **Trend:** AI-augmented requirements gathering, User Story mapping with LLMs, SRS generation using AI tools.		
Unit – II	**OO Analysis & UML Modeling**	**9 Periods**
Identifying Classes, Objects, and Relationships. UML 2.5: Use Case, Class, Interaction (Sequence/Communication), State Machine, and Activity diagrams. Case Study: Smart City/IoT Systems.		
Unit – III	**OO Design & Patterns**	**9 Periods**
Design Principles: **SOLID**, DRY, KISS. Design Patterns: Creational (Singleton, Factory), Structural (Adapter, Facade), Behavioral (Observer, Strategy). **Trend:** Microservices vs. Monoliths.		
Unit – IV	**Implementation & AI Coding**	**9 Periods**
Trend: AI-assisted development (GitHub Copilot/Tabnine). Clean Code practices, Refactoring techniques, Code Smells. Mapping Models to Code (Java/Python/TypeScript).		
Unit – V	**Testing & DevSecOps**	**9 Periods**
Testing Levels: Unit, Integration, System. Test-Driven Development (TD D). **Trend:** Automated Testing, DevSecOps integration, CI/CD pipelines (GitHub Actions/Jenkins).		
		Total: 45 Periods

Weightage	The Weightage for this integrated course is distributed as 50% for Continuous Internal Assessment (including theory tests and lab experiments) and 50% for the Semester End Evaluation (comprising theory and project viva-voce).
Assessment Methodology	The Assessment Methodology follows a project-centric approach that combines scenario-based theory exams, real-time UML modeling studios, and a final deployment of an AI-assisted software prototype to validate both conceptual and practical mastery.
Text Books	1. Roger S. Pressman, *"Software Engineering: A Practitioner's Approach"*, 10th Ed (2025). 2. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI Learning, 2018

Reference Books	1. Erich Gamma et al., "Design Patterns: Elements of Reusable OO Software", Pearson Education. 2. Robert C. Martin, "Clean Code: A Handbook of Agile Software Craftsmanship", Prentice Hall. 3. Anuradha A. Puntambekar, "Object Oriented Software Engineering", Technical Publications
MOOC/Web Platforms	• **NPTEL:** Software Engineering by Prof. Rajib Mall. • **Coursera:** IBM Full Stack Software Developer Professional Certificate. • **Interactive:** Refactoring.Guru for Design Patterns. • **Competitive/Certifications:** ✓ AWS Certified Developer – Associate. ✓ Scrum Alliance: Certified ScrumMaster (CSM).

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. AI-Augmented Requirements: Draft an SRS for a complex system using Prompt Engineering.
2. Agile Planning: Setup a GitHub Project/Jira board for Sprint Management.
3. Use Case Modeling: Create Use Case and Domain Models for a distributed system.
4. Interaction Modeling: Develop Sequence and Communication diagrams for real-time logic.
5. State/Activity Modeling: Model object lifecycles and business workflows.
6. SOLID Refactoring: Refactor legacy code to comply with SOLID principles.
7. Creational Patterns: Implement a multi-provider notification system using Factory Pattern.
8. Behavioral Patterns: Implement an Observer pattern for real-time dashboard updates.
9. TDD with AI: Write JUnit/PyTest cases before implementation using AI assistants.
10. CI/CD Pipeline: Deploy a containerized app using GitHub Actions and Docker.

TOTAL:45 +30=75 Periods

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply Agile methodologies and AI tools for requirements engineering.	Apply (BL 3)
CO2	Create comprehensive UML models for complex software systems	Creating (BL 6)
CO3	Design modular and reusable software using OO Design Patterns and SOLID principles.	Creating (BL 6)
CO4	Develop high-quality code using AI-assisted programming and refactoring	Apply (BL 3)
CO5	Execute automated testing and deploy software using CI/CD frameworks.	Analysis (BL 4)

V - Mapping Table Mapping of COs with POs and PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	1	2	1	2	2	3	3	2
CO2	3	3	3	2	3	-	1	-	1	2	1	3	2
CO3	3	3	3	3	2	1	-	-	1	1	2	3	3
CO4	3	3	3	2	3	-	1	-	2	1	1	3	3
CO5	3	2	3	3	3	1	1	1	3	2	2	2	3
Avg.	3	2.6	2.8	2.4	2.8	1	1.3	1	1.8	1.6	1.8	2.8	2.6

Mapping: 1-Low, 2-Medium, 3-High

I - Course Name: 25AD301 Python for Data Science

Prerequisite	Program Name	Sem	Category	L	T	P	C
25BE202 - Python Programming	B.E.,CSE(AI&ML)	III	PCC	3	0	2	4

II - Course Objectives

1.	To provide knowledge of statistical and mathematical foundations required for Data Science.
2.	To enable students to perform data analysis and preprocessing using Python libraries.
3.	To develop skills in handling numerical data, multidimensional arrays, and data frames.
4.	To introduce data visualization techniques for interpreting and presenting insights.
5.	To apply Python-based tools and libraries for real-world data science applications.

III - Course Content

Preamble: This course introduces the basics of Data Science using Python. It covers statistical analysis, numerical computing, data handling, and data visualization techniques. Students will learn to work with datasets using Python libraries such as NumPy, Pandas, Matplotlib, and Seaborn. The course provides practical knowledge for analyzing and visualizing real-world data.

Unit I	FOUNDATIONS OF DATA SCIENCE	9 Periods

Introduction to Data Science – Applications of Data Science – Data Science Life Cycle – Types of Data – Data Collection Methods – Data Analytics Basics – Exploratory Data Analysis (EDA) – Introduction to Data Preparation – build the models – presenting and building applications.– Case Study.

Unit II	STATISTICS FOR DATA SCIENCE	9 Periods

Introduction to Statistics – Outliers - Measures of Central Tendency (Mean, Median, Mode) – Graphical Representation of Data - Measures of Dispersion –Normal Distributions and Z- Scores - Data Visualization using Tables and Graphs – Correlation and Scatter Plots – Basics of Regression – Introduction to Probability – Random Variables – Probability Distributions (Binomial, Poisson, Normal) – Sampling Techniques – Hypothesis Testing Basics – Case Study.

Unit III	NUMERICAL COMPUTING WITH NUMPY	9 Periods

Introduction to NumPy – Creating Arrays – 1D and 2D Arrays – Array Operations – Indexing and Slicing – Searching and Sorting Arrays – Iterating Arrays – Copying and Reshaping Arrays – Mathematical Operations using NumPy – Case Study.

Unit IV	DATA MANIPULATION WITH PANDAS	9 Periods

Introduction to Pandas – Series and DataFrames – Reading CSV and Excel Files – Selecting and Filtering Data – Sorting and Grouping Data – Handling Missing Values – Data Cleaning and Transformation – Data Aggregation – Data Normalization – Basic Data Wrangling – Case Study.

Unit V	DATA VISUALIZATION	9 Periods

Introduction to Matplotlib – Basic Plots – Creating Subplots – Axes, Ticks, Labels and Legends – Saving Plots – Introduction to Seaborn – Scatter Plot – Line Plot – Bar Plot – Histogram – Box Plot – Pair Plot – Plot Styling and Customization – Basics of 3D Surface Plot – Case Study.

TOTAL: 45 Periods

PRACTICAL EXERCISE:

1. Write a Python program to perform basic data collection and data preparation.
2. Perform Exploratory Data Analysis (EDA) on a simple dataset.
3. Write a program to calculate Mean, Median, and Mode of a dataset.
4. Implement correlation and simple linear regression for a given dataset.
5. Create 1D and 2D NumPy arrays and perform basic array operations.
6. Write a program for array indexing, slicing, reshaping, and sorting using NumPy.
7. Read data from CSV and Excel files using Pandas and perform filtering operations.
8. Perform data cleaning, handling missing values, and data aggregation using Pandas.
9. Create line plot, bar plot, and histogram using Matplotlib.
10. Generate scatter plot, box plot, and pair plot using Seaborn.

TOTAL:30 Periods

TOTAL:45 + 30=75 Periods

Text Books:	1. Wes McKinney, Python for Data Analysis, 3rd Edition, O'Reilly Media, 2022. 2. Jake VanderPlas, Python Data Science Handbook, 2nd Edition, O'Reilly Media, 2023.
Reference Books:	1. Joel Grus, Data Science from Scratch, 2nd Edition, O'Reilly Media, 2019. 2. Pratap Dangeti, Statistics for Machine Learning, Packt Publishing, 2017. 3. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow, 3rd Edition, O'Reilly Media, 2022.
MOOC/ Web Platforms:	• https://nptel.ac.in/courses/106106212 • https://www.coursera.org/specializations/data-science-python

V - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Describe the fundamentals of Data Science and data analytics concepts	Understand (K2)
CO2	Apply statistical techniques for analyzing datasets	Apply (K3)
CO3	Perform numerical computing operations using NumPy arrays	Apply (K3)
CO4	Analyze and manipulate datasets using Pandas	Analyze (K4)
CO5	Create visual representations of data using Matplotlib and Seaborn	Apply (K3)

V -

Mapping Table - Mapping of COs with POs and PSOs

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

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

I – Course Name: 25HSC01 Human Values and Ethics

Prerequisites	Program Name	Sem	Category	L	T	P	C
Nil	B.E. / B.Tech Common to All	III	HSMC	2	0	0	2

II - Course Objectives

1.	To understand core democratic values and their role in citizen participation.
2.	To understand secular values and their importance in promoting acceptance and non-discrimination in a diverse society.
3.	To understand the concept of secularism in the Indian context and its role in promoting acceptance of all faiths and non-discriminatory practices.
4.	To apply ethical reasoning to social issues like gender bias, violence, and discrimination, while understanding constitutional protections and promoting inclusive practices.
5.	To understand and apply professional ethics, including integrity, respect for authority, confidentiality, and the rights of employees and employers, in the workplace.

III - Course Content

Preamble: This course aims to provide a broad understanding of the modern values and ethical principles that have evolved and are enshrined in the Constitution of India concerning the democratic, secular, and scientific aspects. The course is designed for undergraduate students so that they can study, understand, and apply these values in their day-to-day lives.		
Unit – I	**DEMOCRATIC VALUES**	**6 Periods**
Understanding Democratic values: Equality, Liberty, Fraternity, Freedom, Justice, Pluralism, Tolerance, Respect for All, Freedom of Expression, Citizen Participation in the Governance-Indian Freedom Movement.		
Unit – II	**SECULAR VALUES**	**6 Periods**
Understanding Secular values – Interpretation of secularism in the Indian context - Disassociation of state from religion – Acceptance of all faiths – Encouraging non-discriminatory practices.		
Unit – III	**SCIENTIFIC VALUES AND ETHICS**	**6 Periods**
Scientific thinking and method: Inductive and Deductive thinking, Proposing and testing Hypothesis, validating facts using an evidence-based approach. Transparency and Fairness in scientific pursuits – Scientific inventions for the betterment of society - Unfair application of scientific inventions.		
Unit – IV	**SOCIAL ETHICS**	**6 Periods**
Application of ethical reasoning to social problems – Gender bias and issues – Gender violence – Social discrimination – Constitutional protection and policies – Inclusive practices.		
Unit – V	**PROFESSIONAL ETHICS**	**6 Periods**
Plagiarism - Dishonesty - Stealing - Respect for Authority – Collective Bargaining - Confidentiality – Conflicts of Interest – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination. Values, and standards that both employees and employers - Code of ethics in the workplace.		
		Total: 30 Periods
Weightage	Continuous Internal Assessment: 40%, End Semester Examinations: 60% (Different for Theory and Lab)	
Assessment Methodology	Assessment Methodology: Quiz (20 %), Assignments (20 %), Internal Examinations (60 %)	
Text Books:	1. Reading Text: Excerpts from John Stuart Mills on Liberty. 2. Reading Text: Excerpt from Secularism in India: Concept and Practice by Ram Puniyani. 3. Reading Text: Excerpt from The Scientific Temper by Antony Michaelis R. 4. Reading Text: Excerpt from 21 Lessons for the 21st Century by Yuval Noah Harari.	

Reference Books:	1. The Nonreligious: Understanding Secular People and Societies, Luke W. Galen Oxford University Press, 2016. 2. Secularism: A Dictionary of Atheism, Bullivant, Stephen; Lee, Lois, Oxford University Press, 2016. 3. The Oxford Handbook of Secularism, John R. Shook, Oxford University Press, 2017. 4. The Civic Culture: Political Attitudes and Democracy in Five Nations by Gabriel A. Almond and Sidney Verba, Princeton University Press, 5. Research Methodology for Natural Sciences by Soumitro Banerjee, IISc Press, January 2022
MOOC/Web Platforms:	1. ww w.onlineethics.o rg 2. ww w.nspe.org 3. ww w. glo balethics.o rg 4. ww w.ethics.org

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Explain how democratic values like equality, liberty, and justice enhance governance and citizen participation.	Understand (BL 2)
CO2	Apply secular values to ensure acceptance of all faiths and non-discrimination.	Apply (BL 3)
CO3	Apply scientific thinking and methods to assess and promote transparency, fairness, and ethical use of scientific inventions for societal benefit.	Apply (BL 3)
CO4	Explain how ethical reasoning applies to social issues and constitutional protections.	Understand (BL 2)
CO5	Apply professional ethics to address issues such as honesty, confidentiality, and conflicts of interest in the workplace.	Apply (BL 3)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2
CO-1	-	-	-	-	-	1	2	3	1	2	2	-	-
CO-2	-	-	-	-	-	1	2	3	1	2	2	-	-
CO-3	-	-	-	-	-	1	2	3	1	2	2	-	-
CO-4	-	-	-	-	-	1	2	3	1	2	2	-	-
CO-5	-	-	-	-	-	1	2	3	1	2	3	-	-

Mapping: 1-Low, 2-Medium, 3-High