You Choose, We Do It

St. JOSEPH'S COLLEGE OF ENGINEERING

(An Autonomous Institution)

St. Joseph's Group of Institutions

OMR, Chennai - 119.

B.E COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

REGULATION – 2025

CHOICE BASED CREDIT SYSTEM

I - VIII SEMESTERS CURRICULAM AND SYLLABI

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I TO VIII SEMESTERS CURRICULAM AND SYLLABUS

For the candidate Admitted in the Academic Year 2025

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Technical Proficiency

To make the students possess a solid understanding of the fundamental principles and practices of cybersecurity, including knowledge of cryptography, network security, ethical hacking, and risk management.

PEO2: Computational Competency

To develop a strong sense of ethical responsibility and professional conduct, adhering to the highest standards in cybersecurity practices

PEO3: Knowledge Evolution

To develop strong problem-solving and critical thinking skills, enabling them to design, implement, and manage secure systems and networks.

PEO4: Professional and Technical Growth

To make the students recognize the importance of lifelong learning and continuous professional development in the rapidly evolving field of cybersecurity.

PEO5: Career Empowerment

To develop leadership and teamwork skills, enabling them to effectively lead and collaborate within multidisciplinary teams to achieve organizational cybersecurity goals.

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PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and

design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and The World** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, cultural, and environmental issues and the consequent responsibilities relevant to professional engineering practice. Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of, and commitment to, sustainable development and global well-being.
7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
8. **Individual and Collaborative Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
9. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
10. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
11. **Life-long learning**: Recognize the need for, and have the ability to engage in, independent and life-long learning in the broadest context of technological change, adaptability, and tech awareness.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Graduates will gain specialized knowledge and technical skills in advanced cybersecurity domains such as network defense, penetration testing, and secure software development.

PSO2: Graduates will be proficient in developing and enforcing cybersecurity policies and ensuring compliance with national and international standards and regulations.

PSO3: Graduates will be skilled in integrating cybersecurity solutions with emerging technologies such as cloud computing, Internet of Things (IoT), artificial intelligence, and blockchain

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

Abroad relation between the Programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3										
2	2		2	1	3							
3												3
4						2	3	3	2		1	
5			2	2	2	1				2	1	

MAPPING OF PROGRAM SPECIFIC OUTCOMESS WITH PROGRAMME OUTCOMES

Abroad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAM SPECIFIC OUTCOMES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	2			3				2	2		
2				3			3	3			3	
3	1		2		3	2						

Contribution 1: Reasonable

PEOs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
I														
II														
III														

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)

YEAR	SEM	COURSE TITLE	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
YEAR 1	SEM 1	Matrices and Calculus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Professional English I (Lab Integrated Course)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Applied Physics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Applied Chemistry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Problem-Solving and Programming In C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Engineering Drawing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Heritage of Tamils	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Aptitude Course-I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Physics and Chemistry Lab	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Programming in C Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SEM 2	Professional English II (Lab Integrated Course)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Linear Algebra & Number Theory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Semiconductors and Nano-Electronic Devices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Object Oriented Programming with C++	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Digital Principles & Computer Architecture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Tamils and Technology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Aptitude Course-II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Object Oriented Programming with C++ Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Digital Design Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
YEAR 2	SEM 3	Mathematics of Discrete Structures	✓	✓	✓	✓	✓	✓					✓
		Data Structures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Digital Principles & Computer Architecture	✓	✓	✓	✓							
		Database Design and Management	✓	✓	✓	✓	✓				✓	✓	✓
		Cyber Security Essentials	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

YEAR	SEM	COURSE TITLE	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
		Operating Systems (Lab Integrated)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Data Structures Laboratory	✓	✓	✓	✓	✓			✓	✓	✓	✓
		Database Design and Management Laboratory	✓	✓	✓	✓	✓				✓	✓	✓
	SEM 4	Probability Theory & Statistics	✓	✓	✓	✓	✓	✓					✓
		Design and Analysis of Algorithms	✓	✓	✓	✓	✓			✓		✓	✓
		Programming in JAVA	✓	✓	✓	✓	✓			✓	✓	✓	✓
		Computer Networks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Secure Software Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Machine Learning(Lab Integrated)	✓	✓	✓	✓	✓						✓
		Secure Software Engineering Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Programming in JAVA Laboratory	✓	✓	✓	✓	✓			✓	✓	✓	
YEAR 3	SEM 5	Theory of Computation & Compiler Design	✓	✓	✓	✓	✓				✓	✓	✓
		Principles of Ethical Hacking and Cyber Defense	✓	✓	✓	✓	✓	✓					✓
		Secure Coding	✓	✓	✓	✓	✓					✓	✓
		Distributed and Cloud Security (Lab Integrated)	✓	✓	✓	✓	✓	✓					✓
		Secure Coding Laboratory	✓	✓	✓	✓	✓						
	SEM 6	IoT Security	✓	✓	✓	✓	✓	✓					✓
		Introduction to Blockchain Technologies	✓	✓	✓	✓	✓		✓		✓	✓	✓
		Network Security and Applied Cryptography	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Web Technologies and Application Security (Lab Integrated)	✓	✓	✓	✓	✓				✓	✓	✓
		Network Security and Applied Cryptography Laboratory	✓	✓	✓	✓	✓						

YEAR	SEM	COURSE TITLE	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
YEAR 4	SEM 7	Cyber Governance, Risk & Compliance (GRC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Applied Cyber Forensics	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
		Penetration Testing and Vulnerability Assessment (Lab Integrated)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
		Professional Ethics & Human Values	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Applied Cyber Forensics Laboratory	✓	✓	✓	✓	✓	✓		✓		✓	✓
	SEM 8	Project Work – Phase -II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES (ELECTIVE COURSES)

A broad relation between the Course Outcomes and Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) are given in the following table

YEAR	SEM	COURSE TITLE	Programme Outcomes (POs)										
			1	2	3	4	5	6	7	8	9	10	11
YEAR 3	SEM V	AI for Cyber Security	✓	✓	✓	✓				✓		✓	✓
		Privacy Engineering	✓	✓	✓	✓				✓		✓	
		Recommender System	✓	✓	✓	✓	✓				✓	✓	✓
		Agentic AI	✓	✓	✓	✓	✓				✓	✓	✓
		Big Data in Cyber security	✓	✓	✓	✓	✓			✓		✓	✓
		Criminology Analytics	✓	✓	✓	✓	✓	✓				✓	
	SEM VI	Cyber Crime Investigation	✓	✓	✓	✓				✓		✓	
		Mobile Forensics and Security	✓	✓	✓	✓				✓		✓	
		Network Forensics	✓	✓	✓	✓	✓			✓		✓	✓
		Incidence response management	✓	✓	✓	✓	✓			✓		✓	✓
		Risk Assessment & Management	✓	✓	✓	✓	✓			✓		✓	✓
		Cyber Threat Intelligence	✓	✓	✓	✓						✓	
YEAR 4	SEM VII	Malware Analysis	✓	✓							✓	✓	✓
		Crypto-Economic Systems	✓	✓	✓	✓	✓					✓	
		Enterprise Security	✓	✓	✓	✓	✓			✓		✓	✓

		Cyber digital twin	✓	✓	✓	✓	✓			✓		✓	✓
		Wireless Security	✓	✓	✓	✓	✓			✓	✓		✓
		Cyber Ethix	✓	✓	✓	✓	✓					✓	
	SEM VIII	Intrusion Detection System	✓	✓	✓	✓	✓					✓	✓
		IoT Embedded Systems Development (**IoTESD)**	✓	✓	✓	✓	✓	✓					✓
		Linux System Internals	✓	✓	✓	✓	✓	✓					✓
		Cyber Physical systems	✓	✓	✓	✓	✓			✓		✓	✓
		Trusted Embedded Systems	✓	✓	✓	✓	✓			✓		✓	
		Automotive Security	✓	✓	✓	✓	✓					✓	✓
	SEM VIII	Advanced Java Programming	✓	✓	✓	✓	✓					✓	
		React Web Development	✓	✓	✓	✓	✓					✓	
		Spring API Dev	✓	✓	✓	✓	✓					✓	
		Database Tuning	✓	✓	✓	✓	✓					✓	
		Testing and Automation Tools	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Integrated DevOps Frameworks	✓	✓	✓	✓		✓					✓

SEMESTER – I

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	**MA25C01**	**Matrices & Calculus**	**ESC**	**4**	**3**	**1**	**0**	**4**
2	**EN25C01**	**Professional English I** (Lab Integrated Course)	**HSMC**	**4**	**2**	**0**	**2**	**3**
3	**PH25C01**	**Applied Physics**	**ESC**	**3**	**3**	**0**	**0**	**3**
4	**CY25C01**	**Applied Chemistry**	**ESC**	**3**	3	**0**	**0**	**3**
5	**CS25C01**	**Problem-Solving and Programming In C**	**ESC**	**3**	**3**	**0**	**0**	**3**
6	**ME25C01**	**Engineering Drawing**	**SDC**	**6**	**2**	**0**	**4**	**4**
7	**GE25C01**	**Heritage of Tamils**	**HSMC**	**1**	**1**	**0**	**0**	**1**
8	**AP25C01**	**Aptitude Course-I**	**SDC**	**1**	**0**	**1**	**0**	**0**
PRACTICAL								
9	**BS25C01**	**Physics and Chemistry Lab**	**ESC**	**3**	**0**	**0**	**3**	**1.5**
10	**CS25C02**	**Programming in C Lab**	**ESC**	**3**	**0**	**0**	**3**	**1.5**
Total				**30**	**17**	**1**	**12**	**24**

SEMESTER II

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	EN25C02	**Professional English II** (Lab Integrated Course)	HSMC	4	2	0	2	3
2	MA25C02	**Linear Algebra & Number Theory**	ESC	4	3	1	0	4
3	PH25C02	**Semiconductors and Nano-Electronic Devices**	ESC	3	3	0	0	3
4	CS25C03	**Object Oriented Programming with C++** (Common to CSE, IT, M.Tech CSE,CSBS)	PCC	3	3	0	0	3
5	IT25C01	**Information Technology Essentials**	PCC	3	3	0	0	3
6	GE25C02	**Tamils and Technology**	HSMC	1	1	0	0	1
7	AP25C01	**Aptitude Course-II**	SDC	1	0	1	0	0
PRACTICAL								
8	CS25C05	**Object Oriented Programming with C++ Laboratory** (Common to CSE,IT, M.Tech CSE, CSBS)	PCC	3	0	0	3	1.5
9	IT25C02	**Information Technology Essential Laboratory**	PCC	3	0	0	3	1.5
Total				25	15	2	8	20

SEMESTER III

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA25C06	**Mathematics of Discrete Structures** (Common to CSE, IT, ADS, AML, CSBS, M.Tech CSE)	ESC	4	3	1	0	4
2	CS25C07	**Data Structures** (Common to CSE,IT,ADS,AML, CSBS, M.Tech CSE)	PCC	3	3	0	0	3
3	IT25C03	**Digital Principles & Computer Architecture** (Common to IT)	PCC	3	3	0	0	3
4	IT25C05	**Database Design and Management** (Common to CSE,IT,ADS,AML,CSBS, M.Tech CSE)	PCC	3	3	0	0	3
5	CC25301	**Cyber Security Essentials**	PCC	3	3	0	0	3
6		**Ability Enhancement Course-I**	SDC	1	0	1	0	0
THEORY CUM PRACTICALS								
7	CS25C10	**Operating Systems** (Common to CSE,ADS,AML, CSBS, M.Tech CSE)	PCC	4	2	0	2	3
PRACTICAL								
8	CS25C11	**Data Structures Laboratory** (Common to CSE, IT,ADS,AML,CSBS, M.Tech CSE)	PCC	3	0	0	3	1.5
9	IT25C07	**Database Design and Management Laboratory** (Common to CSE,IT, ADS, AML, CSBS, M.Tech CSE)	PCC	3	0	0	3	1.5
Total				28	17	1	10	22

SEMESTER – IV

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA25C09	**Probability Theory & Statistics** (Common to CSE,IT,ADS,AML, CSBS,M.Tech CSE)	ESC	4	3	1	0	4
2	CS25C12	**Design and Analysis of Algorithms** (Common to CSE,IT,ADS,AML,CSBS, M.Tech CSE)	PCC	3	3	0	0	3
3	IT25C04	**Programming in JAVA** (Common to CSE,IT,M.Tech CSE,CSBS)	PCC	3	3	0	0	3
4	CS25C13	**Computer Networks** (Common to CSE, IT,M.Tech CSE,CSBS)	PCC	3	3	0	0	3
5	CC25401	**Secure Software Engineering**	PCC	3	3	0	0	3
6		**Ability Enhancement Course-II**	SDC	1	0	1	0	0
7		**Audit Course**	MC	2	2	0	0	0
THEORY CUM PRACTICAL								
8	CS25C20	**Machine Learning** (Common to CSE)	PCC	4	2	0	2	3
PRACTICAL								
9	CC25402	**Secure Software Engineering Laboratory**	PCC	3	0	0	3	1.5
10	IT25C06	**Programming in JAVA Laboratory** (Common to CSE,IT,M.Tech CSE, CSBS)	PCC	3	0	0	3	1.5
Total				28	17	1	8	22

SEMESTER – V

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	IT25C05	Theory of Computation & Compiler Design (Common to IT, AML)	PCC	3	3	0	0	3
2	CC25501	Principles of Ethical Hacking and Cyber Defense	PCC	3	3	0	0	3
3	CC25502	Secure Coding	PCC	3	3	0	0	3
4		Professional Elective I	PEC	3	3	0	0	3
5		Open Elective I	OEC	3	3	0	0	3
6		Ability Enhancement Course-III	SDC	1	0	1	0	0
THEORY CUM PRACTICAL								
7	CC25503	Distributed and Cloud Security	PCC	4	1	0	4	3
PRACTICAL								
8	CC25504	Secure Coding Laboratory	PCC	3	0	0	3	1.5
9		Internship	SDC		0	0	0	1
Total				24	16	0	7	20.5

COURSES FOR HONOURS DEGREE

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1		Honors Elective – I	PEC	0	0	0	0	3
2		Honors Elective – II	PEC	0	0	0	0	3

COURSES FOR MINOR DEGREE

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1		Minor Elective – I	-	-	-	-	-	-
2		Minor Elective – II	-	-	-	-	-	-

SEMESTER – VI

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CC25601	IoT Security	PCC	3	3	0	0	3
2	CS25602	Blockchain Technologies	PCC	3	3	0	0	3
3	CC25603	Network Security and Applied Cryptography	PCC	3	3	0	0	3
4		Professional Elective II	PEC	3	3	0	0	3
5		Open Elective Course II	OEC	3	3	0	0	3
7		Ability Enhancement Course-IV	SDC	1	0	1	0	0
THEORY CUM PRACTICAL								
8	CC25604	Web Technologies and Application Security	PCC	5	1	0	4	3
PRACTICAL								
9	CC25605	Network Security and Applied Cryptography Laboratory	PCC	3	0	0	3	1.5
10		Mini Project	SDC	2	0	0	2	1
Total				26	16	0	9	2
11		Value Added Course	EEC	Two Weeks				2
12		Seminar	SDC					0.5
COURSES FOR HONOURS DEGREE								
1		Honors Elective – III	PEC	0	0	0	0	3
2		Honors Elective – IV	PEC	0	0	0	0	3
COURSES FOR MINOR DEGREE								
S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1		Minor Elective – III	-	-	-	-	-	-
2		Minor Elective – IV	-	-	-	-	-	-

For Value Added Courses, the grade earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER – VII

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	**CC25701**	**Cyber Governance, Risk & Compliance (GRC)**	**PCC**	**3**	**3**	**0**	**0**	**3**
2	**CC25702**	**Applied Cyber Forensics**	**PCC**	**3**	**3**	**0**	**0**	**3**
3		**Professional Ethics & Human Values** (Common to CSE,IT,CSBS,ADS,AML, M.Tech CSE)	**HSMC**	**3**	**3**	**0**	**0**	**3**
4		**Professional Elective – III**	**PEC**	**3**	**3**	**0**	**0**	**3**
5		**Open Elective III**	**OEC**	**3**	**3**	**0**	**0**	**3**
6		**Ability Enhancement Course-V**	**SDC**	**1**	**0**	**1**	**0**	**0**
THEORY CUM PRACTICAL								
7	**CC25703**	**Penetration Testing and Vulnerability Assessment**	**PCC**	**5**	**1**	**0**	**4**	**3**
PRACTICAL								
8	**CC25704**	**Applied Cyber Forensics Laboratory**	**PCC**	**3**	**0**	**0**	**3**	**1.5**
9	**CC25705**	**Project Phase -I**	**SDC**	**2**	**0**	**0**	**2**	**1**
10		**Internship**	**SDC**					**1**
Total				**26**	**16**	**1**	**9**	**21.5**
COURSES FOR HONOURS DEGREE								
1		Honours Elective – V	PEC	0	0	0	0	3
2		Honours Elective – VI	PEC	0	0	0	0	3
COURSES FOR MINOR DEGREE								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1		Minor Elective – V	-	-	-	-	-	-
2		Minor Elective – VI	-	-	-	-	-	-

SEMESTER – VIII

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1		Professional Elective –IV	PEC	3	3	0	0	3
2		Professional Elective–V	PEC	3	3	0	0	3
PRACTICAL								
3	CC25801	Project Work – Phase -II	SDC	16	0	0	16	8
Total				22	6	0	16	14

Total Credits: 165

HONOURS DEGREE VERTICALS								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25H03**	Advanced Digital Forensics		3	3	0	0	3
2	**CC25H04**	Critical Infrastructure Security		3	3	0	0	3
3	**CC25H05**	Cloud and Mobile Security		3	3	0	0	3
4	**CC25H06**	Security Analytics and Big Data		3	3	0	0	3
5	**CC25H07**	AI-Powered Threat Intelligence		3	3	0	0	3
6	**CC25H08**	Advanced Persistent Threat (APT) Analysis		3	3	0	0	3

MINORS DEGREE VERTICALS								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25M01**	Malware Analysis		3	3	0	0	3
2	**CC25M03**	Cyber Threat Intelligence		3	3	0	0	3
3	**CC25M04**	Security tools and techniques		3	3	0	0	3
4	**CC25M05**	Intrusion Detection and Internet Security		3	3	0	0	3
5	**CC25M06**	Security and Privacy in Cloud		3	3	0	0	3
6	**CC25M08**	Risk Assessment and Management		3	3	0	0	3

HUMANITIES SCIENCE AND MANAGEMENT COURSES (HSMC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EN25C01	Professional English-I (Lab Integrated Course)	HSMC	4	2	0	2	3
2.	EN25C02	Professional English-II (Lab Integrated Course)	HSMC	4	2	0	2	3
3.	HS1310	Professional Skills Laboratory	HSMC	2	0	0	2	1
4.	GE25C01	Heritage of Tamils	HSMC	1	1	0	0	1
5.	GE25C02	Tamils and Technology	HSMC	1	1	0	0	1
6.		Professional Ethics in Engineering	HSMC	3	3	0	0	3

BASIC SCIENCE COURSES (BSC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA25C01	Calculus & Matrices	ESC	4	3	1	0	4
2.	PH25C01	Applied Physics	ESC	3	3	0	0	3
3.	CY25C01	Applied Chemistry	ESC	3	3	0	0	3
4.	BS25C01	Physics and Chemistry Laboratory	ESC	3	0	0	3	1.5
5.	MA25C02	Linear Algebra & Number Theory	ESC	4	3	1	0	4
6.	CS25C01	Problem Solving and Programming in C	ESC	3	3	0	0	3
7.	PH25C02	Semiconductors and Nano-Electronic Devices	ESC	3	3	0	0	3
8.	CS25C11	Programming in C Laboratory	ESC	3	0	0	3	1.5
9.	MA25C06	Mathematics of Discrete Structures	ESC	4	3	1	0	4
10.	MA25C09	Probability and Statistics	ESC	4	3	1	0	4

SKILL DEVELOPMENT COURSES (SDC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME25C01	Engineering Drawing	SDC	6	**2**	**0**	4	4
2.		Aptitude Enhancement Course-I	SDC	1	**0**	**1**	**0**	**0**
3.		Ability Enhancement Course II	SDC	1	**0**	**1**	**0**	**0**
4.		Ability Enhancement Course -III	SDC	1	**0**	**1**	**0**	**0**
5.		Ability Enhancement Course -IV	SDC	1	**0**	**1**	**0**	**0**
6.		Mini Project	SDC	2	**0**	**0**	**2**	**1**
7.		Internship	SDC		**0**	**0**	**0**	**1**
8.		Seminar	SDC	1	**0**	**0**	**0**	**0.5**
9.		Project Phase-I	SDC	2	**0**	**0**	**2**	**1**
10.		Project Work-Phase -II	SDC	16	**0**	**0**	**16**	**8**

PROFESSIONAL CORE COURSES (PCC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS25C02	Object Oriented Programming with C++	PCC	3	3	0	0	3
2.	IT25C01	Information Technology Essentials	PCC	3	3	0	0	3
3.	CS25C21	Object Oriented Programming with C++ Laboratory	PCC	3	0	0	3	1.5
4.	IT25C12	Information Technology Essentials Laboratory	PCC	3	0	0	3	1.5
5.	CC25301	Cyber Security Essentials	PCC	3	3	0	0	3
6.	CC25302	Secure Software Engineering	PCC	3	3	0	0	3
7.	IT25C02	Programming In JAVA	PCC	3	3	0	0	3
8.	CS25C04	Data Structures	PCC	3	3	0	0	3
9.	IT25C03	Digital Principles and Computer Architecture	PCC	3	3	0	0	3
10.	CS25C31	Data Structures Laboratory	PCC	3	0	0	3	1.5
11.	IT25C13	Programming In JAVA Laboratory	PCC	3	0	0	3	1.5
12.	CS25C09	Computer Networks	PCC	3	3	0	0	3
13.	CS25C08	Design and Analysis of Algorithms	PCC	3	3	0	0	3
14.	CS25C07	Operating System(Lab Integrated)	PCC	4	2	0	2	3
15.	IT25401	Machine Learning for Cyber (Lab Integrated)	PCC	4	2	0	2	3
16.	IT25C04	Database Design and Management	PCC	3	3	0	0	3
17.	CC25401	Secure Software Engineering	PCC	3	3	0	0	3
18.	CC25411	Secure Software Engineering Laboratory	PCC	3	0	0	3	1.5
19.	IT25C14	Database Design and Management Laboratory	PCC	3	0	0	3	1.5
20.	CC25501	Principles of Ethical Hacking and Cyber Defense	PCC	3	3	0	0	3
21.	CC25502	Secure Coding	PCC	3	3	0	0	3
22.	IT25C05	Theory of Computation & Compiler Design	PCC	3	3	0	0	3
23.	CC25503	Distributed and Cloud Security (Lab Integrated)	PCC	5	1	0	4	3

24.	CC25501	Principles of Ethical Hacking and Cyber Defense	PCC	3	3	0	0	3
25.	CC25511	Secure Coding Laboratory	PCC	3	0	0	3	1.5
26.	CC25601	IoT Security	PCC	3	3	0	0	3
27.	CS25602	Introduction to Blockchain Technologies	PCC	3	3	0	0	3
28	CC25603	Web Technologies and Application Security(Lab Integrated)	PCC	5	1	0	4	3
29.	CC25604	Network Security and Applied Cryptography	PCC	3	3	0	0	3
30	CC25611	Network Security and Applied Cryptography Laboratory	PCC	3	0	0	3	1.5
31	CC25701	Cyber Governance, Risk & Compliance (GRC)	PCC	3	3	0	0	3
32	CC25702	Applied Cyber Forensics	PCC	3	3	0	0	3
33	CC25703	Penetration Testing and Vulnerability Assessment (Lab Integrated)	PCC	5	1	0	4	**3**
34.	CC25711	Applied Cyber Forensics Laboratory	PCC	3	0	0	3	1.5

PROFESSIONAL ELECTIVE-I								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25E01**	AI for Cyber Security	PEC	3	3	0	0	3
2	**CC25E02**	Privacy Engineering	PEC	3	3	0	0	3
3	**CC25E03**	Recommender System	PEC	3	3	0	0	3
4	**CC25E04**	Agentic AI	PEC	3	3	0	0	3
5	**CC25E05**	Big Data in Cyber security	PEC	3	3	0	0	3
6	**CC25E06**	Criminology Analytics	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE-II								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25E11**	Cyber Crime Investigation	PEC	3	3	0	0	3
2	**CC25E12**	Mobile Forensics and Security	PEC	3	3	0	0	3
3	**CC25E13**	Network Forensics	PEC	3	3	0	0	3
4	**CC25E15**	Incidence response management	PEC	3	3	0	0	3
5	**CC25E16**	Risk Assessment & Management	PEC	3	3	0	0	3
6	**CC25E17**	Cyber Threat Intelligence	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE-III								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25E21**	Malware Analysis	PEC	3	3	0	0	3
2	**CC25E22**	Crypto-Economic Systems	PEC	3	3	0	0	3
3	**CC25E23**	Enterprise Security	PEC	3	3	0	0	3
4	**CC25E24**	Cyber digital twin	PEC	3	3	0	0	3
5	**CC25E25**	Wireless Security	PEC	3	3	0	0	3
6	**CC25E26**	Cyber Ethix	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE-IV								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25E31**	Intrusion Detection System	PEC	3	3	0	0	3
2	**CC25E32**	IoT Embedded Systems Development (**IoTESD)**	PEC	3	3	0	0	3
3	**CC25E33**	Linux System Internals	PEC	3	3	0	0	3
4	**CC25E34**	Cyber Physical systems	PEC	3	3	0	0	3
5	**CC25E35**	Trusted Embedded Systems	PEC	3	3	0	0	3
6	**CC25E36**	Automotive Security	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE-V								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	**CC25E41**	Advanced Java Programming	PEC	3	3	0	0	3
2	**CC25E42**	React Web Development	PEC	3	3	0	0	3
3	**CC25E43**	Spring API Dev	PEC	3	3	0	0	3
4	**CC25E44**	Database Tuning	PEC	3	3	0	0	3
5	**CC25E45**	Testing and Automation Tools	PEC	3	3	0	0	3
6	**CC25E46**	Integrated DevOps	PEC	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

VALUE ADDED COURSES								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	VAC001	Industrial Internet of Things		4	0	0	4	2
2	VAC002	Augmented Reality and Virtual Reality		4	0	0	4	2
3	VAC003	Applied Machine Learning with Python		4	0	0	4	2

AUDIT COURSES (AC)

Sl. No.	Course Code	Subject Name	Category	Contact Periods	L	T	P	C
1	CY25C02	Environmental Science and Engineering	AC	2	2	0	0	0

* Registration for any of these courses is optional to students

CREDIT SUMMARY

	I	II	III	IV	V	VI	VII	VIII	Total	PERCENTAGE OF CREDIT
HSMC	4	4					3		11	6.66
BSC										
ESC	16	7	4	4					31	18.78
PCC		9	18	18	13.5	13.5	10.5		82.5	50
PEC					3	3	3	6	15	9.09
OEC					3	3	3		9	5.45
AC										
SDC	4	0			1	1.5	2	8	16.5	10
EEC						2	2		04	2.42
Total	24	20	22	22	20.5	21	21.5	14	165	100

Board Chairman	Dr. A. Chandrasekar	
Dean Academics	Dr. G. Sreekumar	
Principal	Dr. Vaddi Seshagiri Rao	

SEMESTER-I

EN25C01	**PROFESSIONAL ENGLISH I (Lab Integrated)**	**L**	**T**	**P**	**C**
	(Common to All Branches & M. Tech (CSE))	2	0	2	3

OBJECTIVES

- To improve the communicative competence of learners
- To learn to use basic grammatic structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals. rewrite it and rephrase it.

UNIT - I **SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS** **9**

Listening - Listening to people talk about their past, Listening to a description of a transportation system, Listening to people talk about capsule hotels, Listening to descriptions of foods

Speaking - Introducing yourself; talking about yourself; exchanging personal information; remembering your childhood; asking about someone's childhood, Talking about transportation and transportation problems; evaluating city services; asking for and giving information, Describing positive and negative features; making comparisons; talking about lifestyle changes; expressing wishes, Talking about food; expressing likes and dislikes; describing a favourite snack; giving step-by-step instructions

Writing / Reading - Writing a paragraph about your childhood, Reading about the life of a Mexican painter, Writing an online post on a community message board about a local issue, Reading about the happiest cities in the world, Writing an email comparing two living spaces, Reading about living without money, Writing a recipe, Reading about the history of pizza. **CO1**

Grammar - Past tense; used to for habitual actions, Expressions of quantity with count and non-count nouns: too many, too much, fewer, less, more, not enough; indirect questions from Wh-questions, Evaluations and comparisons with adjectives: not . . . enough, too, (not) as . . . as; evaluations and comparisons with nouns: not enough . . . , too much/many . . . , (not) as much/many . . . as; wish, Simple past vs. present perfect; sequence adverbs: first, then, next, after that, finally

UNIT - II **GENERAL READING AND FREE WRITING** **9**

Listening - Listening to travel advice, Listening to the results of a survey about family life, Listening to a radio program; listening to people give suggestions for using technology, Listening to a description of Carnival in Brazil

Speaking - Describing vacation plans; giving travel advice; planning a vacation, Making requests; agreeing to and refusing requests; complaining; apologizing; giving excuses, Describing technology; giving instructions; giving suggestions, Describing holidays, festivals, customs, and special events

Writing/ Reading - Writing an email with travel suggestions, Reading about unusual vacations, Writing a message making a request, Reading about unusual hotel requests, Writing a message asking for specific favors, Reading about the sharing, Writing an entry on a travel website about a cultural custom, Reading about interesting New Year's customs

Grammar - Future with be going to and will; modals for necessity and suggestion: must, need to, (don't) have to, ought to, -'d better, should (not), Two-part verbs; will for responding to requests; requests with modals and Would you mind . . . ?, Infinitives and gerunds for uses and purposes; imperatives and infinitives for giving suggestions, Relative clauses of time; adverbial clauses of time: when, after, before **CO2**

UNIT -III GRAMMAR AND LANGUAGE DEVELOPMENT 9

Listening – Listening to people talk about changes, Listening to people talk about their job preferences, Listening to descriptions of monuments; listening for information about a country, Listening to stories about unexpected experiences

Speaking - Talking about change; comparing time periods; describing possible consequences, Describing abilities and skills; talking about job preferences; describing personality traits, Talking about landmarks and monuments; describing countries; discussing facts, Describing recent past events and experiences; discussing someone's activities lately

Writing / Reading - Writing a paragraph describing a person's past, present, and possible future, Reading about a town's attempt to attract new residents, Writing a an online cover letter for a job application, Reading about understanding cultural differences in an international company, Writing an introduction to an online city guide, Reading about unusual museums, Writing a description of a recent experience, **CO3**

Reading about an unusual rock band

Grammar - Time contrasts; conditional sentences with if clauses, Gerunds; short responses; clauses with because, Passive with by (simple past); passive without by (simple present), Past continuous vs. simple past; present perfect continuous

UNIT -IV READING AND LANGUAGE DEVELOPMENT 9

Listening - Listening for opinions; listening to a movie review, Listening to people talk about the meaning of signs, Listening to people talk about predicaments; listening to a call-in radio show, Listening for excuses

Speaking - Describing movies and books; talking about actors and actresses; asking for and giving reactions and opinions, Interpreting body language; explaining gestures and meanings; describing acceptable and prohibited behavior in different situations; asking about signs and their meaning, Speculating about past and future events; describing a predicament; giving advice and suggestions, Reporting what people said; making polite requests; making invitations and excuses **CO4**

Writing / Reading - Writing a movie review, Reading about unpleasant experiences actors put themselves through, Writing a list of rules, Reading about idioms and their meaning, Writing a blog post asking for advice, Reading an online, Writing a report about people's responses to a survey, Reading about taking a sick day advice forum

Grammar - Participles as adjectives; relative pronouns for people and things, Modals and adverbs: might, may, could, must, maybe, perhaps, probably, definitely; permission, obligation, and prohibition, Unreal conditional sentences with if clauses; past modals, Reported speech: requests and statements.

UNIT - V Extended Skill Practice **9**

Listening practice through worksheets (with audio – in class)
Grammar practice through worksheets*
Vocabulary practice through worksheets*
Writing practice through worksheets, Speaking Skill Practice (in class) **CO5**
10-minute conversation practice sessions (with guidance from Placement Test)

Total Periods: 60

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1 To use appropriate words in a professional context.
CO2 To gain understanding of basic grammatical structures and use them in right context
CO3 To read and infer the denotative and connotative meanings of technical texts
CO4 To write definitions, descriptions, narrations and essays on various topics
CO5 To Identify topics and formulate questions for productive inquiry

Text Books:

1. Interchange Level 2 - 5th edition published by Cambridge University Press & Assessment
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

Reference Books:

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd
3. English for Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	-	-	-	-	-	-	-	2	1	1	1
CO2	-	-	-	-	-	-	-	1	2	1	1
CO3	-	-	-	-	1	-	-	1	1	2	1
CO4	-	-	-	-	-	-	-	1	1	1	2
CO5	-	-	-	-	-	1	-	1	1	1	1

Lab Component

Getting started: Talk about communication
Listening - Three monologues: Online friendships; At the flower shop; Conversation: learning vocabulary
Speaking - Things you have done recently, learning a foreign language; Giving and responding to opinions; Ways of learning vocabulary
Reading - Article: *But are they real friends?;* Article: *Can you really learn a language in 22 hours?* Article: *What kind of learner are you?*
Writing - A guide; Introducing a purpose; Referring pronouns
Grammar - Subject and object questions; Present simple and present continuous
Vocabulary - Gradable and extreme adjectives
Pronunciation - Word stress: extreme adjectives; Word groups
Everyday English - Giving and responding to opinions.
Getting started - Talk about relationships
Listening - Two monologues: being a twin, a mistake; Conversation: great-grandparents
Speaking - The story of a friendship; Family traditions; Reacting to what people say; Telling a story; A member of your family
Reading - Article: 60 years and 1,000 miles: How a word game brought two unlikely people together; Article: Twin tales*;* An email about how great-grandparents met
Writing - A biography; Describing time
Grammar - Narrative tenses; *used to, usually*
Vocabulary – Relationships. Multi-word verbs
Pronunciation - Linking sounds, Sentence stress: multi-word verbs, Stress in word groups
Everyday English - Telling a story
Getting started - Talk about endangered animals
Listening - Conversation: an environmental project; Interview: inventions inspired by nature; Talking about possible jobs; Monologue: rescuing
whales
Speaking - Predictions about the future; The best place to experience natural beauty; Giving reasons, results and examples; Giving yourself
time to think; A quiz about whales
Reading - Web page: The Whitley Fund for Nature; Article: Animals have adapted to survive everywhere; An essay about water pollution
Writing - A discussion essay; Organising an essay; Signposting language
Grammar - Future forms; Zero and first conditionals
Vocabulary – Environmental issues; The natural world
Pronunciation - Sound and spelling: a; Consonant clusters; Voiced and unvoiced consonants
Everyday English - Giving reasons, results and examples
Getting started: Talk about ideal houses
Listening - Four monologues: describing buildings; Conversation: comparing life in a town and a city; Visiting a friend's family; Conversation: a holiday in Florida
Speaking - Describing buildings; Talking about where you live; Making offers and requests and asking for permission; Imagining people's
feelings; A recent holiday
Reading - Web page: A more personal place to stay; Web page: Five reasons why small towns are better than cities; Article: Top five things to
do … in and around Miami, Florida; A note

Writing - A note with useful information; Offering choices
Grammar - Modals of deduction; Quantifiers
Vocabulary – Buildings; Verbs and prepositions
Pronunciation - Modal verbs; Sentence stress: verbs and prepositions; Sounding polite
Everyday English - Making offers and requests and asking for permission

TOTAL PERIODS : 15

MA25C01 **MATRICES AND CALCULUS**

(Common to All Branches & M. Tech (CSE)) 3 0 1 4

OBJECTIVES

- The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus.
- The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions.
- Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering.
- This course is designed to cover topics such as ordinary differential equations which plays an important role in the understanding of science and engineering

UNIT I MATRICES **9+3**

Characteristic equation –Eigenvalues and Eigenvectors of a real matrix- Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms **CO1**

UNIT II CALCULUS OF ONE VARIABLE **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules – Interval of increasing and decreasing functions – Maxima and Minima - Intervals of concavity and convexity. **CO2**

UNIT III CALCULUS OF SEVERAL VARIABLES **9+3**

Partial differentiation – Homogeneous functions and Euler‘s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor‘s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange‘s method of undetermined multipliers. **CO3**

UNIT IV MULTIPLE INTEGRALS **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Change of variables from Cartesian to polar in double integrals-Triple integrals – Volume of solids **CO4**

UNIT V ORDINARY DIFFERENTIAL EQUATIONS **9+3**

Higher order linear differential equations with constant coefficients - Method of variation of parameters– Homogenous equation of Euler‘s and Legendre‘s type - System of simultaneous linear differential equation with constant co-efficient. **CO5**

TOTAL : 60 PERIODS

TEXT BOOKS

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 45th Edition, 2024.
2. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 7th Edition, New Delhi,2015

REFERENCE BOOKS

1. Erwin Kreyszig "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015.
2. Greenberg M.D., “Advanced Engineering Mathematics”, Pearson Education2nd Edition, 5th Reprint, Delhi, 2009.
3. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”,Narosa Publications, 5 th Edition, New Delhi, 2017.
4. Narayanan S. and Manicavachagom Pillai T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, 7 th Edition, New Delhi , 2012.
6. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

7. T. Veerarajan. Engineering Mathematics – I, McGraw Hill Education; First edition 2017.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Have a clear idea of matrix algebra pertaining to Eigenvalues and Eigenvectors in addition to dealing with quadratic forms.

CO2 Understand the concept of limit of a function, continuity and derivative of a given function and apply differentiation to solve maxima and minima problems.

CO3 Have the idea of extension of a function of one variable to several variables. Multivariable functions of real variables are inevitable in engineering.

CO4 Do double and triple integration so that they can handle integrals of higher order which are applied in engineering field.

CO5 Master the techniques of solving ordinary differential equations that arises in most of the engineering problems

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1 To apply accurate grammatical structures and topic-specific vocabulary to formulate clear opinions, narrate stories, and describe personal experiences in spoken and written communication.

CO2 To analyze and interpret a variety of texts by inferring meaning, identifying arguments, and evaluating the writer's purpose.

CO3 To compose well-structured written texts, including biographies, discussion essays, and guides, using appropriate signposting language and organizational techniques to enhance clarity and coherence.

CO4 To demonstrate effective and appropriate spoken communication in everyday contexts by actively listening, responding, telling stories, and exchanging opinions with clarity and politeness

CO5 To evaluate real-world scenarios by applying conditional structures and modal verbs to discuss possibilities, make deductions, and present reasoned arguments.

Mapping of COs with POs

COS	PROGRAM OUTCOMES (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	1	1	1	-	2	1	1	1	1
CO2	2	1	1	1	1	-	2	1	1	1	1
CO3	2	2	2	1	1	-	2	1	1	1	1
CO4	2	2	1	1	1	-	2	1	1	1	1
CO5	1	1	2	1	1	-	2	1	1	1	1

Mapping of COs with POs

COS	PROGRAM OUTCOMES (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	1	2	3	0	3	2	3	3
CO2	3	3	3	2	2	1	0	0	0	1	2
CO3	3	3	3	2	2	1	0	0	0	1	2
CO4	3	3	3	2	1	1	0	0	0	1	2
CO5	3	3	3	3	1	1	0	0	0	1	2

PH25C01	APPLIED PHYSICS	L	P	T	C
	(Common to All Branches & M. Tech (CSE))	3	0	0	3

OBJECTIVES

- To enable the students to gain knowledge of the Principles of LASER, Nonlinear optics, and their various technological applications.
- To effectively help the students, achieve an understanding of Fiber optics, remote sensing, and their applications in various fields.
- Equipping the students to successfully understand the importance of quantum physics
- Understanding crystal structure: Learn about crystal lattices, unit cells, and the structure of crystals.
- Analyzing the importance of various instrumentation techniques for material analysis.

UNIT I LASER AND NONLINEAR OPTICS **9**

Introduction to LASER - Stimulated Absorption, Spontaneous and Stimulated emission- Conditions for laser- Einstein's A & B coefficients -Types of Lasers: Nd-YAG Laser, Semiconductor laser – Applications: Defence and Biomedical, AI in photonics. Nonlinear Optics: Nonlinear optical phenomena - Nonlinear optical materials – Applications: Frequency doubling and mixing - Second Harmonic Generation (SHG) Optical Parametric Amplification - Optical Parametric Generation (OPG) - Optical Parametric Oscillators (OPO) – Construction and working. **CO1**

UNIT II FIBER OPTICS AND REMOTE SENSING **9**

Introduction – Principle - Light propagation through fibre - Numerical Aperture - Acceptance angle - Modes and configuration – Losses – Applications - Communication system with block diagram – Endoscopy - Remote sensing - Active and Passive Remote sensing- Components of remote sensing – RADAR – Block diagram - Transmission lines and Waveguides - Cell phone reception. **CO2**

UNIT III QUANTUM MECHANICS **9**

Introduction to blackbody radiation – Wien's law - Rayleigh Jeans's law - Planck's radiation law - Scattering of radiation as particles - Compton Effect theory and experimental verification. Wave-particle dualism – de-Broglie hypothesis – Heisenberg uncertainty principle (Qualitative) - Concept of the wave function and its physical significance - Schrodinger's wave equation: time-independent and time-dependent equations - Application of Schrodinger's wave equation: Particle in a one-dimensional rigid box – Tunnelling (Qualitative). **CO3**

UNIT IV SOLID STATE PHYSICS AND NON-DESTRUCTIVE TESTING **9**

Introduction – Elasticity – Stress strain curve – Bending moment – Modulus of elasticity by uniform bending - Classification ~~o~~f solids – Space lattice – Basis and Unit cell – primitive and nonprimitive unit cell – Lattice parameter - Seven crystal systems - Bravais lattices – structural study of different crystals (Qualitative) – Crystal growth techniques: Bridgman and Czochralski techniques. Ultrasonics – Production - Magnetostriction and Piezoelectric methods –Non-Destructive Testing (NDT) – Liquid penetrant method – Ultrasonic testing – Ultrasonic flaw detector - Principle, Transducers, transmission and pulse echo method, data representation A Scan, B scan and C scan. **CO4**

UNIT V INSTRUMENTATION FOR MATERIAL ANALYSIS **9**

Introduction to materials and Techniques – Bragg's law – X ray diffraction: Rotating crystal method – Powder method – AI based structural determination - Optical and Electron Microscopes - Scanning Electron Microscope – Transmission Electron Microscope - Spectroscopy: UV-VIS, Fourier transform infrared spectroscopy, Electrical Impedance spectroscopy, Scanning Capacitance Spectroscopy. **CO5**

TOTAL: 45 PERIODS

TEXTBOOKS

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2019.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2017.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2019

REFERENCE BOOKS

1. Thyagarajan, K and Ghatak, A., "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019.
2. David J. Griffiths, Darrell F. Schroeter "Introduction to Quantum Mechanics" 2019.
3. Elmer A. Rosauer "Instruments for Materials Analysis" 1981.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 To gain knowledge of the Principles of LASER, Nonlinear optics, and their various applications
CO2 Understanding Fiber optics, remote sensing, and their applications in various fields.
CO3 Equipping the students to understand the importance of quantum physics.
CO4 Understand the properties of solids, and the relationship between structure and properties.
CO5 Analysing the importance of various instrumentation techniques for material analysis.

CY25C01	APPLIED CHEMISTRY	L	P	T	C
	(Common to All Branches & M. Tech (CSE))	3	0	0	3

OBJECTIVES

- To develop a foundational understanding of types, properties and applications of batteries and renewable energy sources.
- To acquire knowledge about synthesis and uses of nano materials, principles, and applications of electrochemistry.
- To get awareness about water quality parameters and its treatment process.
- To equip students with a comprehensive understanding of significance and merits of phase diagrams and various industrial polymers and composites.
- To evaluate and analyse the vital role of computational chemistry and AI in various industrial domains.

UNIT I CHEMISTRY IN ENERGY **9**

Introduction – Batteries – Classification – Primary batteries – Alkaline battery, Secondary batteries – Lead-acid battery, Nickel-cadmium battery and Lithium battery; Renewable energy sources – Solar energy – Principle, working and applications of solar cell, Wind energy; Fuel cell – Hydrogen Oxygen fuel cell, Microbial fuel cell; Super capacitors – Storage principle, types and examples; EDLC and its applications; Electric vehicles – working principle. **CO1**

UNIT II NANO MATERIALS & ELECTROCHEMISTRY **9**

Nano Materials: Introduction – Types – Nanoparticles, Nanoclusters, Nanowires, Nanotubes; Preparation of nanomaterials – Chemical vapour deposition, sol-gel, electro spinning; Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis. **CO2**

Electrochemistry: Introduction – electrochemical cell – electrode potential – electrochemical series and its significance; Nernst equation – applications; Potentiometric titration (redox titrations) – Conductometric titration (Strong acid Vs Strong base) – Principle, applications.

UNIT III WATER PURIFICATION TECHNIQUES **9**

Hardness of water – Types – Expression of hardness; Estimation of hardness by EDTA method – Numerical problems on EDTA method; Boiler trouble (scale & sludge); Treatment of boiler feed water – Internal treatment (carbonate, phosphate, colloidal, sodium aluminate and calgon conditioning) – External treatment (Ion exchange process, Zeolite process); Desalination of brackish water by Reverse Osmosis; Municipal water treatment – Primary treatment and disinfection (UV, Ozonation, Breakpoint chlorination). **CO3**

UNIT IV PHASE RULE AND POLYMER COMPOSITES **9**

Phase rule - Introduction, Definition of terms with examples; One component system – Water system; Construction of simple eutectic phase diagram – Reduced Phase rule –Two component system – Lead-Silver system – Pattinson Process.

Polymer composites: Introduction – classification – Thermoplastics, Thermosetting plastics; Preparation, properties, and uses of Engineering plastics (Nylon-6,6, PVC, Teflon, Bakelite); Definition and need for composites; Properties and applications of Metal and ceramic matrix composites; Fiber reinforced polymers. **CO4**

UNIT V COMPUTATIONAL CHEMISTRY **9**

Introduction to Computational Chemistry; Cheminformatics – Definition, Scope and Significance; Applications in the industrial sector – Carbon foot print measurements - Data analysis and Interpretation; Applications of Artificial Intelligence (AI) in various fields of chemistry – agriculture, medicine, dyes, petrochemicals, water treatment, nanomaterials, pollution abatement. **CO5**

TOTAL : 45 PERIODS

TEXT BOOKS

1. P.C.Jain, Monica Jain, "Engineering Chemistry" 17th Ed., Dhanpat Rai Pub. Co., New Delhi, (2018).
2. S.S. Dara, S.S. Umare, "A text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2020).
3. P. Kannan, A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company (P) Ltd., Chennai, (2009).
4. Sivasankar B, "Engineering Chemistry", Tata McGraw-Hill publishing company Ltd, New Delhi, (2008)
5. A.Sheik Mideen, Engineering Chemistry, 1st Revised Edition, Airwalk Publications, 2023.

REFERENCE BOOKS

1. O. G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition (2017).
2. B. S. Murty, P. Shankar. Baldev Raj, B. B. Rath and James Murday, "Text book of Nanosciene and Nanotechnology" Universities Press-IIM Series in Metallurgy and Materials science, (2018).
3. Dr. Shikha Gulati, Application of Artificial Intelligence in Wastewater Treatment, Springer, (2024)
4. Andrew R. Leach, V.J. Gillet, An Introduction to Chemoinformatics, Springer, (2007).

COURSE OUTCOMES:

On completion of this course work, students will be able to:

CO1 Understand the principles and applications of batteries and fuel cells.

CO2 Comprehend the contemporary applications of nano materials and the concepts of electrochemistry
CO3 Appreciate the significance of water quality parameters and carry out various treatment processes.
CO4 Apply the phase rule for one, two component systems and get an in-depth idea on the industrial significance of polymers and composites.
CO5 Acquire the complete knowledge on the practical applications of cheminformatics and Artificial Intelligence in the domains of Chemistry.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	2	3	3	2	2	2	2	2	2	3
CO2	3	2	3	2	2	2	2	2	3	3	2
CO3	3	3	3	3	3	3	2	2	2	2	3
CO4	3	3	3	3	2	3	2	2	2	2	2
CO5	3	3	3	3	3	3	3	2	2	3	3

CS25C01 PROBLEM SOLVING AND PROGRAMMING IN C

L	**T**	**P**	**C**
3	0	0	3

OBJECTIVES

- To understand problem solving and learn the basics of C programming and control statements.
- To understand loop control and how to use arrays and strings.
- To explore functions, recursion, and pointers in C.
- To study structures, unions, and data management.
- To learn how to use macros and work with files in C.

UNIT I	**PROBLEM SOLVING AND BASICS OF C PROGRAMMING**	**9**
Introduction to Algorithms- Building blocks of algorithms - Algorithmic problem-solving steps - Simple Strategies and notation for developing algorithms - Control flow, Flow charts, Pseudo codes, Programming languages - Introduction to programming paradigms –- Structure of C program - C programming: Data Types - Constants - Keywords - Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements - Decision making statements - Switch statement.		**CO1**
UNIT II	**LOOP CONTROL STATEMENTS AND ARRAYS**	**9**
Iteration statements: For, while, Do-while statements, nested loops, break & continue statements - Introduction to Arrays: Declaration, Initialization - One-dimensional array - Two-dimensional arrays – Searching and sorting in Arrays – Strings – string handling functions - array of strings.		**CO2**
UNIT III	**FUNCTIONS AND POINTERS**	**9**
Modular programming - Function prototype - function definition - function call - Built-in functions – Recursion – Recursive functions - Pointers - Pointer increment - Pointer arithmetic - Parameter passing - Pass by value - Pass by reference - pointer and arrays - dynamic memory allocation with malloc/calloc.		**CO3**
UNIT IV	**STRUCTURES AND UNION**	**9**
Storage class - Structure and union - Features of structures - Declaration and initialization of structures – Self-referential structure - Array of structures - Pointer to structure - Structure and functions – Typedef - Bit fields - Enumerated data types - Union.		**CO4**
UNIT V	**MACROS AND FILE PROCESSING**	**9**
Preprocessor directives – Simple and Conditional macros with and without parameters - Files - Types of file processing: Sequential and Random access – File operations – read, write & seek – Command Line Arguments.		**CO5**

TOTAL : 45 PERIODS

TEXT BOOKS

1. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.

REFERENCE BOOKS

1. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
2. Ashok N Kamthane, Programming in C, Pearson, Third Edition, 2020
3. Reema Thareja, Programming in C, Oxford University Press, Third Edition, 2023.
4. Paul Deitel and Harvey Deitel, How to Program, Ninth edition, Pearson Publication 2022.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C"' McGraw-Hill Education, 1996.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Develop algorithmic solutions to simple computational problems and write C programs using basic constructs.

CO2 Design searching and sorting algorithms using arrays and strings.

CO3 Implement modular applications using Functions and pointers.
CO4 Develop and execute applications using structures and Unions.
CO5 Solve real world problem using files.

MAPPING OF COs WITH POs											
COs	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	1	1	1	1	1	-	-	-	-	-	1
CO2	2	1	1	1	2	1	-	-	-	-	2
CO3	1	1	1	1	2	-	-	-	-	-	1
CO4	1	2	1	1	1	1	-	-	-	-	2
CO5	2	2	1	1	1	-	-	-	-	-	1

ME25C01 ENGINEERING DRAWING L T P C

(Common to All Branches & M. Tech (CSE)) 2 0 4 4

OBJECTIVES

- To develop students graphic skills for communication of concepts, ideas and design of engineering products.
- To inculcate drawing practice in standardized form whenever technical drawing is needed.
- To expose them existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) **1**

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning.

UNIT - I PLANE CURVES AND FREEHAND SKETCHING **7 + 12**

Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid, epicycloids and hypocycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves.

Visualization concepts and free hand sketching: Visualization principles -Representation of three-dimensional objects - Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT - II PROJECTION OF POINTS, LINES AND PLANE SURFACE **6 + 12**

Orthographic projection - principles - Principal planes - First angle projection - projection of points. Projection of straight lines (only first angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT - III PROJECTION OF SOLIDS 5 + 12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT - IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5 + 12

Sectioning of simple solids like prisms, pyramids, cylinder, and cone in a simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other - obtaining true shape of section.
Development of lateral surfaces of simple and sectioned solids - Prisms, pyramids cylinders and cones - Graphically finding the shortest distance connecting two points.

UNIT - V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6 + 12

Principles of isometric projection - isometric scale - Isometric projections and isometric views of simple solids and truncated solids - Prisms, pyramids, cylinders, cones.
Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method

Total Periods: 90

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1	Understand the fundamentals and standards of Engineering graphics.
CO2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.
CO3	Understand the concept of orthographic projections of lines and plane surfaces.
CO4	Draw projections of the section of solids and development of surfaces.
CO5	Visualize and to project isometric and perspective sections of simple solids.

Text Books:

1. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, Twenty ninth edition 2017
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2011.
3. S. Ramachandran and K. Pandian, “Engineering Graphics” Airwalk Publications; 8th edition 2014

Reference Books:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2018.
3. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2018.
4. Luzzader, Warren. J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
6. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Mapping of COs with POs											
COS	PROGRAM OUTCOMES (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	1	0	3	3	2	3
CO2	3	1	2	2	1	1	0	3	3	2	3
CO3	3	1	1	3	1	1	0	3	3	2	3
CO4	3	1	1	3	1	1	0	3	3	2	3
CO5	3	1	2	3	1	1	0	3	3	2	3

GE25C01 **தமிழர் மரபு** L T P C

(Common to All Branches & M. Tech (CSE)) 1 0 0 1

அலகு 1 மொழி மற்றும் இலக்கியங்கள் 3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்வியலக்கியங்கள்- சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிற்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண, பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. **CO1**

அலகு 2 மரபு - பாறை ஓவியங்கள் முதல் தவீன ஓவியங்கள் வரை – சிற்பக்கலை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள் - மிருதங்கம், பறை, நாதஸ்வரம் - தமிழர்களின் சமூக, பொருளாதார வாழ்வில் கோவில்களின் பங்கு. **CO2**

அலகு 3 நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியாகூத்து, ஒயிலாட்டம், தோல் பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள் **CO3**

அலகு 4 தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு- சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும். கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி. **CO4**

அலகு 5 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம்- சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு. **CO5**

TOTAL 15

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் – டாக்டர் கே.கே. பிள்ளை. (வெளியீடு தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. தபொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 பழந்தமிழ் இலகியங்களின் சிறப்பு, இந்திய மொழிக்குடும்பங்களின் வரலாறு ஆகியவற்றை மாணவர்கள் அறிதல்.

CO2 நடுகல் முதல் நவீன ஓவியங்கள் மற்றும் இசைக்கருவிகளின் சிறப்பை உணர்தல்,.

CO3 நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகளின் வரலாறு ஆகியவற்றை தெரிந்து கொள்ளுதல்.

CO4 பழந்தமிழரின் திணைக்கோட்பாடு, எழுத்தறிவு மற்றும் கல்வி அறிவு முதலானவற்றின் சிறப்பை உணர்தல்.

CO5 இந்திய விடுதைப்போரில் தமிழர்களின் பங்கு மற்றும் சுயமரியாதை இயக்க சிந்தனைகள் குறித்தும் மாணவர்கள் தெரிந்து கொள்ளுதல்.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-		3	-	-	-

GE25C01	**HERITAGE OF TAMILS**	L	T	P	C
	(Common to All Branches & M.Tech (CSE))	1	0	0	1

UNIT 1 LANGUAGE AND LITERATURE **3**

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan. **CO1**

UNIT 2 HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils. **CO2**

UNIT 3 FOLK AND MARTIAL ARTS **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils. **CO3**

UNIT 4 THINAI CONCEPT OF TAMILS **3**

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. **CO4**

UNIT 5 CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE **3**

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. **CO5**

TOTAL 15

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் – டாக்டர் கே.கே. பிள்ளை. (வெளியீடு தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
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12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Students will learn about the special features of ancient Tamil literature and the history of Indian language families.

CO2 Realizing the splendor of paintings and musical instruments from the Hero Stone to modern times.

CO3 Learn about the history of folk arts and martial arts.

CO4 Realizing the importance of the ancient Tamils & thinai concept, philosophy of religion, educational knowledge, literacy, etc..

CO5 To make students aware of the role of Tamils in the Indian freedom struggle and the ideas of the self-respect movement..

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-		3	-	-	-

BS25C01 PHYSICS AND CHEMISTRY LABORATORY **L T P C**

(Common to All branches & M.Tech (CSE)) 0 0 3 1.5

Objectives

The students will be trained to perform experiments to study the following.

- The Properties of Matter
- Optical properties like Interference and Diffraction.
- Characteristics of Lasers & Optical Fibre
- Electrical & Thermal properties of Materials
- Enable the students to enhance accuracy in experimental measurements.
- To make the student acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

Course Outcomes (CO)

CO1 Able to understand the concept about the basic properties of matter like stress, strain and types of modulii
Able to understand the concept of determining the pH value by using pH meter.

CO2 Able to understand the concept of optics like reflection, refraction, diffraction by using spectrometer grating.
Able to understand the concept about the measure the conductance of strong acid and strong base and mixture of acids by using conductivity meter.

CO3 Able to understand the thermal properties of solids, specific heat and some models for specific heat calculation.
Able to understand the concept about the amount of chloride present in the given sample of water.

CO4 Able to understand the concept of microscope and its applications in determining the moduli.
Able to understand the concept of determining the elf values by using potentiometer

CO5 Able to understand the importance of various growth methods of crystal and its study.
Able to understand Able to understand the amount of dissolved oxygen present in the water.

LIST OF EXPERIMENTS - PHYSICS

(A minimum of 5 experiments to be performed from the given list)

1. Determination of Young's modulus of the material of the given beam by non-uniform bending method.
2. Ultrasonic Interferometer - Velocity of ultrasonic waves in a liquid and compressibility of

the liquid

3. Determination of wavelength of mercury spectra using Spectrometer and grating.
4. Determination of Numerical aperture, acceptance angle of an optical fibre and groove width of a CD using laser.
5. Determination of wavelength and particle size using a laser.
6. Determination of Young's modulus of the material of the given beam by uniform bending method.
7. Determination of energy band gap of the semiconductor.
8. Determination of Lattice Cell Parameter Using X-Ray Diffraction data.

LIST OF EXPERIMENTS - CHEMISTRY

(Any Six experiments to be conducted)

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 Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
10. Conductometric titration of strong acid Vs strong base.

DEMONSTRATION EXPERIMENTS

1. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
2. Estimation of sodium and potassium present in water using flame photometer.

Total Periods: 30

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	2	3	3	2	2	2	2	2	2	3
CO2	3	2	3	2	2	2	2	2	3	3	2
CO3	3	3	3	3	3	3	2	2	2	2	3
CO4	3	3	3	3	2	3	2	2	2	2	2
CO5	3	3	3	3	3	3	3	2	2	3	3

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl. No.	Description of Equipment	Quantity required (R)
1.	Young's modulus by non-uniform bending method	6
2.	Torsion pendulum	6
3.	Wavelength mercury spectrum – spectrometer grating	6
4.	Wavelength, and particle size using Laser, angle in an optical fiber	6
5.	Young's modulus by uniform bending method	6
6.	Band gap of a semiconductor	6
7.	Ultrasonic interferometer	6
8	Conductivity Meter	10
9.	Flame Photometer	2
10.	Potentiometer	10
11.	Spectrophotometer	2
12.	Viscometer	10
13.	Electronic Balance	1

CS25C02	PROGRAMMING IN C LABORATORY	L	T	P	C
	(Common to All branches & M.Tech (CSE))	0	0	3	1.5

OBJECTIVES

- To analyse problems and design solutions using algorithms, flowcharts, and pseudocode.
- To apply the concepts of looping and arrays.
- To apply the concepts of functions and pointers.
- To apply structures and union concepts.
- To implement the file operations.

LIST OF EXPERIMENTS

1. Write algorithm, draw flowchart and write pseudo code for a real life or scientific or technical problems	**CO1**
2. Programs using decision making and branching statements	
3. Programs using for, while, do-while loops and nested loops.	
4. Programs using arrays and operations on arrays.	**CO2**
5. Programs implementing searching and sorting using arrays	
6. Programs implementing string operations on arrays	
7. Programs using functions and recursion	
8. Programs using pointers & strings with pointers	**CO3**
9. Programs using Dynamic Memory Allocation	
10. Programs using Structures & Unions	**CO4**
11. Programs using pointers to structures and self-referential structures.	
12. Programs to handle file operations	**CO5**
13. Programs to handle file with structure	

TOTAL : 60 PERIODS

LAB REQUIREMENTS

Processors: Intel Core i5, i7, or newer. Operating systems: Ubuntu or any Linux distribution, GCC (GNU Compiler Collection)

REFERENCE BOOKS

1. Reema Thareja, Programming in C, Oxford University Press, Third Edition, 2023.

2. Ashok N Kamthane, Programming in C, Pearson, Third Edition, 2020

WEB REFERENCES

1. https://learn.microsoft.com/en-us/cpp/c-language/c-language-reference?view=msvc-170

2. https://medium.com/@kasra_mp/my-top-4-c-programming-references-f2dda61058

SD25C01	APTITUDE TRAINING COURSE - I	L	T	P	C
	(Common to all Branches and M.TECH(CSE))	0	0	2	0

OBJECTIVES

The course aims to:

- Build strong fundamentals in Quantitative Aptitude & Reasoning.
- Develop analytical and logical problem-solving skills.
- Strengthen competitive exam readiness through structured practice.
- Enhance speed and accuracy in solving aptitude-based problems.
- Apply mathematical and reasoning concepts to real-world and placement scenarios.

UNIT I Number System **3**

- Introduction to Numbers, Types of Numbers, Number Line, Classification: Even/Odd, Prime/Composite, Co-primes.
- Divisibility Rules
- HCF & LCM (methods & word problems)
- Puzzle Practice Questions

UNIT II Commercial Mathematics **3**

- Percentage Concepts, increase/decrease, successive change, comparison, real-life applications and Practice Questions

UNIT III Ratio, Proportion **3**

- Ratio & Proportion (properties, variations)
- Puzzle Practice Questions

UNIT IV Averages, Ages & Applications **3**

- Averages (weighted, replacement cases)
- Ages (equations, ratio-based problems)
- Practice Questions – Topic-wise and mixed tests 4

UNIT V Logical Reasoning **3**

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Understand fundamentals of quantitative aptitude & Number System

CO2 Apply shortcuts & formulas to solve percentages and commercial math problems

CO3 Analyze complex problems in ratios and proportion

CO4 Analyze complex problems in averages, ages and application

CO5 Create solutions to competitive exam-style and real-life logical reasoning problems

- Series & Sequences (number, alphabet)
- Odd man out (number, alphabet, alphanumeric, missing/wrong term)
- Coding–Decoding (letter, number, symbol, substitution, advanced)
- Direction Sense (Basics)
- Puzzle Practice Questions

TOTAL PERIODS **15**

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Analyze problem-solving concepts and decision-making techniques

CO2 Apply looping constructs and array manipulations

CO3 Implement the concepts of functions and pointers

CO4 Implement structure and union concepts.

CO5 Implement file handling techniques.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	1	2	-	-	-	-	-	2
CO2	3	2	2	-	3	-	-	-	-	-	2
CO3	3	2	2	-	3	-	-	-	-	-	2
CO4	3	2	2	-	3	-	-	-	-	-	2
CO5	3	2	3	1	3	1	1	1	1	1	3

SD25C02	C PROGRAMMING TRAINING	L	T	P	C
	(Common to all Branches and M.TECH(CSE))	0	0	2	0

TOPIC - 1 Introduction to C Programming

Subtopics / Concepts:

- Structure of C Program
- Compilation & Execution
- Keywords, Identifiers, Data Types
- Input/Output (scanf, printf)
- Type Casting

Advanced / Placement-Level Problems:

1. Basic programing and format programs

TOPIC - 2 Operators and Expressions

Subtopics / Concepts:

- Arithmetic, Relational, Logical
- Bitwise Operators
- Conditional Operator
- Operator Precedence

Advanced / Placement-Level Problems:

1. Write a program to swap two numbers without using a third variable.
2. Compute sum of digits using only arithmetic operators.
3. Convert temperature between Celsius and Fahrenheit.

TOPIC - 3 Control Structures

Subtopics / Concepts:

- Decision Making: if, switch
- Loops: for, while, do-while
- Jump statements (break, continue, goto)

Advanced / Placement-Level Problems:

1. Find if a number is odd/even using bitwise operator.
2. Count set bits in an integer.
3. Perform XOR swapping without using extra variables.
4. Print all Armstrong numbers between two intervals.
5. Generate Fibonacci series up to N.
6. Find LCM and GCD of two numbers.

TOPIC - 4 Functions and Recursion

Subtopics / Concepts:

- Function Declaration & Definition
- Recursion
- Call by Value/Reference
- Storage Classes

Advanced / Placement-Level Problems:

1. Find factorial using recursion.
2. Generate nth Fibonacci using recursion.
3. Implement power function without using pow().

TOPIC - 5 Arrays and Strings

Subtopics / Concepts:

- 1D, 2D Arrays
- Searching (Linear/Binary)
- Sorting (Bubble, Insertion, Selection)
- String Functions (strlen, strcmp, strcat)
- Character Arrays

Advanced / Placement-Level Problems:

1. Find second largest element in array.
2. Remove duplicates from array.
3. Reverse a string without using built-in functions.
4. Check if two strings are anagrams.
5. Sort array using Bubble/Quick Sort.

TOPIC - 6 Pointers

Subtopics / Concepts:

- Pointer Basics
- Pointer Arithmetic
- Pointers and Arrays
- Pointers to Functions
- Dynamic Memory (malloc, calloc, realloc, free)

Advanced / Placement-Level Problems:

1. Reverse array using pointers.
2. Find length of string using pointer.
3. Allocate dynamic memory for matrix and find its transpose.
4. Implement function pointer for arithmetic operations.

TOPIC - 7 Structures and Unions

Subtopics / Concepts:

- Structure Declaration
- Nested Structures
- Array of Structures
- Pointer to Structure
- Union vs Structure

Advanced / Placement-Level Problems:

1. Store and display N employee records.
2. Find highest marks student using array of structures.
3. Simulate library system using structures.
4. Demonstrate memory sharing in union.
5. "Store and display N employee records.

6. Find highest marks student using array of structures.
7. Simulate library system using structures.
8. Demonstrate memory sharing in union."

TOPIC - 8 File Handling

Subtopics / Concepts:

- fopen, fclose
- Reading/Writing (fprintf, fscanf, fgetc, fputc)
- Random Access (fseek, ftell)
- Error Handling

Advanced / Placement-Level Problems:

1. Copy contents from one file to another.
2. Count lines, words, and characters in a file.
3. Append student records to a file.
4. Merge two text files into one.

TOPIC - 9 Preprocessor and Dynamic Memory

Subtopics / Concepts:

- #define, #include
- Macros, Conditional Compilation
- Memory Allocation
- Header Files

Advanced / Placement-Level Problems:

1. Create a macro to find max of three numbers.
2. Implement dynamic array using malloc.
3. Demonstrate memory leak detection.

TOPIC - 10 Advanced Concepts

Subtopics / Concepts:

- Command Line Arguments
- Enumerations
- Typedef
- Bit Fields
- Volatile and Const Qualifiers

Advanced / Placement-Level Problems:

1. Sum of numbers using command line arguments.
2. Demonstrate enum for menu-driven program.
3. Bit-field representation for memory optimization.

TOPIC - 11 Problem Solving & Logical Thinking

Subtopics / Concepts:

- Mathematical Problems
- Pattern Printing
- Matrix Operations
- Searching and Sorting Practice

Advanced / Placement-Level Problems:

1. Print spiral matrix pattern.
2. Find saddle point in a matrix.
3. Generate Pascal's Triangle.
4. Sort words in a sentence alphabetically.

TOPIC - 12 Mini Projects & Coding Challenges

Subtopics / Concepts:

- Student Record Management
- Library System
- Banking System
- Quiz Game
- File-based Projects

Advanced / Placement-Level Problems:

Library Management System.
Banking System with File I/O.
Student Record Management using Structure & File.
Word Count Tool like Linux wc.

SEMESTER-II

EN25C08	PROFESSIONAL ENGLISH II (Lab Integrated)	L	T	P	C
	(Common to All Branches & M.Tech (CSE))	2	0	2	3

OBJECTIVES

- To engage learners in meaningful language activities to improve their reading and writing skills
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT - I	MAKING COMPARISONS	9+3
Listening - Listening for descriptions of people; listening for opinions, Listening to the good and bad parts of a job; listening for complaints, Listening to people making, accepting, and declining requests, Listening to news stories; listening to messages and a podcast **Speaking** - Describing personalities; expressing likes and dislikes; agreeing and disagreeing; complaining, Talking about possible careers; describing jobs; deciding between two jobs, Making direct and indirect requests; accepting and declining requests, Narrating a story; describing events and experiences in the past **Writing / Reading** - Writing a description of a good friend, Reading about unusual social networking sites, Writing about two career choices, Reading about different types of workplaces, Writing a message with requests, Reading about talking to friends about difficult, Writing a personal account, Reading about the reliability of online content topics **Grammar** - Relative pronouns as subjects and objects; it clauses + adverbial clauses with when, Gerund phrases as subjects and objects; comparisons with adjectives, nouns, verbs, and past participles, Requests with modals, if clauses, and gerunds; indirect requests, Past continuous vs. simple past; past perfect		**CO1**

UNIT - II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	9+3
Listening - Listening for information about living abroad; listening to opinions about customs, Listening to complaints; listening to people exchange things in a store; listening to a conversation about a "throwaway culture", Listening to environmental problems; listening for solutions, Listening to a conversation with a guidance counsellor; listening for additional information **Speaking** - Talking about moving abroad; expressing emotions; describing cultural expectations; giving advice, Describing problems; making complaints; explaining something that needs to be done, Identifying and describing problems; coming up with solutions, Asking about preferences; discussing different skills to be learned; talking about learning methods; talking about life skills		

Writing/ Reading - Writing a pamphlet for tourists, Reading about moving to another country, Writing a critical online review, Reading about a problem with a ride-sharing service, Writing a post on a community website, Reading about a creative solution to lionfish on St. Lucia, Writing about a skill, Reading about different studying styles **Grammar** - Noun phrases containing relative clauses; expectations: *the custom to*, (*not*) *supposed to*, *expected to*, (*not*) *acceptable to,* Describing problems with past participles as adjectives and with nouns; describing problems with *need* + gerund, *need* + passive infinitive, and *keep* + gerund, Passive in the present continuous and present perfect; prepositions of cause; infinitive clauses and phrases, *Would rather* and *would prefer*; *by* + gerund to describe how to do things		**CO2**
UNIT - III	**PROBLEM SOLVING**	**9+3**
Listening - Listening to New Year's resolutions, Listening for dates and time periods; listening to predictions, Listening to descriptions of important events; listening to regrets and explanations, Listening for features and slogans **Speaking** - Talking about things you need to have done; asking for and giving advice or suggestions, Talking about historic events; talking about things to be accomplished in the future, Describing milestones; describing turning points; describing regrets and hypothetical situations, Describing qualities for success; giving reasons for success; interviewing for a job; talking about ads and slogans **Writing / Reading** - Writing a message of advice, Reading about young scientist Jack Andraka, Writing a biography, Reading about futurists and their predictions for the year 2050, Writing a message of apology, Reading about a conflict with a friend and advice on how to fix it, Writing a TV or web commercial, Reading about what makes some advertisements memorable, **Grammar** - Get or have something done; making suggestions with modals + verbs, gerunds, negative questions, and infinitives, Referring to time in the past with adverbs and prepositions: *during*, *in*, *ago*, *from…to*, *for*, *since*; predicting the future with *will*, future continuous, and future perfect, Time clauses: *before*, *after*, *once*, *the moment*, *as soon as*, *until*, *by the time*; expressing regret with *should* (*not*) *have* + past participle; describing hypothetical situations with *if* clauses + past perfect and *would*/*could have* + past participle, Describing purpose with infinitive clauses and infinitive clauses with *for*; giving reasons with *because*, *since*, *because of*, *for*, *due to*, and *the reason.*		**CO3**
UNIT - IV	**THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY**	**9+3**
Listening - Listening to explanations; listening for the best solution, Listening for parts of a movie, Listening for solutions to everyday annoyances; listening to issues and Opinions, Listening to past obstacles and how they were overcome; listening for people's goals for the future **Speaking** - Drawing conclusions; offering explanations; describing hypothetical events; giving advice for complicated situations, Describing how something is done or made; describing careers in film, TV, publishing, gaming, and music, Giving opinions for and		

against controversial topics; offering a different opinion; agreeing and disagreeing, Giving opinions about inspirational sayings; talking about the past and the future		
Writing / Reading - Writing about a complicated situation, Reading about unexplained events, Writing about a process, Reading about what the job of film extra is like, Writing a persuasive essay, Reading about plagiarism in the digital age, Writing a personal statement for an application, Reading about the athlete Michael Edwards **Grammar** - Past modals for degrees of certainty: *must (not) have*, *may (not) have*, *might (not) have*, *could (not) have*; past modals for judgments and suggestions: *should (not) have*, *could (not) have*, *would (not) have,* The passive to describe process with *is*/*are* + past participle and modal + *be* + past participle; defining and non-defining relative clauses, Giving recommendations and opinions with passive modals: *should be*, *ought to be*, *must be*, *has to be*, *has got to be*; tag questions for opinions, Accomplishments with the simple past and present perfect; goals with the future perfect and *would like to have* + past participle		
UNIT - V	**EXTENDED SKILL PRACTICE**	**9+3**
Listening practice through worksheets (with audio – in class) Grammar practice through worksheets* Vocabulary practice through worksheets* Writing practice through worksheets* Speaking Skill Practice (in class) - 10-minute conversation practice sessions (with guidance from Placement Test)		**CO5**
LAB COMPONENT		
Getting started - Talk about the workplace Listening - Radio show: likeability; A problem; Conversation: life changes Speaking - Work and training experiences; Interviewing classmates about technology use; Making and responding to suggestions; Sounding sympathetic or pleased; Talking about life changes Reading - Article: Not the best interview I've ever had! Work and training experiences; Article: What's your favourite app? Reading an email about a new job Writing - An informal email; Adding new information Grammar - Present perfect and past simple; Present perfect and present perfect continuous Vocabulary – Work, technology Pronunciation - Present perfect and past simple; Sentence stress: main verb / auxiliary verb; Sentence stress Everyday English - Making and responding to suggestions. Getting started: Talking about people Listening - Radio show: successful people; Two monologues: personality types; Asking for help; Three monologues: websites Speaking - Becoming successful at something; Describing a person; Question tags; Offering and asking for help; Things people use the Internet for Getting started: Talk about different cultures Listening - Three monologues: culture shock; Radio show: vending machines in Japan; A special gift; Three monologues: special occasions		

Speaking - Describing different cultures; Describing a special meal; Asking for and giving recommendations; Expressing surprise; Place to go out
Reading - Article: Culture shock? There's an app to deal with that; Blog: Hungry adventures; Reviews of a café
Writing - Two reviews; Positive and negative language; Adverbs
Grammar - Modals of obligation; Comparatives and superlatives
Vocabulary - Compound nouns; Describing food
Pronunciation - Word stress: compound nouns; Sound and spelling; Sounding interested
Everyday English - Asking for and giving recommendations.
Reading - Article: When will I be famous?; Article: Why the world needs introverts; Three online adverts
Writing - An informal online advert; The language of adverts
Grammar - Modals and phrases of ability; Articles
Vocabulary - Ability; Personality adjectives
Pronunciation - Stress with modal verbs, intonation in question tags
Everyday English - Offering and asking for help
Getting started: Talk about an interesting news story
Listening - Podcast: Pod-on-pod; Interview: fake reviews; A job interview; Monologue: a news story
Speaking - Giving opinions about podcasts; Describing experiences using reporting verbs; Generalising; Being vague; Air travel
Reading - Article: Thinking of making a podcast? Just give it a try!, Article: The restaurant that wasn't there, A news story
Writing - An email about a news story; Summarising information
Grammar - Reported speech; Verb patterns
Vocabulary - Sharing information; Reporting verbs
Pronunciation - Sound and spelling
Everyday English - Generalising and being vague
Getting started: Talk about different kinds of opportunities

Text Books:

1. Interchange Level 3 - 5th edition published by Cambridge University Press & Assessment
2. English for Science & Technology Cambridge University Press 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourde Joevani, Department of English, Anna University.

Reference Books:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.

3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.

Listening - Conversation: trying new activities; Making a marriage proposal; Monologue: volunteering
Speaking - Taking new opportunities; A past event that made life better; Talking about possible problems and reassuring someone; Changing the subject; Volunteering
Reading - Article: Searching for serendipity; A web page about volunteering; Emails giving advice
Writing - An email with advice; Advising a course of action
Grammar - Second conditional; Third conditional
Vocabulary - Sport; Adjectives and prepositions; Expressions with do, make and take
Pronunciation - Sentence stress: would, would and have; Sounding sure and unsure
Everyday English - Talking about possible problems and reassuring someone

Total Periods: 60

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1 To compare and contrast products and ideas in technical texts.
CO2 To identify and report cause and effects in events, industrial processes through technical texts
CO3 To analyse problems in order to arrive at feasible solutions and communicate them in the written format.
CO4 To present their ideas and opinions in a planned and logical manner
CO5 To draft effective resumes in the context of job search.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	2	1	1	1	1	-	2	1	2	1	2
CO2	2	2	2	1	1	-	2	1	2	1	2
CO3	2	3	3	1	1	-	2	1	2	1	2
CO4	2	1	1	1	1	-	2	1	3	1	2
CO5	1	1	1	1	1	-	2	1	3	1	1

COURSE OUTCOMES FOR LAB COMPONENT

Upon completion of the course, students will be able to

CO1 To discuss workplace topics and life experiences accurately using present perfect and past simple tenses, including talking about work, training, technology use, and life changes in spoken and written formats.
CO2 To comprehend and interpret various spoken materials such as radio shows, conversations, and monologues related to personal experiences, culture, and success, enhancing listening and inferencing skills.
CO3 To describe and compare cultural practices, personality types, and different social situations using appropriate vocabulary, grammar (e.g., modals, comparatives), and pronunciation features like

sentence stress and word stress.

CO4 To write different forms of communication effectively, including informal emails, reviews, adverts, and summaries, incorporating new information, positive/negative language, and reporting verbs accurately.

CO5 To engage confidently in everyday English conversations requiring suggestions, help offers, opinions, advice, and discussions about opportunities, sports, and volunteering, applying conditionals and modal verbs correctly.

Mapping of COs with POs											
COS	**PROGRAM OUTCOMES (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	2	1	1	1	1	-	1	1	3	1	1
CO2	1	2	1	1	-	-	1	1	3	1	1
CO3	1	1	1	1	-	-	1	1	3	1	1
CO4	1	1	1	1	-	-	1	1	3	1	1
CO5	1	1	1	1	-	-	1	1	3	1	1

MA25C02	LINEAR ALGEBRA AND NUMBER THEORY	L	P	T	C
	(Common to CSE, CSE(CC),CSBS, IT and M.TECH(CSE))	3	0	1	4

OBJECTIVES

- To find the basis and dimension of vector space
- To obtain the matrix of linear transformation and its eigenvalues and eigenvectors
- To find orthonormal basis of inner product space and find least square approximation
- To understand the basic concepts in number theory

UNIT I	VECTOR SPACES	12
Vector spaces, Subspaces, Linear combinations, Linear independence and linear dependence, Bases and dimensions.		CO1
UNIT II	**LINEAR TRANSFORMATION**	**12**
Linear transformation - Rank space and null space - Rank and nullity - Dimension theorem - Matrix representation of linear transformation - Eigenvalues and eigenvectors of linear transformation.		CO2
UNIT III	**INNER PRODUCT SPACES**	**12**
Inner product and norms - Properties - Orthogonal, Orthonormal vectors - Gram Schmidt orthonormalization process - Least square approximation		CO3
UNIT IV	**DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS**	**12**
Division algorithm – Base - b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.		CO4
UNIT V	**DIOPHANTINE EQUATIONS AND CONGRUENCES**	**12**
Linear Diophantine equations – Congruence‘s – Linear Congruence‘s - Applications: Divisibility tests - Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.		CO5
		TOTAL :60 PERIODS

TEXT BOOKS

1. Friedberg S.H, Insel A.J. and Spence L, Linear Algebra, Fifth edition, Pearson, 2018
2. Burden R. and Faires J.D. Numerical Analysis, tenth edition, Brooks/Cole, 2015.
3. Strang G, Linear algebra for everyone, Wellesley Cambridge press, 2020.
4. Koshy, T., Elementary Number Theory with Applications, Elsevier Publications, New Delhi, 2008.

REFERENCE BOOKS

1. Seymour Libschutz and Marc Lipson, Linear Algebra, Sixth edition, McGraw Hill Education India private limited, New Delhi, 2017.
2. Iyengar S.R.K. and Jain R.K., Numerical Methods, Third edition, New age international publications, 2012.
3. Kumaresan S, Linear Algebra - A geometric approach, Prentice Hall of India, New Delhi, Reprint, 2010.
4. Sundarapandian V, Numerical Linear Algebra, Prentice Hall of India, New Delhi, 2008.
5. Bernard Kolman and David R. Hill, Introductory Linear Algebra, Pearson Educations, New Delhi, First Reprint, 2009.
6. Lidl, R. and Pitz, G, "Applied Abstract Algebra", Springer Verlag, New Delhi, 2nd Edition, 2006.
7. Niven, I., Zuckerman.H.S., and Montgomery, H.L., — An Introduction to Theory of Numbers, John Wiley and Sons , Singapore, 2004.
8. San Ling and Chaoping Xing, Coding Theory – A first Course, Cambridge Publications, Cambridge, 2004

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Find the basis and dimension of vector space
CO2	Obtain the matrix of linear transformation and its eigenvalues and eigenvectors
CO3	Find orthonormal basis of inner product space and find least square approximation
CO4	Understand the basic concepts in number theory and approach into the analysis of numbers
CO5	Apply the basic ideas of number theory to real world problems by the way of congruence and Linear Diophantine equations and Chinese remainder theorem.

PH25C02	SEMICONDUCTORS AND NANOELECTRONIC DEVICES	L	P	T	C
	(Common to CSE, IT, AI-DS, AI-ML, CYBER, CSBS and M.Tech(CSE))	3	0	0	3

OBJECTIVES

To understand the essential principles of Physics in Semiconductor devices and AI based applications.
To have the necessary understanding of magnetic and optical properties of materials and its applications.
To grasp the basics of quantum structures and their impact on nano devices.
To understand number representation, analyse logic processes and AI based applications in digital circuits
To introduce the basics of quantum computing through a practical approach.

UNIT I	CONDUCTORS AND SEMICONDUCTORS	9
Introduction – Electron theory of solids - Success and failures of Quantum free electron theory (Qualitative) – Fermi distribution function – Density of Energy states – Band theory (Qualitative) – Effective mass of electrons, concept of hole - Bloch theorem - Types of semiconductors - Carrier concentration in Intrinsic and Extrinsic semiconductors - Hall effect - determination of Hall co-efficient - Applications of Hall effect based on Artificial Intelligence.		**CO1**
UNIT II	**MAGNETISM AND OPTOELECTRONICS**	**9**
Magnetic dipole moment – Atomic magnetic moments- Magnetic permeability and susceptibility - Magnetic material classification: Diamagnetism – Para magnetism – Ferromagnetism – Antiferromagnetism – Ferrimagnetism – Photo current in a P-N diode – Solar cell – Light Dependent Resistor – Light Emitting Diode – Organic LED –Photodetectors: Avalanche and PIN photodetectors- Optical data storage: Holography - Cloud storage		**CO2**
UNIT III	**NANO DEVICES**	**9**
Quantum confinement -Quantum structures - Density of states in quantum well, quantum wire and quantum dot structure-Carbon Nanotubes-Fabrication-Properties and applications - Nano electronics: Single electron Tunnelling - Coulomb Blockade - Single Electron Transistor (SET) -Quantum dot laser. Applications: Nanoelectromechanical Systems (NEMS) in data storage- Microelectromechanical Systems (MEMS) in GPS navigation system.		**CO3**
UNIT IV	**DIGITAL ELECTRONICS**	**9**
Introduction to Number system – Binary, Decimal, Octal and Hexadecimals - conversion between number systems – Basic Logic gates: OR, AND, NOT, NAND and NOR gates – Boolean expression and Truth table – Microwave generation – Cavity Magnetron – Memory storage devices – Random Access Memory and Read Only Memory. Decoders - Encoders-Multiplexers-Microprocessors (8085)-Application of AI in digital electronics – Integrated Circuit inspection, Printed Circuit Board inspection.		**CO4**
UNIT V	**APPLIED QUANTUM COMPUTING**	**9**
Magnetic Semiconductors – Dilute Magnetic Semiconductors – Spintronics - Spintronic devices: Spin valve, Spin LED, Spin FET- Quantum Cellular Automata (QCA) – Quantum system for information processing- Quantum states- Classical bits- Quantum bits (Qubits) – C-NOT gate-Multiple Q-bits-Bloch sphere-Quantum gates - Advantages and disadvantages of quantum computing over classical computing - Qubit Quantum computing – The role of Quantum computing in Artificial intelligence.		**CO5**
		TOTAL: 45 PERIODS

TEXTBOOKS

1. **Subramanyam Bhupesh Bhatia, M.V., Basic Digital Electronics , 2017**
2. **Kasap, S.O., Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.**
3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

REFERENCE BOOKS

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Band, Y. B., and Avishai, Y., Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.

3. Mitin, V. V., Kochelap, V. A., and Stroscio, M. A., Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4. Hanson, G. W., Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.

COURSE OUTCOMES
Upon completion of the course, students will be able to

CO1	ain knowledge on quantum and band theories, energy band structures and semiconductor applications in AI.
CO2	Get knowledge on magnetic and optical properties of materials and their applications in data storage.
CO3	Acquire the idea of engineered nanomaterials that are safer and more sustainable alternative.
CO4	Have the necessary understanding on the functioning digital logic processes and AI applications in IC and PCB digital circuits.
CO5	Analyze to approach the calculation which uses principles of fundamental physics to solve extremely complex problems very quickly

CS25201	OBJECT ORIENTED PROGRAMMING WITH C++	L	T	P	C
(Common to CSE, IT, CSE(CC) , CSBS and M.Tech(CSE))		3	0	0	3

OBJECTIVES

- To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
- To understand and apply the principles hiding, localization and modularity in software development.
- Use the generic programming features of C++ including the STL.
- Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes.

UNIT I	BASICS OF OBJECT – ORIENTED PROGRAMMING	9
Object oriented programming concepts – C++ Programming features– Token – Expressions –Control structures – Functions – function prototyping, friend functions , inline function , constant arguments ,default arguments , function as arguments , pointers, references ,role of this pointer – Scope resolution operator – Classes – Objects.		CO1
UNIT II	**CONSTRUCTORS, DESTRUCTORS AND POLYMORPHISMS**	**9**
Constructors – default constructor, parameterized constructors, constructor with dynamic allocation, copy constructor – Destructor – Operator overloading – overloading through friend functions, overloading the assignment operator – Function overloading.		CO2
UNIT III	**INHERITANCE AND STRING**	**9**
Inheritance – defining derived classes , constructors in derived classes, types of inheritance , virtual base classes –abstract classes – Runtime polymorphism – virtual functions , pure virtual functions – Run time type information – typeid , dynamic casting , cross casting , down casting – String Handling – Manipulating string objects, C style string.		CO3
UNIT IV	**TEMPLATES AND EXCEPTION HANDLING**	**9**

Templates – class template, function template, overloading of template functions, non-type template arguments – Exception handling – try-catch-throw paradigm, throwing mechanism, catching mechanism, re-throwing an exception.		**CO4**
UNIT V	**I/O STREAMS AND STANDARD LIBRARIES**	**9**
Managing File IO operations – Streams, Formatted and Unformatted IO operations - File handling concepts, random access , Command Line arguments – Object serialization – Namespaces – ANSI String Objects – Standard template library – components of STL, containers , iterators , function adaptors – Algorithms.		**CO5**
		TOTAL : 45 PERIODS

TEXT BOOKS

1. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
2. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.

REFERENCE BOOKS

1. Ira Pohl, "Object Oriented Programming using C++", 2nd Edition, Pearson Education, Reprint 2004.
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", 4th Edition, Pearson Education, 2005.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Design problem solutions using Object Oriented Techniques.
CO2	Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions. Use the control structures of C++ appropriately.
CO3	Develop C++ programs using operator overloading and polymorphism.
CO4	Implement C++ programs using Files and exceptions
CO5	Design problem solutions using Object Oriented Techniques.

IT25201	INFORMATION TECHNOLOGY ESSENTIALS	L	T	P	C
	(Common to IT, CSE(CC))	3	0	0	3

OBJECTIVES

- To introduce the fundamentals of computer systems, data representation, and connectivity.
- To provide foundational knowledge of operating systems and shell scripting.
- To understand the basics of Internet technologies and web components.
- To impart basics of application development and version control using Git and GitHub.
- To provide an understanding of cloud computing and emerging IT technologies,

UNIT I	COMPUTER FUNDAMENTALS AND CONNECTIVITY ESSENTIALS	9
Computer System Components – Functional Units of a Computer – Data Representation: Number Systems and Conversions – Memory and Storage Hierarchy – Input and Output Devices – Overview of Peripheral Devices and Interfaces – Basics of Data Communication – Transmission Modes and Medium – Wired and Wireless Connections – Introduction to Computer Connectivity – Network Devices: Modem, Switch, Router (Concepts Only) – File Sharing and Resource Access in Local Systems.		**CO1**
UNIT II	**INTRODUCTION TO OPERATING SYSTEMS AND SHELL PROGRAMMING**	**9**
Operating System – Functions and Components – Types of Operating Systems – Kernel and Shell – User and System Interfaces – File System Structure and File Management – Introduction to Command Line Interface (CLI) – Basic File and Directory Commands – Process and System Commands – Introduction to Shell Scripting – Variables and Operators – Conditional and Looping Statements – Command Substitution and Input/Output Redirection.		**CO2**
UNIT III	**FUNDAMENTALS OF INTERNET AND WEB CONCEPTS**	**9**
Introduction to the Internet and World Wide Web – Evolution of Internet Technologies – IP Addressing and Domain Name System (DNS) – Web Browsers and Search Engines: Working Principles – Introduction to Web Servers, Hosting, and HTTP/HTTPS Protocols – Structure of a Web Page: Content, Links, and Navigation – Overview of Web Technologies: HTML, CSS, and Scripting Basics.		**CO3**
UNIT IV	**APPLICATION DEVELOPMENT AND VERSION CONTROL**	**9**
Introduction to Application Software and Development Life Cycle – Types of Applications: Desktop, Web, Mobile – Overview of Low-Code and No-Code Platforms – Basics of APIs and Integration – Introduction to Data Storage and Databases – Version Control Concepts – Introduction to Git and GitHub – Repository, Commit, Push, Pull, Branch, Merge – Collaborative Development and Project Management using GitHub.		**CO4**
UNIT V	**CLOUD COMPUTING AND EMERGING TECHNOLOGIES**	**9**
Introduction to Cloud Computing – Characteristics and Service Models (IaaS, PaaS, SaaS) – Virtualization Concepts – Cloud Storage and Resource Management – Overview of Public, Private, and Hybrid Clouds – Introduction to Edge and Fog Computing – Overview of Artificial Intelligence, Machine Learning, Internet of Things (IoT), and Automation – Role of Cloud in Modern IT Infrastructure – Future Trends in Computing Technologies.		**CO5**

TOTAL : 45 PERIODS

TEXT BOOKS

1. Sumitabha Das, "*Unix Concepts and Applications*", 4th Edition, McGraw-Hill Education, 2017.
2. Behrouz A. Forouzan, "*Data Communications and Networking with TCP/IP Protocol Suite*", 6th Edition, McGraw-Hill Education, 2022.
3. Scott Chacon and Ben Straub, *"Pro Git"*, 2nd Edition, Apress, 2014.
4. Thomas Erl, *"Cloud Computing: Concepts, Technology & Architecture"*, Pearson, 2013.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Understand computer system components, data representation, memory hierarchy, and peripheral devices.
CO2	Demonstrate operating system usage, file management, command-line operations, and shell scripting.
CO3	Describe the basics of Internet technologies and essential web components.
CO4	Apply version control concepts and use Git/GitHub for collaborative development and project management.
CO5	Explain cloud computing models and emerging IT technologies.

MAPPING OF COs WITH POs AND PSOs

COs	PROGRAM OUTCOMES (POs)											PROGRAM SPECIFIC OUTCOMES (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	0	1	0	0	0	1	1	1	3	3	3
CO2	3	2	1	2	2	0	0	0	1	1	1	3	3	3
CO3	3	1	3	1	3	0	0	0	2	2	2	3	3	3
CO4	3	1	3	1	3	2	2	1	2	2	2	3	3	3
CO5	3	3	3	2	3	1	1	2	2	2	3	3	3	3

GE25C02 **தமிழரும் தொழில்நுட்பமும்** L T P C

(Common to All Branches & M.Tech (CSE)) 1 0 0 1

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம் **3**

சங்க காலத்தில் நெசவுத் தொழில்- பானைத் தொழில்நுட்பம்- கருப்பு சிவப்பு பாண்டங்கள்- பாண்டங்களில் கீறல் குறியீடுகள். **CO1**

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் **3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய விவரங்கள்- மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் -நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால்-செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை. **CO2**

அலகு 3 உற்பத்தித் தொழில்நுட்பம் **3**

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை- இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள்- எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் -சிலப்பதிகாரத்தில் மணிகளின் வகைகள். **CO3**

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் **3**

அணை - ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம்- கால்நடை பராமரிப்பு- கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்- வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் -பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம். **CO4**

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ் **3**

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் -சொற்குவைத் திட்டம். **CO5**

TOTAL PERIODS **15**

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் – டாக்டர் கே.கே. பிள்ளை.

   (வெளியீடு தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. தபொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr.K.D. Thirunavukkarasu)

   (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by:

   International Institute of Tamil Studies)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:

   Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 பழந்தமிழகத்தில் நடைபெற்ற நெசவுத் தொழிலின் தொன்மை மற்றும் மட்பாண்டக்கலையின் சிறப்பு முதலியவற்றை அறிந்து கொள்ளுதல்.

CO2 சங்ககால கட்டிட வடிவமைப்பு, சிற்பக்கலை, கோயில் கட்டிடக்கலை முதலியனவற்றின் சிறப்பை மாணவர்கள் உணர்தல்.

CO3 பழந்தமிழகதில் நடைபெற்ற அறிவியல் பூர்வமான தொழில்வகைகளின் சிறப்பை தெரிந்து கொள்ளுதல்.

CO4 பழந்தமிழகத்தில் நடைபெற்ற வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பங்கள், கடல் சார் அறிவு முதலியவற்றை உணர்தல்.

CO5 அறிவியல் தமிழ் வளர்ச்சி மற்றும் கணினியின் இணையப் பயன்பாடு ஆகியவற்றின் பயன்பாட்டை உணர்தல்.

GE25C02	TAMILS AND TECHNOLOGY	L	T	P	C
	(Common to All Branches & M.Tech (CSE))	1	0	0	1

UNIT 1 WEAVING AND CERAMIC TECHNOLOG **3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. **CO1**

UNIT 2 DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period. **CO2**

UNIT 3 MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads – Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram. **CO3**

UNIT 4 AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries– Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge SpecificSociety. **CO4**

UNIT 5 SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project. **CO5**

TOTAL 15

TEXT-CUM

REFERENCE

BOOKS

CO1	பழந்தமிழகத்தில் நடைபெற்ற நெசவுத் தொழிலின் தொன்மை மற்றும் மட்பாண்டக்கலையின் சிறப்பு முதலியவற்றை அறிந்து கொள்ளுதல்.
CO2	சங்ககால கட்டிட வடிவமைப்பு, சிற்பக்கலை, கோயில் கட்டிடக்கலை முதலியனவற்றின் சிறப்பை மாணவர்கள் உணர்தல்
CO3	பழந்தமிழகதில் நடைபெற்ற அறிவியல் பூர்வமான தொழில்வகைகளின் சிறப்பை தெரிந்து கொள்ளுதல்.
CO4	பழந்தமிழகத்தில் நடைபெற்ற வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பங்கள், கடல் சார் அறிவு முதலியவற்றை உணர்தல்.
CO5	அறிவியல் தமிழ் வளர்ச்சி மற்றும் கணினியின் இணையப் பயன்பாடு ஆகியவற்றின் பயன்பாட்டை உணர்தல்.

		L	T	P	C
CS25211	**OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY**				
	(Common to CSE, IT, CSE(CC) , CSBS and M.Tech(CSE))	0	0	3	1.5

OBJECTIVES

- To strengthen problem solving ability by using the characteristics of an object-oriented approach.
- To design applications using object oriented features.
- To handle Exceptions in programs.
- To learn virtual functions and file handling in C++.

LIST OF EXPERIMENTS

1. Write a C++ program to display Names, Roll No., and grade of 3 students who have appeared in the examination. Declare the class of name, roll no., and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class members. **CO1**
3. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
4. Write a C++ program to allocate memory using new operator.
5. Write a C++ program to create multilevel inheritance.
6. Write a C++ program to create an array of pointers. Invoke functions using array objects.
7. Write a C++ program to use pointer for both base and derived classes and call the member function. Use virtual keyword. **CO2**
8. Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.
9. Write a program to implement I/O operations on characters. I/O operations includes inputting a string, Calculating length of the string, Storing the string in a file, fetching the stored characters from it, etc.
10. Write a program to copy the contents of one file to another.
11. Write a program for reading and writing data to and from the file using command line arguments.
12. Write a program to implement the exception handling with multiple *catch* statements. **CO3**
13. Write a program to implement the exception handling with re throwing in exception.

TOTAL : 60 PERIODS

LAB REQUIREMENTS

30 machines with intel i5/i7 processor with minimum 4GB RAM and 1TB Hard Disk, C/C++ Compiler or Visual Studio C++.

REFERENCE BOOKS

1. Object Oriented Programming Through C++, E. Balaguruswamy 6 Edition, 2013.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

WEB REFERENCES

1. https://www.learncpp.com/
2. http://www.cplusplus.com/

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Understand the features of C++ supporting object oriented programming.
CO2	Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.

CO3	Understand advanced features of C++ specifically stream I/O, operator overloading, file handling in object oriented environment.

IT25211	INFORMATION TECHNOLOGY ESSENTIALS LABORATORY (Common to IT, CSE(CC))	L	T	P	C
		0	0	3	1.5

OBJECTIVES

- Practice basic Linux commands, file operations, and permission management.
- Apply networking commands for connectivity and troubleshooting.
- Create and host simple web pages using HTML, CSS, and servers.
- Perform version control and collaborative development using Git and GitHub.
- Explore cloud platforms and deploy simple applications securely.

LIST OF EXPERIMENTS

1. **COMPUTING & OPERATING SYSTEMS**

a) Practice the following commands in Linux:

A. Internal commands- echo, date etc.

B. External commands- ls, bc, sort, head and cal etc.

C. Other commands – tput, clear, who, man, passwd, uname (with different options).

b) Practice File and Directory commands in Linux:

A. Directory related Commands – pwd, mkdir, rmdir, cd, ls.

B. Manipulate Absolute paths and Relative paths using cd command.

C. File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc. **CO1**

c) Perform the following in Linux:

A. List the seven attributes of a file : ls and its options.

B. File Permissions: Absolute and Relative permissions.

C. Manipulate File permissions using chmod command.

D. Manipulating File Ownership using chown command.

E. Miscellaneous: apt-get.

2. **NETWORK ESSENTIALS**

a) Networking Commands: ping, ssh, ifconfig, netstat, traceroute.

3. **WEB DEVELOPMENT ESSENTIALS** **CO2**

a) Create a simple web page with basic HTML tags and CSS styling.

b) Host a basic web page locally using an HTTP server or online hosting platform.

4. **GITHUB AND VERSION CONTROL**

a) Install Git and initialize a repository.

b) Commit, push, pull, and clone repositories.

c) Create branches, merge branches, and resolve conflicts. **CO3**

d) Collaborate using GitHub (forking, pull requests, issues).

5. **CLOUD COMPUTING & SECURITY CONCEPTS**

a) Access cloud platforms (AWS/Azure/GCP) and explore services.

b) Create a virtual machine or storage bucket in the cloud.

c) Prepare a mini-project integrating cloud storage, automation, or web hosting.

TOTAL: 60 PERIODS

LAB REQUIREMENTS

Processors: Intel Atom® processor or Intel® Core™ i3 processor. Operating systems: Windows* networking devices, internet, browsers, IDEs (VS Code), Git/GitHub, Packet Tracer, cloud accounts (AWS/Azure/GCP), and basic firewall/VPN tools.

REFERENCE BOOKS

1. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 8th Ed., Pearson.
2. Jennifer Niederst Robbins, Learning Web Design, 5th Ed., O'Reilly.
3. Scott Chacon, Ben Straub, Pro Git, 2nd Ed., Apress.

WEB REFERENCES

1. https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking.html
2. https://www.w3schools.com/
3. https://git-scm.com/doc

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1 Demonstrate basic Linux commands, file and directory operations, and file permission management.

CO2 Apply networking commands to explore system connectivity and perform network diagnostics.

CO3 Create and host simple web pages, use Git/GitHub for version control, and deploy projects on cloud platforms.

MAPPING OF COs WITH POs AND PSOs														
COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO 2**	**PSO3**
CO1	3	3	1	2	2	-	-	0	1	1	1	3	3	2
CO2	3	2	3	1	3	-	-	0	2	2	2	3	3	2
CO3	3	2	3	1	3	-	-	2	2	2	3	3	3	2

SD25C06	**APTITUDE TRAINING COURSE - II**	**L**	**T**	**P**	**C**
	(Common to all Branches and M.TECH(CSE))	0	0	2	0

OBJECTIVES

The course aims to:

- Build strong fundamentals in commercial mathematics and problem-solving.
- Strengthen logical and critical reasoning abilities for competitive exams.
- Develop speed and accuracy in aptitude-based problem solving.
- Enable application of quantitative & reasoning skills to real-world scenarios.
- Prepare students for aptitude tests in **placements, SSC, Bank PO, and higher studies.**

UNIT I Permutations & Combinations **3**

- Counting Principles (Addition, Multiplication)
- Permutations (with/without repetition, identical objects, word problems)
- Circular Permutations
- Combinations (properties, restrictions, real-life applications)
- Puzzle Practice Questions

UNIT II Probability **3**

- Basics of Probability: definitions, sample space, types of events
- Addition Rule of Probability
- Multiplication Rule of Probability
- Independent & Dependent Events
- Puzzle Practice Questions

UNIT III Time & Work **3**

- Work Efficiency Basics – Units of work, rate-time relationship, efficiency ratios
- Work Equations – Work = Rate × Time, combined work, partial work problems
- Work Sharing – Two/more persons, alternate days, joining/leaving scenarios
- Pipes & Cisterns – Inlet/outlet pipes, leakage, alternate working problems
- Practice Questions – Topic-wise & mixed

UNIT IV Time, Speed & Distance **3**

- Concepts – Speed-distance-time, unit conversions, relative speed, average speed
- Problems on Trains – Crossing objects, platforms, overtaking, relative speed train problems
- Problems on Boats & Streams – Upstream/downstream, average speed, advanced word problems
- Practice Questions – Topic-wise & mixed

UNIT V Logical Reasoning – Advanced **3**

- **Syllogism** – Categorical statements, Venn diagrams, possibility-based, reverse syllogism
- **Data Sufficiency** – Yes/No vs value-based, arithmetic & logical reasoning applications
- **Venn Diagrams** – Set theory, classification problems, application in DI & reasoning

- **Arrangement-Based** – Linear, circular, square, advanced puzzles (blood relations + seating)
- **Statement & Arguments** – Strong vs weak arguments, assumptions, traps in reasoning
- **Statement & Conclusions** – Inference vs conclusion, syllogism-based vs context-based
- **Cause & Effect** – Identifying causes, sequential chains, correlation vs causation

TOTAL PERIODS **15**

COURSE OUTCOME

Upon completion of the course, students will be able to

CO1 Apply fundamentals of arithmetic, percentages, profit/loss, interest, time–work–speed

CO2 Analyze and solve advanced quantitative aptitude problems

CO3 Employ logical reasoning (syllogism, arrangements, data sufficiency, Venn)

CO4 Evaluate arguments, conclusions, and cause–effect relationships

CO5 Develop efficient strategies for aptitude-based tests

SEMESTER III

MA25C06	MATHEMATICS FOR DISCRETE STRUCTURES	L	T	P	C
	(Common to CSE, IT,ADS, AML, CYBER, CSBS, M.Tech CSE)	3	1	0	4

OBJECTIVES

- To introduce Mathematical Logic, Inference Theory and proof methods.
- To provide fundamental principles on combinatorial counting techniques.
- To introduce graph models, their representation, connectivity and traverse ability.
- To explain the fundamental algebraic structures, groups and their algebraic properties.
- To introduce partial ordering and some functions on a set.

UNIT I	LOGIC AND PROOFS	12
Propositional Logic – Propositional Equivalences – Normal Forms - Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy.		CO1
UNIT II	**COMBINATORICS**	**12**
Mathematical Induction – Strong Induction and Well Ordering – The Basics of Counting - The Pigeonhole Principle – Permutations and Combinations – Recurrence Relations -Generating Functions - Solving Linear Recurrence Relations Using Generating Functions– Inclusion –Exclusion – Principle and Its Applications.		CO2
UNIT III	**SETS AND FUNCTIONS**	**12**
Set -Relations on sets – Types of relations and their properties – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram. Functions: Characteristic function of a set– Hashing functions – Recursive functions – Permutation functions		CO3
UNIT IV	**GRAPHS**	**12**
Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Matrix Representation of Graphs and Graph Isomorphism – Connectivity – Euler and Hamilton Paths		CO4
UNIT V	**ALGEBRAIC STRUCTURES**	**12**
Groups – Subgroups – Homomorphisms – Isomorphism - Normal Subgroup and Coset – Lagrange's Theorem.		CO5

TOTAL : 60 PERIODS

TEXT BOOKS

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill Pub.Co.Ltd., Seventh Edition, Special Indian Edition, New Delhi, 2012.
2. Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, Thirtieth Reprint, New Delhi, 2011.

REFERENCE BOOKS

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Pearson Education, Fifth Edition, New Delhi, 2014
2. Seymour Lipschutz and Mark Lipson," Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., Third Edition, New Delhi, 2013.
3. Thomas Koshy," Discrete Mathematics with Applications", Elsevier Publications, Boston, 2004.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Construct proofs by using direct proof, proof by contraposition, proof by contradiction. Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositions. Logic helps in arriving inferences for any problem.
CO2	Solve problems such as permutation and combination and in generating functions. Prove mathematical theorems using mathematical induction. Demonstrate basic counting principles, compute and interpret the meaning in the context of the particular application. Helps to apply the combinatorial techniques in Algorithms and Data structure for analysis and design.
CO3	Understand relations on a set and functions on a set.
CO4	Apply the concepts of graph theory in data structures, data mining, image segmentation and in clustering.
CO5	Familiar with algebraic systems, groups, sub groups, Lagrange's theorem and normal subgroups. In coding algorithms and in theoretical computer science algebraic structures are applied.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	1	-	-	-	-	1	3	2	1
CO2	3	3	2	2	2	1	-	-	-	-	1	3	2	1
CO3	3	2	2	1	1	1	-	-	-	-	1	3	2	1
CO4	3	3	2	3	3	2	1	-	-	-	2	3	2	1
CO5	3	3	2	3	2	2	1	-	-	-	1	2	1	1

CC25301	CYBER SECURITY ESSENTIALS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the fundamental concepts and core principles of cyber security.
- To identify and analyse various cyber threats, attacks, and vulnerabilities.
- To apply cryptographic techniques to secure data and ensure its integrity.
- To recognize different cyberattacks and implement appropriate defence mechanisms.
- To protect network infrastructures with suitable security measures.

UNIT I	BASICS OF CYBER SECURITY	9
Introduction to Cyber Security Essential Terminologies, OSI Reference Model, TCP/IP Model,Types of Cyber Attacks, Threat categories, Attack vectors, Risk assessment, CIA Triad, Ethical Hacking Essentials, Stages of Hacking, Types of Hacker, Cyber Laws and Standard		CO1
UNIT II	**KALI LINUX AND CYBER ANONYMITY TOOLS**	**9**
Kali Linux Installation, Basic Overview with Kali Linux, Basic Linux commands, Directory commands, File commands. File access commands, Tor Browser, Dark Web, Deep Web, Surface web v/s Dark web. IP address, Types of IP address, MAC address, Types of MAC address, VPN, VPN-working and VPN protocols, Proxy Server, Spoofing.		CO2
UNIT III	**INFORMATION GATHERING**	**9**
Information gathering, Types of Information Gathering, Footprinting and reconnaissance, Outcome of footprinting, Familiarization of various information gathering tools, Open source intelligence, Maltego, Recon-ng, Hunter.io, Art of Googling (Google advanced search operators), Sub-Domain Enumeration, Social Engineering, Types of social engineering, Phishing, how to prevent Phishing attacks.		CO3
UNIT IV	**NETWORK SECURITY AND ATTACK ANALYSIS**	**9**
Networking Basics, TCP and UDP, Important Port Numbers, Network Mapping, Vulnerability analysis, Nessus, Nikto, Lynis, Searchsploit, Metasploit framework, Android Hacking, Malware analysis and source code review. Denial of Service, DoS Evolution, Types of DoS, Symptoms of DoS, Distributed Denial of Service, Hammer, DDosTor, Dos attack Prevention		CO4
UNIT V	**ADVANCED TRENDS IN CYBER SECURITY**	**9**
Fundamentals of Cloud Security - Security in the Internet of Things (IoT) - Mobile Device Security - Blockchain Technology in Cyber Security - Use of AI in Cyber Security - Protecting Critical Infrastructure - Privacy and Data Protection Laws (GDPR, CCPA) -Future Directions in Cyber Security		CO5
		TOTAL : 45 PERIODS

TEXT BOOKS

1. Donaldson, S., Siegel, S., Williams, C.K., "Enterprise Cybersecurity -How to Build a Successful Cyber defense", A Press, 1st,2015.(Unit 1.II)
2. Charles P. Pfleeger & Shari Lawrence Pfleeger "Security in Computing ", 6th Edition (2020).(Unit III to V)

REFERENCE BOOKS

1. Michael E. Whitman & Herbert J. Mattord , "Principles of Information Security" 7th Edition, July 2021.
2. Mark Stamp, "Information Security: Principles and Practice" ,4th Edition, 2022

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Understand the basic concepts and principles of cyber security.
CO2	Generalize and comprehend various cyber threats and vulnerabilities, apply cryptographic methods to secure data.
CO3	Apply different types of cyber attacks and implement suitable defenses. Safeguard network infrastructures with security measures.
CO4	Understand the security operations and incident responses effectively.
CO5	Analyse the emerging trends and future directions in cyber security.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	2	1	–	2	1	1	2	–	3	–
CO2	3	3	3	2	2	2	1	3	2	1	2	–	3	–
CO3	2	3	2	3	2	2	1	3	1	1	2	–	3	–
CO4	2	2	3	3	3	1	–	2	1	1	2	–	3	–
CO5	2	2	2	2	3	1	–	2	2	1	3	–	3	–

IT25C03	DIGITAL PRINCIPLES AND COMPUTER ARCHITECTURE	L	T	P	C
	(Common to IT)	3	0	0	3

OBJECTIVES

- To learn about Boolean algebra and simplification of Boolean functions.
- To learn about the design of different combinational circuits.
- To understand the processor functional units, instruction execution, and basic datapath design.
- To understand the concepts of pipelined execution.
- To learn about the different levels of memory hierarchy and techniques for I/O device communication.

UNIT I	BOOLEAN ALGEBRA AND LOGIC GATES	9
Number Systems: Digital, Binary, Octal and Hexadecimal Numbers – Number-Base Conversions – Complements of Binary Numbers –Signed Number Representation - Arithmetic Operations – Binary Codes - Boolean Algebra –Theorems and Postulates – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions – Digital Logic Gates – Implementation of Universal gates.		**CO1**

UNIT II	COMBINATIONAL LOGIC	9
Combinational Circuits – Analysis and Design Procedures - Binary Adders- Half adder, Full adder , Parallel adder – Subtractor – Half Subtractor , Full Subtractor , Parallel Subtractor- 2-bit Binary Multiplier - Decimal Adder - Parity Generator and Checker – 2-bit Magnitude Comparator – Decoders – Encoders – Multiplexers – Demultiplexers.		**CO2**

UNIT III	PROCESSOR AND CONTROL UNIT	9
Eight ideas-Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation –MIPS addressing modes- A Basic MIPS implementation – Building a Datapath		**CO3**

UNIT IV	PIPELINING AND PARALLELISIM	9
. Pipelining – Pipelined data path and control –Data Hazards & Control Hazards – Parallel processing challenges — Flynns classification — SISD, MIMD, SIMD, SPMD, and Vector Architectures — Hardware multithreading — multi-core processors and other Shared Memory Multiprocessors		**CO4**

UNIT V	MEMORY & I/O SYSTEMS	9
Memory Hierarchy — memory technologies — cache memory — measuring and improving cache performance — virtual memory, TLBs — Accessing I/O Devices — Interrupts — Direct Memory Access — Bus structure — Bus operation — Arbitration —Interface circuits — USB.		**CO5**

TOTAL : 45 PERIODS

TEXT BOOKS

1. J.L. Hennessy and D.A. Patterson," Computer Architecture: A Quantitative Approach" , 5th edition, 2019.
2. M. Morris Mano, "Computer System Architecture," 3rd Edition, Pearson Education, 1993.

3. M. Morris Mano, Michael D. Ciletti, "Digital Design", Fifth Edition, Pearson Education, 2013.

REFERENCE BOOKS

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, "Computer Architecture and Organization, Third Edition", Tata McGraw Hill, 2012.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Apply the concepts of Arithmetic operations in any number system and various techniques to simplify the Boolean functions.
CO2	Design Combinational Circuits that perform arithmetic operations.
CO3	Explain the structure, operation, and instruction set concepts of a basic computer system.
CO4	Understand pipelined execution with hazard handling. .
CO5	Understand memory hierarchy and I/O interfacing concepts in computer architecture.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2	-	-	-	1	-	-	1	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO3	3	1	1	1	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	3	-	-
CO5	3	1	2	1	-	-	-	-	-	-	-	3	-	-

CS25C07	DATA STRUCTURES	L	P	T	C
	(Common to CSE,IT,ADS,AML,CSBS,M.Tech CSE)	3	0	0	3

OBJECTIVES

- To understand the concepts of ADTs.
- To learn linear data structures like lists, stacks, and queues.
- To learn Non-linear tree data structures.
- To apply Graph structures
- To understand sorting and hashing algorithms

UNIT I	LINEAR DATA STRUCTURES – LIST	9
Abstract Data Types(ADTs)–List ADT–array based implementation–linked list implementation— singly linked lists - doubly linked lists - circularly linked lists - applications of List: polynomial manipulation (Insertion, Deletion, Merge, Traversal).		CO1
UNIT II	**LINEAR DATA STRUCTURES – STACKS, QUEUES**	**9**
StackADT– applications of Stack: Evaluating arithmetic expressions-conversion of Infix to Postfix expression –Queue ADT– Circular Queue– applications of Queue: Priority Queue.		CO2
UNIT III	**NON-LINEAR DATA STRUCTURES – TREES**	**9**
Tree ADT–tree traversals–Binary Tree ADT–expression trees–applications of trees– binary search tree ADT–AVL Trees – B-Tree – Heap.		CO3
UNIT IV	**NON-LINEAR DATA STRUCTURES – GRAPHS**	**9**
Definition – Representation of Graph – Types of graph – Graph traversal -Topological Sort – Bi-connectivity –Graph Algorithms – Single Source Shortest Path Algorithms: Dijkstra's Algorithm – All pair shortest Path Algorithms: Floyds warshall Algorithm–Minimum Spanning Tree: Prim's Algorithm– Kruskal's Algorithm–Applications of Graph.		CO4
UNIT V	**SEARCHING, SORTING AND HASHING TECHNIQUES**	**9**
Sorting: Bubble sort – Selection sort – Insertion sort – Merge sort – Quick sort –Hashing: Hash Functions– Separate Chaining-Open Addressing–Rehashing–Extendible Hashing.		CO5

TOTAL : 45 PERIODS

TEXT BOOKS

1. Mark Allen Weiss,"Data Structures and Algorithm Analysis in C",2nd Edition, Pearson Education,1997.

REFERENCE BOOKS

1. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press,2011.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley, 2013. .
3. Bradley N. Miller, David L. Ranum, " Problem Solving with Algorithms and Data Structure using Python " , Second Edition, 2013
4. Rance D. Necaise," Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.

COURSE OUTCOMES Upon completion of the course, students will be able to	
CO1	Implement abstract data types for linear data structures.
CO2	Apply the different linear data structures to problem solutions.
CO3	Implement abstract data types for non-linear data structures.
CO4	Apply Graph data structure for the real-world problems.
CO5	Critically analyze the various sorting and hash functions that result in a collision free scenario for data storage and retrieval.

MAPPING OF COs WITH POs AND PSOs

COs	PROGRAM OUTCOMES (POs)											PROGRAM SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO 3
CO1	3	3	3	2	2	2	3	2	3	3	3	3	-	-
CO2	3	3	3	3	2	2	3	2	3	3	3	3	-	-
CO3	2	3	3	3	3	2	3	2	3	3	3	3	-	-
CO4	3	2	3	3	3	2	3	2	3	3	3	3	-	-
CO5	3	3	3	3	3	2	3	2	3	3	3	3	-	-

IT25C06	DATABASE DESIGN AND MANAGEMENT	L	P	T	C
	(Common to CSE, IT, ADS, AML, CSBS, M. Tech CSE)	3	0	0	3

OBJECTIVES

- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques
- To understand the fundamental concepts of transaction, concurrency and recovery processing
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To have an introductory knowledge about the Distributed databases, NOSQL and database Security

UNIT I	RELATIONAL DATABASES	9
Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL		CO1
UNIT II	**DATABASE DESIGN**	**9**
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form		CO2
UNIT III	**TRANSACTIONS**	**9**
Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multiversion – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging – ARIES Algorithm		CO3
UNIT IV	**IMPLEMENTATION TECHNIQUES**	**9**
RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation.		CO4
UNIT V	**ADVANCED TOPICS**	**9**
Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control		CO5
		TOTAL : 45 PERIODS

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson

Education, 2017.

3. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

REFERENCE BOOK

1. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan," Database System Concepts",7th edition,2019

COURSE OUTCOMES

Upon completion of the course, the students will gain knowledge on

CO1	Construct SQL Queries using relational algebra
CO2	Design database using ER model and normalize the database
CO3	Construct queries to handle transaction processing and maintain consistency of the database
CO4	Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database
CO5	Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirements

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUCOMES**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3	2	1	-	-	-	2	1	1	2	1	3
CO2	3	1	1	1	1	-	-	-	2	3	2	3	1	2
CO3	3	2	3	2	1	-	-	-	2	1	2	2	3	3
CO4	1	2	3	2	-	-	-	-	3	2	2	1	2	3
CO5	1	1	3	3	2	-	-	-	1	3	2	2	2	2

CS25C10	OPERATING SYSTEMS (Lab Integrated) (COMMON TO CSE, ADS, AML, CSBS, M.Tech CSE)	L	T	P	C
		2	0	2	3

OBJECTIVES

- To introduce the fundamental concepts and design principles of operating systems.
- To explain process management, CPU scheduling, synchronization, and deadlock handling.
- To describe memory and file management mechanisms.
- To provide practical exposure to system-level programming and simulation of OS concepts.
- To enable students to relate theory to practice through Linux commands, shell scripting, and algorithmic simulation.

UNIT I	INTRODUCTION TO OPERATING SYSTEMS	9
Basic Concepts: Operating system objectives and functions, evolution of OS-OS Services, System Calls, Types of OS (Batch, Time Sharing, Distributed, Real-Time) -Operating System Structure – Layered, Monolithic, Microkernel, Modular. Case Study: Linux System Structure. **Lab Integration:** Practice basic **Linux/UNIX commands** for file, process, and user management. Simple **shell scripting** exercises.		**CO1**
UNIT II	**PROCESS MANAGEMENT**	**9**
Processes: Concept, States, Process Control Block (PCB).Process Scheduling: Scheduling criteria and algorithms – FCFS, SJF, RR, Priority. Threads: Multithreading models. Inter process Communication (IPC). **Lab Integration:** Implement CPU Scheduling algorithms in C/Python. Implement **Interprocess Communication** using pipes/message queues/shared memory.		**CO2**
UNIT III	**PROCESS SYNCHRONIZATION AND DEADLOCK**	**9**
Critical Section Problem, Semaphores, Monitors. Classical Synchronization Problems: Producer-Consumer, Reader-Writer, Dining Philosophers. Deadlock: Characterization, Prevention, Avoidance (Banker's Algorithm), Detection, and Recovery. **Lab Integration:** Simulate **process synchronization** using semaphores or monitors. Implement **deadlock detection and avoidance** algorithms.		**CO3**
UNIT IV	**MEMORY MANAGEMENT**	**9**
Memory Partitioning, Paging, Segmentation. Virtual Memory: Demand Paging, Page Replacement Algorithms – FIFO, LRU, Optimal. Allocation Methods – Contiguous, Non-contiguous, Fragmentation. **Lab Integration:** Simulate **memory allocation techniques** (First Fit, Best Fit, Worst Fit). Implement **page replacement algorithms**.		**CO4**
UNIT V	**FILE SYSTEMS AND I/O MANAGEMENT**	**9**

File Concepts, Access Methods, Directory Structure, File Allocation (Contiguous, Linked, Indexed). File Protection and Access Control-Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN.I/O Hardware and Device Drivers overview. **Lab Integration:** Simulate **file allocation techniques** and **disk scheduling algorithms**. Mini project: Build a **simple file system or process scheduler** simulation.	**CO5**
TOTAL : 45 PERIODS	

TEXT BOOKS

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne,"Operating System Concepts", 10th Edition, Wiley, 2018
2. William Stallings,"Operating Systems: Internals and Design Principles", Pearson, 9th Edition,2018

REFERENCE BOOKS

1. Andrew S. Tanenbaum," Modern Operating Systems", 4th Edition, 2015
2. D.M. Dhamdhere,"Operating Systems: A Concept-Based Approach," 3rd Edition, 2009.
3. Achyut S. Godbole,"Operating Systems", 3rd Edition, 2009.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Explain the fundamental concepts, architecture, and design principles of operating systems.
CO2	Analyze and apply process management techniques including CPU scheduling, synchronization, and deadlock handling
CO3	Demonstrate understanding of memory management and file system organization.
CO4	Develop and execute system-level programs and simulations illustrating operating system concepts.
CO5	Apply Linux commands and shell scripting to solve operating system-related problems and perform practical tasks.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	1	-	-	-	-	1	1	3	-	-
CO2	3	3	2	2	2	-	-	-	-	1	1	3	-	-
CO3	3	2	2	2	2	-	-	-	-	1	1	3	-	-
CO4	3	3	3	3	3	2	-	-	-	2	1	3	-	-
CO5	2	2	3	3	3	3	-	-	-	3	2	3	-	-

CS25C11	DATA STRUCTURES LABORATORY USING C	L	T	P	C
	(Common to CSE, IT, ADS, AML, CSBS, M.Tech CSE)	0	0	3	1.5

OBJECTIVES

- To explore data structures based on lists.
- To learn about linear data structures such as stacks and queues.
- To investigate tree-based (non-linear) data structures.
- To develop into graph algorithms and minimum spanning trees.
- To understand sorting and hashing algorithms..

LIST OF EXPERIMENTS

1. **IMPLEMENTATION OF LIST** Write C programs to a) Array implementation of List ADT. b) Design and implement Single Linked List. c) Design and implement Doubly Linked List. d) Design and implement Circular Linked List.	**CO1**
2. **IMPLEMENTATION OF STACK AND QUEUE** Write C programs to a) Design and implement Stack and its operations using List. b) Design and implement Queue and its operations using List.	
3. **APPLICATIONS OF LINEAR DATA STRUCTURE** Write C programs for the following: a) Design and implement polynomial ADT using list b) Uses Stack operations to convert infix expression into postfix expression. c) Uses Stack operations for evaluating the postfix expression.	**CO2**
4. **IMPLEMENTATION OF TREE** a) Write a C program to Design and implement binary Search tree. a) Traverse the above binary tree recursively in pre-order, post-order & in-order.	
5. **IMPLEMENTATION OF ADVANCED TREE** a) Design and Implement AVL tree using Templates. Design and Implement heap tree using Templates.	
6. **IMPLEMENTATION OF SHORTEST PATH ALGORITHMS** Write C programs for the following: a) Design and Implement Dijkstra's algorithm a) Design and Implement Floyd Warshall algorithm.	**CO3**
7. **IMPLEMENTATION OF MINIMUM SPANNING TREE** Write C programs for the following:	

a) Design and Implement Kruskal's algorithm. b) Design and Implement Prim's algorithm.	
9. **IMPLEMENTATION OF MINIMUM SPANNING TREE** Write C programs for the following: a) Design and Implement Kruskal's algorithm. b) Design and Implement Prim's algorithm.	**CO4**

10. GRAPH TRAVERSAL & APPLICATIONS Write C programs to implement the following algorithms: a) Depth first search. b) Breadth first search. a) Topological Sorting.
11. **SORTING AND HASHTABLE IMPLEMENTATION** a) Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order. i. Insertion sort ii.Selection sort iii. Quicksort iv. Merge sort b) Write C programs for implement Hashing–any two collision techniques
TOTAL : 60 PERIODS
LAB REQUIREMENTS
Processors: Intel Atom® processor or Intel® Core™ i3 processor. Operating systems: Windows* Turbo C
REFERENCE BOOKS
1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C",2nd Edition, Pearson Education,1997. 2. Reema Thareja, ―Data Structures Using C‖, Second Edition , Oxford University Press, 2011.
WEB REFERENCES
1. https://www.mygreatlearning.com/blog/data-structures-using-c/ 2. https://www.faceprep.in/data-structures/data-structures-programs/

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Implement and evaluate list-based data structures efficiently.
CO2	Use stacks and queues appropriately to solve algorithmic problems.
CO3	Apply tree structures for hierarchical data and analyse their operations.
CO4	Model problems with graphs, apply traversal and minimum spanning tree algorithms.
CO5	Implement sorting and hashing algorithms and choose the right one for a problem.

MAPPING OF COs WITH POs AND PSOs														
COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	1	1	-	-	2	2	2	3	3	3	2
CO2	3	3	3	1	1	-	-	2	2	2	3	3	3	2
CO3	3	3	3	1	1	-	-	2	2	2	3	3	3	2
CO4	3	3	3	1	1	-	-	2	2	2	3	3	3	2
CO5	3	3	3	1	1	-	-	2	2	2	3	3	3	2

IT25C07	DATABASE DESIGN AND MANAGEMENT LABORATORY	L	T	P	C
	(Common to CSE, IT, ADS, AML, CSBS, M. Tech CSE)	0	0	3	1.5

Objectives

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To be familiar with the use of a front end tool for GUI based application development.

LISTOF EXPERIMENTS

1. **CREATE AND MANAGE DATABASE TABLES** Create a database table, add constraints such as Primary Key, Unique, Check, and Not Null. Perform insert, update, and delete operations using SQL DDL and DML commands.	**CO1**
2. **ESTABLISH TABLE RELATIONSHIPS** Create a set of tables, define foreign key constraints, and incorporate referential integrity between related tables.	
3. **QUERYING TABLES USING WHERE AND AGGREGATE FUNCTIONS** Execute SQL queries using different WHERE clause conditions and implement aggregate functions like COUNT, AVG, SUM, MIN, and MAX.	**CO2**
4. **SUBQUERIES AND SIMPLE JOINS** Query database tables using subqueries and simple join operations to retrieve related data.	
5. **PL/SQL PROGRAMMING: FUNCTIONS AND STORED PROCEDURES** Write SQL user-defined functions and stored procedures using PL/SQL for performing modular database operations..	**CO3**
6. **TRANSACTIONS MANAGEMENT: TCL AND DCL COMMANDS** Execute complex transactions and demonstrate the use of Data Control Language (DCL) and Transaction Control Language (TCL) commands.	
7. **TRIGGERS IN SQL** Write SQL triggers for insert, delete, and update operations to automate actions within a database table.	
8. **VIEWS AND INDEXES** Create database views and indexes for tables containing large numbers of records to improve performance and data abstraction.	**CO4**
9. **XML DATABASE CREATION AND VALIDATION** Create an XML database and validate it using XML Schema (XSD).	
10. **NOSQL DATABASE IMPLEMENTATION** Create document-based, column-based, and graph-based data structures using NoSQL tools.	

11. **CASE STUDY – REAL LIFE DATABASE APPLICATION** Choose one of the following applications and perform the complete database design and implementation: a) Inventory Management for E-Mart Grocery Shop b) Society Financial Management c) Cop Friendly App – eSeva d) Property Management – eMall e) Star Small and Medium Banking and Finance	

TOTAL:45 PERIODS

LAB REQUIREMENTS

- **Hardware: Intel® Core™ i3 Processor or above**
- **Operating System: Windows / Linux**
- **Software Tools: MySQL / Oracle / PostgreSQL / MongoDB / Any suitable NoSQL tool**

REFERENCEBOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *"*Database System Concepts*"*, 7th Edition, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, *"*Fundamentals of Database Systems*"*, 7th Edition, Pearson Education, 2017.

Web References:

1. https://www.w3schools.com/sql/
2. https://www.geeksforgeeks.org/sql-tutorial/
3. https://www.mongodb.com/

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Design and create relational database tables using SQL DDL and DML commands with constraints.
CO2	Query and manipulate database tables using SQL clauses, aggregate functions, and join operations.
CO3	Develop SQL triggers, stored procedures, and user-defined functions for database automation.
CO4	Implement XML and NoSQL databases for structured and unstructured data management.
CO5	Design and develop a complete database-driven application with GUI integration.

MAPPING OF COs WITH POs AND PSOs

	PROGRAM OUTCOMES (POs)											PROGRAM SPECIFIC OUTCOMES (PSOs)		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	1	-	-	-	3	1	3	2	3	2
CO2	2	2	3	2	2	-	-	-	1	2	3	2	1	2
CO3	3	3	2	1	1	-	-	-	1	1	1	2	3	3
CO4	1	3	3	3	1	-	-	-	1	1	3	3	1	3
CO5	3	2	1	1	1	-	-	-	2	2	3	3	1	2

SEMESTER IV

MA25C08	PROBABILITY THEORY AND STATISTICS	L	T	P	C
	Common to CSE, IT, CSBS, ADS , AML and M.TECH(CSE)	**3**	**1**	**0**	**4**

OBJECTIVES

- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in engineering applications.
- To acquaint the knowledge of testing of hypothesis for small and large samples, which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT – I	PROBABILITY AND RANDOM VARIABLES	12
Probability – The axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.		**CO1**
UNIT – II	**TWO - DIMENSIONAL RANDOM VARIABLES**	**12**
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Central limit theorem (for independent and identically distributed random variables).		**CO2**
UNIT – III	**MARKOV MODELS**	**12**
Introduction to Discrete stochastic process - Definition and examples - Markov Process – Discrete Parameter Markov chain – Chapman Kolmogorov theorem (without proof) -State transitions- state probabilities - properties – steady state analysis – absorbing chains.		**CO3**
UNIT – IV	**STATISTICAL TESTING**	**12**
Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) – Goodness of fit.		**CO4**
UNIT – V	**DESIGN OF EXPERIMENTS**	**12**
One way and Two way classifications - Completely randomized design – Randomized block design –Latin square design - 22 factorial design.		**CO5**
		TOTAL : 60 PERIODS

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2017.
2. Ibe, O.C."Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2014.

REFERENCE BOOKS:

1. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2017.
2. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2014.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 4thEdition,Elsevier, 2009.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Apply the basic concepts of probability and random variables to model real-life engineering problems.
CO2	Analyze and interpret one- and two-dimensional probability distributions.
CO3	Evaluate and apply random process concepts in various engineering applications.
CO4	Perform hypothesis testing for small and large samples and draw valid conclusions.
CO5	Design and analyze experiments using statistical methods applied in agriculture and quality control.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUCOMES**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	1	0	0	0	0	1	3	2	1
CO2	3	3	2	2	2	1	0	0	0	0	1	3	2	1
CO3	3	2	2	1	1	1	0	0	0	0	1	3	2	1
CO4	3	3	2	3	3	2	1	0	0	0	2	3	2	1
CO5	3	3	2	3	2	2	1	0	0	0	2	2	1	1

CS25C13	COMPUTER NETWORKS	L	T	P	C
	(Common to CSE)	3	0	0	3

OBJECTIVES

- To understand the protocol layering and physical level communication and to analyse the performance of a network.
- To analyse the contents of Data Link layer packet, based on the layer concept.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer
- To know about different application layer protocols.

UNIT I	INTRODUCTION AND PHYSICAL LAYER	9
Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching		CO1
UNIT II	**DATA-LINK LAYER & MEDIA ACCESS**	**9**
Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC– PPP – Media Access Control – Wired LANs: Ethernet – Wireless LANs – Introduction –IEEE 802.11, Bluetooth – Connecting Devices		CO2
UNIT III	**NETWORK LAYER**	**9**
Network Layer Services – IPV4 Addresses – Forwarding of IP Packets – Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics –IPV6 Addressing – IPV6 Protocol		CO3
UNIT IV	**TRANSPORT LAYER**	**9**
Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol– Transmission Control Protocol-Congestion Control Mechanisms-Streaming Control Transmission Protocol		CO4
UNIT V	**APPLICATION LAYER**	**9**
WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP- Internet Multimedia.		CO5
		TOTAL : 45 PERIODS

TEXT BOOKS

1. Behrouz A. Forouzan, "Data Communications and Networking", Sixth Edition TMH, 2022
2. William Stallings, " Data and Computer Communications, Tenth Edition", Pearson Education, 2014.

REFERENCE BOOKS

1. Larry L. Peterson, Bruce S. Davie," Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2012
2. Nader F. Mir, "Computer and Communication Networks", Second Edition, Prentice Hall2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker," Computer Networks: An Open-Source Approach",

McGraw Hill Publisher, 2011

4. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Sixth Edition, Pearson Education, 2013.

COURSE OUTCOMES Upon completion of the course, students will be able to	
CO1	Understand the basic layers and its functions in computer networks and evaluate the performance of a network.
CO2	Understand the basics of how data flows from one node to another.
CO3	Analyze and design routing algorithms
CO4	Design protocols for various functions in the network
CO5	Understand the working of various application layer protocols

MAPPING OF COs WITH POs AND PSOs

COs	PROGRAM OUTCOMES (POs)											PROGRAM SPECIFIC OUTCOMES (PSOs)		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	1	1	1	1	1	1	1	3	3	-	-
CO2	3	3	3	2	1	1	1	1	1	1	3	3	-	-
CO3	3	3	3	2	1	1	1	1	1	2	3	3	-	-
CO4	3	3	3	2	1	1	1	1	1	2	3	3	-	-
CO5	3	3	3	2	1	1	1	1	1	2	3	3	-	-

CS25C12	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
	(Common to CSE, IT, ADS, AML, CSBS, MTech CSE)	3	0	0	3

OBJECTIVES

- To learn the general framework for analyzing algorithm efficiency
- To be conversant with algorithms for common problems.
- To analyse the algorithms for time/space complexity.
- To write algorithms for a given problem using different design paradigms.
- To understand computational complexity of problems

UNIT I	INTRODUCTION	9
Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – The Analysis Framework – Asymptotic Notations and Basic Efficiency Classes – Mathematical Analysis of Non recursive and Recursive Algorithms – Empirical Analysis of Algorithms. Strassen's matrix multiplication.		CO1
UNIT II	**DECREASE AND CONQUER AND DIVIDE-AND-CONQUER**	**9**
Decrease-and-Conquer– Insertion Sort – Binary Search – Computing a Median and the Selection Problem – Divide-and-Conquer – Merge Sort – Quicksort – The Closest –Pair and Convex –Hull-Problems by Divide-and-Conquer.		CO2
UNIT III	**DYMANIC PROGRAMMING AND GREEDY TECHNIQUE**	**9**
The Knapsack Problem and Memory Functions – Optimal Binary Search Trees – Warshall's Algorithm – Floyd's Algorithm – Greedy Technique – Prim's Algorithm – Kruskal's Algorithm –Dijkstra's Algorithm – Huffman Trees and Codes.		CO3
UNIT IV	**ITERATIVE IMPROVEMENT**	**9**
The Simplex Method – The maximum Flow Problem – Maximum Matching in Bipartite Graphs – The Stable Marriage Problem.		CO4
UNIT V	**COPING WITH THE LIMITATIONS OF ALGORITHM POWER**	**9**
P, NP, and NP- Complete Problems – Backtracking – n-Queens Problem – Hamiltonian Circuit Problem – Subset-Sum Problem – Branch-and-Bound – Assignment Problem – Knapsack Problem – Traveling Salesman Problem.		CO5
		TOTAL : 45 PERIODS

TEXT BOOKS

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, McGraw Hill, 2009.

REFERENCE BOOKS

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Fourth Edition, PHI Learning, 2022.
3. Harsh Bhasin, "Algorithms: Design and Analysis", First Edition, Oxford University Press, 2015.
4. I. Chandra Mohan, "Design and Analysis of Algorithms", Second Edition, PHI Learning, 2012.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Ability to investigate an algorithm's efficiency with respect to running time
CO2	Design and implement problems using algorithmic design techniques such as decrease and conquer and divide and conquer
CO3	Ability to understand the design techniques such as Dynamic programming and Greedy Technique
CO4	Ability to understand the iterative design techniques
CO5	Understand the variations among tractable and intractable problems

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	2	-	-	3	-	2	3	3	2	2
CO2	3	3	3	3	2	-	-	3	-	2	3	3	2	2
CO3	3	3	3	3	2	-	-	3	-	2	3	3	2	2
CO4	3	3	3	3	2	-	-	3	-	2	3	3	2	2
CO5	3	3	3	3	2	-	-	3	-	2	3	3	2	2

IT25C04	PROGRAMMING IN JAVA (COMMON TO CSE, IT, CSBS, M.Tech CSE)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand Object Oriented Programming concepts and fundamentals of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces with database connectivity

UNIT I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	9
Object Oriented Programming concepts - Abstraction – objects and classes - Encapsulation- Inheritance –Polymorphism- Characteristics of Java – The Java Environment-. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays.		CO1
UNIT II	**PACKAGES, INHERITANCE AND INTERFACES**	**9**
Inheritance – Super classes- sub classes – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface - Object cloning -inner classes, Array Lists – Strings, Packages		CO2
UNIT III	**EXCEPTION HANDLING AND I/O CONCEPTS**	**9**
Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams.		CO3
UNIT IV	**CONCURRENT AND GENERIC PROGRAMMING**	**9**
Multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types.		CO4
UNIT V	**EVENT DRIVEN PROGRAMMING AND DATABASE CONNECTIVITY**	**9**
Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events – AWT event hierarchy – layout management - Swing Components- JDBC Architecture - Establishing Connectivity – Working with statements - Creating and executing SQL statements - Working with Result Set.-Simple Java Applications		CO5

TOTAL : 45 PERIODS

TEXT BOOKS

1. Cay S. Horstmann, "Core Java SE 9 for the Impatient", 2nd Edition, Addison-Wesley,2017 .
2. Herbert schildt , "The complete reference", 11th Edition, Tata Mc Graw Hill, New Delhi. 2018.
3. Judith Bishop, "Java Gently : Programming Principles Explained", 3rd Edition, 2000.

REFERENCE BOOKS

1. T. Budd, "An Introduction to Object Oriented Programming", 3rd Edition, Pearson Education, 2009.

2. Y. Daniel Liang , “Introduction to Java programming”, 7th Edition, Pearson education, 2010.
3. C Xavier , “Java Programming – A Practical Approach”, Tata McGraw-Hill Edition, 2011.
4. K. Arnold and J. Gosling, “The Java programming language”, 3rd Edition, Pearson Education, 2000.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Understand the fundamental ideas behind the object oriented approach to programming
CO2	Inculcate concepts of inheritance to create new classes from existing one & Design the classes needed given a problem specification
CO3	Build Java applications using exceptions and I/O streams
CO4	A modern coverage of concurrent programming that focuses on high-level synchronization constructs
CO5	Know the concept of event handling used in GUI with Database Connectivity

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	1	1	2	-	2	1	1	1	2	2	1
CO2	1	1	2	1	1	1	1	2	1	1	1	2	2	2
CO3	1	1	1	1	1	-	1	2	2	2	1	1	2	2
CO4	1	1	2	-	1	-	-	1	1	2	1	3	1	3
CO5	2	2	2	2	2	-	1	2	1	2	2	1	2	2

CC25401	SECURE SOFTWARE ENGINEERING	L	P	T	C
		3	0	0	3

OBJECTIVES

- To know the importance and need for software security.
- To gain knowledge about various attacks.
- To learn secure software design principles and practices.
- To understand risk management in secure software development.
- To know the working of tools related to software security.

UNIT I	NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS	9
Software Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory- Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attack		CO1
UNIT II	**SECURE SOFTWARE DESIGN**	**9**
Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating the Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles		CO2
UNIT III	**SECURITY RISK MANAGEMENT**	**9**
Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management		CO3
U NIT IV	**SECURITY TESTING**	**9**
Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation-Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding-Detection-Tools for Penetration Testing		CO4
UNIT V	**SECURE PROJECT MANAGEMENT**	**9**
Governance and security - Adopting an enterprise software security framework - Security and project management - Maturity of Practice		CO5

TOTAL : 45 PERIODS

TEXT BOOKS

1. Julia H. Allen, “Software Security Engineering”, Pearson Education, 2008. (Unit I,II,V)
2. Evan Wheeler, “Security Risk Management: Building an Information Security Risk”,1st Edition, 2011(III,V)
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, “The Art of Software Identifying Software Security Flaws”, 1st Edition, 2006.

REFERENCE BOOKS:

1. Gary McGraw, "Software Security: Building Security" In Addison-Wesley, 1st Edition, 2006.
2. Michael Howard, David LeBlanc, "Writing Secure Code", Microsoft Press,2008.
3. Mark Dowd, John McDonald, Justin Schuh,"The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities",Addison-Wesley, 1st Edition, 2006

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Understand the importance of software security and identify major sources of software vulnerabilities.
CO2	Analyze different types of software attacks and propose suitable defensive strategies.
CO3	Apply secure software design principles and methodologies to develop robust applications.
CO4	Perform risk management processes including threat identification, risk evaluation, and mitigation planning.
CO5	Utilize security testing tools for vulnerability detection, penetration testing, and improving software assurance.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSO's)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2	2	1	1	1	1	1	1	3	-	-
CO2	3	3	3	2	2	1	1	1	1	1	1	3	-	-
CO3	3	3	3	2	2	1	1	1	1	1	1	3	-	-
CO4	3	3	3	2	2	1	1	1	1	1	1	3	-	-
CO5	3	3	3	2	2	1	1	1	1	1	1	3	-	-

CC25408	WEB TECHNOLOGIES AND APPLICATION SECURITY (Lab Integrated)	L	T	P	C
		2	0	2	3

OBJECTIVES

- To understand the fundamentals of web application security
- To focus on wide aspects of secure development and deployment of web applications
- To learn how to build secure APIs
- To learn the basics of vulnerability assessment and penetration testing
- To get an insight about Hacking techniques and Tools

UNIT I	INTRODUCTION	9
History of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation		CO1
UNIT II	**SECURE DEVELOPMENT AND DEPLOYMENT**	**9**
Security Testing, Security Incident Response Planning,The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)		CO2
UNIT III	**SECURE API DEVELOPMENT**	**9**
API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Encryption, Audit logging, Securing service-to-service APIs: API Keys, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests.		CO3
UNIT IV	**VULNERABILITY ASSESSMENT AND PENETRATION TESTING**	**9**
Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database- based vulnerability scanners, Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing		CO4
UNIT V	**HACKING TECHNIQUES AND TOOLS**	**9**
Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite		CO5

TOTAL : 15 PERIODS

TEXT BOOKS

1. Andrew Hoffman," Web Application Security: Exploitation and Countermeasures for Modern Web Applications", First Edition, 2020, O'Reilly Media, Inc.(**Unit I-V)**
2. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead," Software Security Engineering: A Guide for Project Managers," Addison-Wesley Professional, 2008 (Unit II)

REFERENCE BOOKS

1. Bryan Sullivan and Vincent Liu, Web Application Security: A Beginner's Guide, McGraw-Hill, 2017.
2. Eric Cole and Ronald L. Krutz, Network Security Bible, John Wiley & Sons Inc, 2017.

Practical Exercises:

1. Install Wireshark and explore the various protocols
   a. Analyze the difference between HTTP vs HTTPS
   b. Analyze the various security mechanisms embedded with different protocols.
2. Identify the vulnerabilities using OWASP ZAP tool
3. Create simple REST API using Python for following operations
   a. GET
   b. PUSH
   c. POST
   d. DELETE
4. Install Burp Suite to do following vulnerabilities:SQL injection
5. Cross-site scripting (XSS)
6. Attack the website using Social Engineering method
7. Implement and test OAuth2 / Token-based API security
8. Implement rate limiting on the API (e.g., token bucket / Redis-backed limiter).
9. Create a pipeline that runs static analysis (SAST), dependency checks, and DAST before deployment.

COURSE OUTCOMES

CO1	Understand and mitigate common web application vulnerabilities using secure coding practices
CO2	Understand the secure configurations for network infrastructure to defend against threats.
CO3	Analyse the web security monitoring, intrusion detection, and incident response tools for proactive threat detection and handling
CO4	Apply the web security policies, incident response procedures, and compliance measures.
CO5	Apply security measures, such as web application firewalls and secure authentication, to protect web applications and data.

MAPPING OF COs WITH POs AND PSOs

COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	–	–	1	1	–	–	2	3	3	–	–
CO2	2	3	2	2	–	1	1	–	–	2	3	3	–	–
CO3	3	2	2	2	–	1	1	-	–	2	3	3	–	–
CO4	2	2	3	2	3	1	1	-	2	2	2	3	–	–
CO5	2	2	3	2	3	1	1	-	2	2	3	3	–	–

CC25411	SECURE SOFTWARE ENGINEERING LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES

- To practice secure coding techniques for preventing common software attacks.
- To identify and fix vulnerabilities through code analysis and remediation.
- To use security tools for detecting and verifying software flaws.
- To implement runtime defences and memory protection mechanisms.
- To perform threat modelling and apply security controls for safe software design.

LIST OF EXPERIMENTS

1.Implement Security Requirements Engineering Using the SQUARE Methodology	**CO1**
2.Implement Security Controls Mapping and Checklist Evaluation for a Login System	
3.Implement Threat and Vulnerability Identification for a Web Application	
4.Implement Static Code Analysis Using a Security Testing Tool	**CO2**
5.Implement Secure Code Remediation Based on Analysis Findings	
6.Implement Buffer Overflow Vulnerability Demonstration in C	**CO3**
7. Implement Defense Mechanisms Against Memory Corruption Attacks (Stack Canary and ASLR)	
8.Implement Software Fuzz Testing on a Simple Parser or CGI Program	**CO4**
9.Implement Web Application Vulnerability Scanning Using OWASP ZAP or Nikto	
10.Implement SQL Injection Attack Demonstration and Prevention Technique	**CO5**

REFERENCE BOOKS **Total Hrs:60**

1. Julia H. Allen, "Software Security Engineering", Pearson Education, 2008
2. Mark Dowd, John McDonald, Justin Schuh,"The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities", Addison-Wesley, 1st Edition, 2006

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Apply secure coding practices to develop software resistant to common attacks.
CO2	Analyze and identify security vulnerabilities in code using manual and automated techniques.
CO3	Utilize static and dynamic analysis tools for vulnerability detection and testing.
CO4	Implement runtime security mechanisms such as stack canaries and ASLR to mitigate attacks.
CO5	Perform threat modeling, risk assessment, and apply security controls to ensure software reliability.

MAPPING OF COs WITH POs AND PSOs														
COs	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFI OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2	1	1	-	-	-	-	2	3	-	-
CO2	2	3	2	2	2	1	-	-	-	-	2	3	-	-
CO3	3	2	2	2	1	1	-	-	-	-	2	3	-	-
CO4	2	2	2	2	2	2	-	-	-	-	2	3	-	-
CO5	2	2	3	2	2	2	-	-	-	-	2	3	-	-

IT25C05	PROGRAMMING IN JAVA LABORATORY	L	T	P	C
	(Common to IT)	0	0	3	1.5

OBJECTIVES

- To Develop programming and problem-solving skills using Java for real-world software applications.
- To Apply Object-Oriented Programming (OOP) principles such as encapsulation, inheritance, polymorphism, and abstraction to design modular programs.
- To Implement exception handling, multithreading, file I/O, and generics to create efficient and robust Java applications.
- To Design Graphical User Interfaces (GUI) using AWT and Swing components with effective event-handling mechanisms.
- To Integrate Java applications with databases (JDBC) to develop complete, interactive, and data-driven systems.

LIST OF EXPERIMENTS	
1. Develop a java application to generate electricity bill. Create a class with the following Consumer no., consumer name, previous month reading, current month reading, and type of EB connection (i.e. domestic or commercial) .Compute the bill amount using the following tariff. If the type of the EB connection is domestic. Calculate the amount to be pain follows. First 100 units –Rs.1 per unit 101-200 units –Rs.2.50 per unit 201-500 units –Rs.4 per unit >501 unit –Rs.6 per unit If the type of the EB connection is commercial ,calculate the amount to be paid follows First 100 units –Rs.2 per unit 101-200 units –Rs.4.50 per unit 201-500 units –Rs. 6 per unit >501 units –Rs. 7 per unit	**CO1**
2. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor with Professor from employee class. Add basic Pay(BP) as the member of all the inherited classes with 97% of BP as DA,10% of BP as HRA,12% of BP as PF,0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.	**CO2**
3. Write a Java program to make frequency count of words in a given text	

4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.	
5. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementation	
6. Complete the following: 1. Create a package named shape. 2. Create some classes in the package representing some common shapes like Square,Triangle, and Circle. 3. Import and compile these classes in other program.	**CO3**
7. Write a Java program to implement user defined exception handling.	
8. Write a Java program to read copy content of one file to other by handling all file related exceptions	
9. Write a Java program that creates three threads. First thread displays "Good Morning" everyone second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.	
10. Write a java program to find the maximum value from the given type of elements using a generic function	**CO4**
11. Write a program in Java for String handling which performs the following: i) Checks the capacity of StringBuffer objects. ii) Reverses the contents of a string given on console and converts the resultant string in upper case. iii) Reads a string from console and appends it to the resultant string of ii.	
12. Write a program to perform string operations using ArrayList. Write functions for the following a. Append - add at end b. Insert – add at particular index c. Search d. List all string starts with given letter	**CO5**
13. Write a java Program to create a window when we press a. M or m the window displays Good Morning b. A or a the window displays Good After Noon c. E or e the window displays Good Evening d. N or n the window displays Good Night	
14. Create a GUI program in java with the following components. a. A frame with Flow layout.	

b. Add the following components on to the frame. i. Two Text Field ii. A button with the label display c. Allow the user to enter data into the JTextField d. When the button is clicked paint the frame by displaying the data entered in the JTextField e. Allow the user to properly close the frame	
15. Design and Develop the GUI application with database connectivity of your choice	
TOTAL : 45 PERIODS	
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS	
Standalone desktops with any JDK IDE (like NetBeans 1.8v) 30 Nos.	
(or)	
Server with Java Web Server supporting 30 terminals	
REFERENCE BOOKS	
1. Herbert schildt , The complete reference, 11th edition, Tata Mc Graw Hill, New Delhi. 2018.	
WEB REFERENCES	
1. https://www.startertutorials.com/corejava/resources 2. https://docs.oracle.com/javase/tutorial/ 3. https://wiki.c2.com/?JavaLinks	
COURSE OUTCOMES **Upon completion of the course, students will be able to**	

CO1	Apply fundamental Object-Oriented Programming concepts to design and implement reusable Java classes, interfaces, and packages.
CO2	Develop Java programs incorporating exception handling, multithreading, and file input/output operations for robust applications.
CO3	Utilize generics and collections to implement efficient and flexible data manipulation and management.
CO4	Design and implement event-driven GUI applications using Java Swing and AWT components.
CO5	Develop and deploy Java applications with database connectivity using JDBC for real-time data management.

MAPPING OF COs WITH POs AND PSOs														
CO'S	**PROGRAM OUTCOMES (POs)**											**PROGRAM SPECIFIC OUTCOMES (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	1	2	-	2	2	2	-	2	2	3	
CO2	3	3	3	2	2	-	2	2	2	1	2	3	3	
CO3	3	3	3	2	2	-	2	2	2	1	2	2	3	
CO4	2	3	3	1	2	-	2	2	2	-	2	2	3	
CO5	3	3	3	2	2	-	2	2	2	1	2	3	3	