B.Tech. Degree

in

INFORMATION TECHNOLOGY

CURRICULUM & SYLLABUS (CBCS)

(For students admitted from the Academic Year 2022-2023)

DEPARTMENT OF INFORMATION TECHNOLOGY

St. XAVIER'S CATHOLIC COLLEGE OF ENGINEERING

CHUNKANKADAI, NAGERCOIL – 629 003.

KANYAKUMARI DISTRICT, TAMIL NADU, INDIA

St. XAVIER'S CATHOLIC COLLEGE OF ENGINEERING

Chunkankadai, Nagercoil – 629 003.

AUTONOMOUS COLLEGE AFFILIATED TO ANNA UNIVERSITY

ACADEMIC REGULATIONS 2022

B.TECH. INFORMATION TECHNOLOGY CURRICULUM

CHOICE BASED CREDIT SYSTEM

Inconsonance to the vision of our college,

An engineering graduate we form would be a person with optimal human development, i.e. physical, mental, emotional, social and spiritual spheres of personality.

He/she would be also a person mature in relationships, especially knowing how to treat everyone with respect, including persons of complementary gender with equality and gender sensitivity guided by clear and pro-social values.

He/she would be patriotic and would hold the Indian Constitution and all the precepts it outlays close to his heart and would have a secular spirit committed to safeguard and cherish the multi-cultural, multi-religious and multi-linguistic ethos of Indian Society.

Academically, he/she would be a graduate with a strong engineering foundation with proficient technical knowledge and skills. He/she would have enough exposure and experience into the ethos of relevant industry and be industry ready to construct a successful career for himself and for the benefit of the society.

He/she would have been well trained in research methodology and would have established himself as a researcher having taken up many research projects, with sound ethical standards and social relevance. He/she would be a person with a passion for technical innovations committed to lifelong learning and research.

He/she would be well prepared and confident to develop ingenuous solutions to the problems people face as an individual and as a team and work for the emancipation of our society with leadership and courage.

This Information Technology programme intends to produce graduates with essential skills to take on appropriate professional positions upon graduation and progress into leadership qualities, pursue research or post graduate studies in the field of IT.

Upon graduation a student should be able to explain and apply appropriate methodologies on scientific and mathematical foundations and adapt emerging technologies in the management of

IT resources to help individuals or organizations to achieve its goals and objectives for the welfare of humane society.

1. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1.	Apply analytical and critical thinking to meet the requirements of industry, academia and research.
2.	Develop an intelligent system by applying the knowledge of computing tools and techniques to solve real world problems.
3.	Develop computerware by understanding the importance of social, business and environmental needs in the human context.
4.	Design optimal solution with work ethics and adaptability to address complex engineering problems in multi-disciplinary industries.
5.	Inculcate a high degree of professionalism, leadership skills, effective communication and team-spirit in heterogeneous environment.

2. PROGRAM OUTCOMES (POs)

PO#	Graduate Attribute
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 modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**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.
11	**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.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

3. PROGRAM SPECIFIC OUTCOMES (PSOs)

1	Apply programming proficiencies to solve complex engineering problems.
2	Build and manage IT infrastructure to solve real world problems with modelling and prediction tools, techniques and resources.
3	Comprehend the lifelong learning on technological advancement and practice professional ethics in concern for social well-being.

PEO's - PO's & PSO's MAPPING:

PEO#	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
PEO1	3	3	2	1	-	1	-	-	-	-	-	1	2	-	1
PEO2	3	2	2	2	3	1	-	-	-	-	-	2	1	3	1
PEO3	-	-	3	2	2	2	3	-	-	-	1	1	1	3	1
PEO4	3	2	3	3	1	-	-	3	-	2	-	1	1	2	1
PEO5	-	-	-	-	-	1	-	-	3	3	3	2	-	-	2

PROGRAM ARTICULATION MATRIX

Year	Semester	Course Code	PO												PSO		
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
I	I	MA22101	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
		PH22101	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-
		CH22101	3	2	2	1	-	-	2	-	-	-	-	1	2	-	-
		CS22101	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-
		HS22102	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
		EN22101	-	-	-	-	-	-	-	-	2	2	-	2	-	-	1
		BS22101	3	1	-	-	-	2	2	-	2	1	-	1	2	-	-
		CS22102	3	3	3	3	2	-	-	-	-	-	-	1	3	-	-
		HS22101	3	2	2	1	-	-	2	-	2	-	1	1	-	3	-
	II	MA22201	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
		ES22202	2	2	-	-	-	1	-	-	-	-	-	1	-	2	-
		CS22201	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
		ME22201	3	1	-	-	-	-	-	-	3	1	-	1	-	2	-
		GE3152	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

		EN22201	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
		PH22203	2	1	-	-	-	-	-	-	2	1	-	1	2	-	-
		CH22201	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
		CS22202	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
		ES22203	3	-	-	-	-	-	-	-	3	1	-	1	-	1	-
II	III	MA22302	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
		IT22301	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		IT22302	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		CS22301	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		CS22302	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
		GE3252	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
		CS22305	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
		CS22306	2	2	2	1	2	-	-	-	-	-	-	2	-	3	-
		SD22301	3	2	2	-	1	1	1	1	2	3	1	2	2	1	2
		AC22301	-	1	1	1	1	1	1	1	1	1	1	1	-	-	2
		HS22301	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
	IV	IT22401	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
		CS22402	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		CS22403	3	1	1	2	-	-	-	-	-	-	-	1	2	-	-
		IT22402	3	3	3	1	2	-	-	-	-	-	-	1	-	3	-
		IT22403	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
		CS22405	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		IT22404	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
		SD22401	3	2	2	-	1	1	1	1	2	3	1	2	2	1	2
		AC22401	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
III	V	IT22501	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		IT22502	3	3	3	1	3	-	-	-	-	-	-	-	2	-	-
		IT22503	3	2	1	1	3	-	-	-	-	-	-	1	3	-	-
		IT22504	2	2	-	-	-	-	-	-	2	2	1	2	-	2	3
		IT22505	2	2	1	2	3	3	1	1	2	2	1	2	2	2	3
		SD22501	2	2	2	-	1	1	1	1	2	2	1	2	2	1	2
		AC22501	1	1	1	1	1	2	1	2	1	1	1	1	-	-	1
		HS22501	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
	VI	HS22601	1	1	1	1	2	2	3	3	2	2	1	2	-	-	3
		CS22601	3	2	1	-	-	-	-	-	-	-	-	-	-	-	3
		IT22601	3	2	2	-	2	-	-	-	-	1	-	-	-	2	-
		SD22601	3	2	2	-	1	1	1	1	2	3	1	2	2	-	2
IV	VII	MS22701	-	1	1	1	1	1	1	1	2	1	1	2	-	-	3
		IT22701	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		IT22702	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
		IT22703	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3
		SD22701	3	2	2	-	1	1	1	1	2	3	1	2	2	-	2
	VIII	IT22801	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES								
1.	MA22101	Matrices and Calculus	BSC	3	1	0	4	4
2.	PH22101	Engineering Physics	BSC	3	0	0	3	3
3.	CH22101	Engineering Chemistry	BSC	3	0	0	3	3
4.	CS22101	Problem Solving and Python Programming	ESC	3	0	0	3	3
5.	HS22102	Universal Human Values: Understanding Harmony and Ethical Human Conduct	HSMC	2	0	0	2	2
THEORY COURSES WITH PRACTICAL COMPONENT								
6.	EN22101	Communicative English	HSMC	2	0	2	4	3
PRACTICAL COURSES								
7.	BS22101	Physics & Chemistry Laboratory	BSC	0	0	4	4	2
8.	CS22102	Python Programming Laboratory	ESC	0	0	4	4	2
MANDATORY COURSES								
9.	IP22101	Induction Programme	-	-	-	-	-	0
10.	HS22101	Higher Order Thinking	MC	1	0	0	1	1
TOTAL				**17**	**1**	**10**	**28**	**23**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES								
1.	MA22201	Statistics and Numerical Methods	BSC	3	1	0	4	4

2.	ES22202	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
3.	CS22201	Programming in C	ESC	3	0	0	3	3
4.	ME22201	Engineering Graphics	ESC	2	0	2	4	3
5.	GE3152	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
THEORY COURSES WITH PRACTICAL COMPONENT								
6.	EN22201	Technical English	HSMC	2	0	2	4	3
7.	PH22203	Physics for Information Science	BSC	2	0	2	4	3
8.	CH22201	Environment and Sustainability	BSC	2	0	2	4	3
PRACTICAL COURSES								
9.	CS22202	C Programming Laboratory	ESC	0	0	4	4	2
10.	ES22203	Engineering Practices Laboratory	ESC	0	0	4	4	2
TOTAL				**18**	**1**	**16**	**35**	**27**

SEMESTER III

SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE - GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSES								
1.	MA22302	Discrete Mathematics	BSC	3	1	0	4	4
2.	IT22301	Computer Architecture	PCC	3	0	0	3	3
3.	IT22302	Digital Systems	PCC	3	0	0	3	3
4.	CS22301	Object Oriented Programming	PCC	3	0	0	3	3
5.	CS22302	Data Structures	PCC	3	0	0	3	3
6.	GE3252	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
PRACTICAL COURSES								
7.	CS22305	Object Oriented Programming Laboratory	PCC	0	0	4	4	2

8.	CS22306	Data Structures Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
9.	SD22301	Coding Skills and Soft Skills Training – Phase I	EEC	0	0	4	4	2
MANDATORY COURSES								
10.	AC22301	Constitution of India	MC	2	0	0	2	0
11.	HS22301	Value Education-I	MC	1	0	0	1	0
TOTAL				**19**	**1**	**12**	**32**	**23**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES								
1.	IT22401	Fundamentals of Algorithm Analysis	PCC	3	0	0	3	3
2.	CS22402	Database Management Systems	PCC	3	0	0	3	3
3.	CS22403	Operating Systems	PCC	3	0	0	3	3
THEORY COURSES WITH PRACTICAL COMPONENT								
4.	IT22402	Probability and Machine Learning	PCC	2	0	2	4	3
5.	IT22403	Web Essentials	PCC	2	0	2	4	3
PRACTICAL COURSES								
6.	CS22405	Database Management Systems Laboratory	PCC	0	0	4	4	2
7.	IT22404	Operating Systems Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
8.	SD22401	Coding Skills and Soft Skills Training - Phase II	EEC	0	0	4	4	2

MANDATORY COURSES								
9.	AC22401	Industrial Safety Engineering	MC	2	0	0	2	0
TOTAL				**15**	**0**	**16**	**31**	**21**

On the completion of second-year the students can understand and apply the knowledge of scientific, mathematical, theoretical foundations and computing tools to solve real world problems.

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES WITH PRACTICAL COMPONENT								
1.	IT22501	Data Communication and Networking	PCC	2	0	2	4	3
2.	IT22502	Software Engineering	PCC	2	0	2	4	3
3.		Professional Elective - I	PEC	2	0	2	4	3
4.		Professional Elective - II	PEC	2	0	2	4	3
PRACTICAL COURSES WITH THEORY COMPONENT								
5.	IT22503	Mobile Application Development Laboratory	PCC	1	0	2	3	2
EMPLOYABILITY ENHANCEMENT COURSES								
6.	IT22504	Technical Seminar	EEC	0	0	2	2	1
7.	IT22505	Inplant / Industrial Training (2 weeks - During 4th semester Summer Vacation)	EEC	-	-	-	-	1
8.	SD22501	Coding Skills and Soft Skills Training - Phase III	EEC	0	0	4	4	2
MANDATORY COURSES								
9.	AC22501	Entrepreneurship Development	MC	2	0	0	2	0
10.	HS22501	Value Education - II	MC	1	0	0	1	0
TOTAL				**12**	**0**	**16**	**28**	**18**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES								
1.	HS22601	Professional Ethics	HSMC	3	0	0	3	3
2.	CS22601	Compiler Design	PCC	3	0	0	3	3
3.		Open Elective - I	OEC	3	0	0	3	3
THEORY COURSES WITH PRACTICAL COMPONENT								
4.	IT22601	Data Science	PCC	2	0	2	4	3
5.		Professional Elective - III	PEC	2	0	2	4	3
6.		Professional Elective - IV	PEC	2	0	2	4	3
EMPLOYABILITY ENHANCEMENT COURSES								
7.	SD22601	Coding Skills, Logical Reasoning and Quantitative Aptitude Training – Phase I	EEC	0	0	4	4	2
TOTAL				**15**	**0**	**10**	**25**	**20**

On the completion of third-year the students can adapt emerging IT technologies to solve challenging engineering problems in multi-disciplinary industries.

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY COURSES								
1.	MS22701	Principles of Management	HSMC	3	0	0	3	3
2.	IT22701	Cryptography and Network Security	PCC	3	0	0	3	3
3.		Open Elective - II	OEC	3	0	0	3	3
4.		Open Elective - III	OEC	3	0	0	3	3
THEORY COURSES WITH PRACTICAL COMPONENT								

5.		Professional Elective - V	PEC	2	0	2	4	3
6.		Professional Elective - VI	PEC	2	0	2	4	3
PRACTICAL COURSES								
7.	IT22702	Security Lab	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
8.	IT22703	Product development Lab/ Mini project work	EEC	0	0	6	6	3
9.	SD22701	Coding Skills, Logical Reasoning and Quantitative Aptitude Training - Phase II	EEC	0	0	4	4	2
TOTAL				**16**	**0**	**18**	**34**	**25**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICAL COURSES								
1.	IT22801	Internship/ Project Work	EEC			16		8
TOTAL				**0**	**0**	**16**	**0**	**8**

On the completion of final year, the students can design ethical solutions and manage IT infrastructure for the sustainable development of humane society**.**

SUMMARY

INFORMATION TECHNOLOGY									
Sl.No	**Subject Area**	**Credits Per Semester**							**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
1	HSMC	5	4	1			3	3		16
2	BSC	12	10	4						26
3	ESC	5	13							18
4	PCC			16	19	8	6	5		54
5	PEC					6	6	6		18
6	OEC						3	6		9
7	EEC			2	2	4	2	5	8	23
8	MC	1		0	0	0				1
9	AC				×	×				0
Total		23	27	23	21	18	20	25	8	165

OPEN ELECTIVE - I

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CERDITS
				L	T	P		
1	IT22681	Python for Data Science	OEC	3	0	0	3	3
2	IT22682	Internet of Things	OEC	3	0	0	3	3

OPEN ELECTIVE – II

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CERDITS
				L	T	P		
1	IT22781	Introduction to Web Technology	OEC	3	0	0	3	3
2	IT22782	Fundamentals of Cloud Computing	OEC	3	0	0	3	3

OPEN ELECTIVE - III

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CERDITS
				L	T	P		
1	IT22783	Mobile Computing	OEC	3	0	0	3	3
2	IT22784	Neural Network and Fuzzy Logic Systems	OEC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES

LIST OF IDENTIFIED VERTICALS	
1	INTERNET TECHNOLOGIES
2	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
3	DATA SCIENCE
4	INFORMATION ASSURANCE AND SECURITY
5	COGNITIVE TECHNOLOGIES

Semester	VERTICAL 1	VERTICAL 2	VERTICAL 3	VERTICAL 4	VERTICAL 5
	Internet Technologies	**Artificial Intelligence and Machine Learning**	**Data Science**	**Information Assurance and Security**	**Cognitive Technologies**
5	Full Stack Web Development	Soft Computing	Data Analytics	Cyber Ethics and Legal Issues	Quantum Computing
5	Cloud Computing	Artificial Intelligence	NoSQL Databases	Penetration Testing and Vulnerability Analysis	Site Reliability Engineering
6	UI/UX Design	Optimization Techniques	Data Visualization Techniques	Digital Forensics	Edge Computing
6	DevOps	Deep Learning	Text and Speech Analysis	Information Security	AR/VR Mixed Reality
7	Advanced Web Application Development	Cognitive Science	Business Intelligence	Multimedia Security	Prompt Engineering
7	Digital Marketing	Generative AI	Social Media Analytics	Blockchain Technologies	Robotics Process Automation

VERTICAL 1: (6 courses)

INTERNET TECHNOLOGIES

SL.NO	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	IT22511	Full Stack Web Development	PEC-1	2	0	2	4	3
2	IT22512	Cloud Computing	PEC-2	2	0	2	4	3
3	CS22641	UI/UX Design	PEC-3	2	0	2	4	3
4	IT22611	DevOps	PEC-4	2	0	2	4	3
5	IT22711	Advanced Web Application Development	PEC-5	2	0	2	4	3
6	IT22712	Digital Marketing	PEC-6	2	0	2	4	3

VERTICAL 2 :(6 courses)

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

SL.NO	COURSE CODE	COURSE TITLE	CATE - GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CERDITS
				L	T	P		
1	CS22521	Soft Computing	PEC-1	2	0	2	4	3
2	IT22521	Artificial Intelligence	PEC-2	2	0	2	4	3
3	IT22621	Optimization Techniques	PEC-3	2	0	2	4	3
4	CS22622	Deep Learning	PEC-4	2	0	2	4	3
5	IT22721	Cognitive Science	PEC-5	2	0	2	4	3
6	IT22722	Generative AI	PEC-6	2	0	2	4	3

VERTICAL 3: (6 courses)

DATA SCIENCE

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CERDITS
				L	T	P		
1	IT22531	Data Analytics	PEC-1	2	0	2	4	3
2	CS22512	NoSQL Databases	PEC-2	2	0	2	4	3
3	IT22631	Data Visualization Techniques	PEC-3	2	0	2	4	3
4	IT22632	Text and Speech Analysis	PEC-4	2	0	2	4	3
5	IT22731	Business Intelligence	PEC-5	2	0	2	4	3
6	IT22732	Social Media Analytics	PEC-6	2	0	2	4	3

VERTICAL 4: (6 courses)

INFORMATION ASSURANCE AND SECURITY

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PEROIDS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	IT22541	Cyber Ethics and Legal Issues	PEC-1	2	0	2	4	3
2	IT22542	Penetration Testing and Vulnerability Analysis	PEC-2	2	0	2	4	3
3	IT22641	Digital Forensics	PEC-3	2	0	2	4	3
4	IT22642	Information Security	PEC-4	2	0	2	4	3
5	IT22741	Multimedia Security	PEC-5	2	0	2	4	3
6	CS22732	Blockchain Technologies	PEC-6	2	0	2	4	3

VERTICAL 5: (6 courses)

COGNITIVE TECHNOLOGIES

SL.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	IT22551	Quantum Computing	PEC-1	2	0	2	4	3
2	IT22552	Site Reliability Engineering	PEC-2	2	0	2	4	3
3	IT22651	Edge Computing	PEC-3	2	0	2	4	3
4	IT22652	AR/VR Mixed Reality	PEC-4	2	0	2	4	3
5	IT22751	Prompt Engineering	PEC-5	2	0	2	4	3
6	IT22752	Robotics Process Automation	PEC-6	2	0	2	4	3

SYLLABUS

MA22101	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

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

UNIT I	MATRICES	12

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Problem solving using Cayley-Hamilton method – Orthogonal transformation of a symmetric matrix to Diagonal form – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature, rank, index.

UNIT II	DIFFERENTIAL CALCULUS	12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules: sum, product, quotient, chain rules - Implicit differentiation – Logarithmic differentiation –

Applications: Maxima and Minima of functions of one variable.

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12

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 – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV	MULTIPLE INTEGRALS	12

Double integrals – Double integrals in Cartesian and polar coordinates –Area enclosed by plane curves - Change of order of integration – Triple integrals – Volume of solids: cube, rectangular parallelopiped.

UNIT V	ORDINARY DIFFERENTIAL EQUATIONS	12

Linear differential equations of second and higher order with constant coefficients when the R.H.S is e^{ax}, x^n , sin ax, cos ax, $e^{ax}\,x^n$, e^{ax} sinbx, e^{ax} cosbx – Linear differential equations of second and third order with variable coefficients: Cauchy's and Legendre's linear equations – Method of variation of parameter .

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Define the basic concepts of matrices, limit and continuity of a function, differentiation, ODE and integration
CO2:	Explain the properties of matrices and nature of the quadratic form
CO3:	Interpret the techniques of differentiation, partial differentiation, ODE and integration
CO4:	Apply diagonalization of matrices in quadratic form and apply Cayley Hamilton theorem to find the inverse of matrices
CO5:	Solve problems on differentiation, partial differentiation, integration and ODE using different methods

TEXT BOOKS:

1.	Narayanan, S. and ManicavachagomPillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, Reprint 2017.
2.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition,2014.

REFERENCES:

1.	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
2.	Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.
3.	Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
4.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
5.	Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-

3-High, 2- Medium, 1-Low

PH22101	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology
- To help the students to interrelate the topics such as properties of matter, thermal physics, ultrasonics, quantum theory and crystals, learned in the course
- To motivate students to compare and contrast the available equipment in the respective fields
- To induce the students to design new devices that serve humanity by applying the knowledge gained during the course

UNIT I	PROPERTIES OF MATTER	9

Elasticity – Types of Elastic moduli – Factors affecting elasticity - Stress-strain diagram and its uses - beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: determination of young's modulus – I shaped Girders - twisting couple - torsion pendulum: determination of rigidity modulus and moment of inertia – torsion springs - other states of matter

UNIT II	THERMAL PHYSICS	9

Modes of Heat transfer – Thermal conductivity – Newton's law of cooling – Linear heat flow – Thermal conductivity in compound media - Lee's Disc method – Radial heat flow – Rubber tube method – Solar water heater - Thermodynamics – Isothermal and adiabatic process – Otto cycle – Diesel cycle

UNIT III	ULTRASONICS	9

Sound waves – ultrasonics – properties - production: magnetostriction method - piezoelectric method – cavitation - acoustic grating: wavelength and velocity of ultrasonic waves in liquids –

applications: welding, machining, cleaning, soldering and mixing (qualitative) - SONAR – ultrasonic flaw detector - ultrasonography.		
UNIT IV	**QUANTUM PHYSICS**	**9**
Black body radiation – Planck's radiation law – Deduction of Wien's displacement law and Rayleigh Jean's law - Compton effect, Photoelectric effect (qualitative) – matter waves – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – scanning tunneling microscope.		
UNIT V	**CRYSTAL PHYSICS**	**9**
Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, Crystal planes, directions and Miller indices – Characteristics of crystal structures: SC, BCC, FCC and HCP structures - crystal imperfections: point, line and surface defects – crystal growth : epitaxial and lithography techniques		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Recall the basics of properties of matter, thermal physics and ultrasonics, to improve their engineering knowledge
CO2:	Define the advanced physics concepts of quantum theory and the characteristics of crystalline materials
CO3:	Illustrate Bending of beams, thermal behavior and ultrasonic devices to assess societal and safety issues
CO4:	Summarize the dual aspects of matter, crystal structures and imperfections of crystals
CO5:	Apply the moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields

TEXT BOOKS:

1.	Gaur, R.K & Gupta.S.L, Engineering Physics, Dhanpat Rai Publishers, 2016.
2.	Shatendra Sharma & Jyotsna Sharma, Engineering Physics, Pearson India Pvt Ltd., 2018

REFERENCES:

1.	Halliday.D, Resnick, R. & Walker. J, "Principles of Physics", Wiley, 2015.
2.	Bhattacharya, D.K. & Poonam.T., Engineering Physics, Oxford University Press, 2015.
3.	Pandey.B.K, & Chaturvedi.S, Engineering Physics, Cengage Learning India. 2012.
4.	Malik H K & Singh A K, "Engineering Physics", McGraw Hill Education (India Pvt. Ltd.) 2nd edition 2018.
5.	Serway.R.A. & Jewett, J.W, "Physics for Scientists and Engineers", Cengage Learning India. 2010.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-

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

3-High, 2- Medium, 1-Low

CH22101	**ENGINEERING CHEMISTRY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To make the students conversant with water treatment methods and electrochemistry Concept
- To gain basic knowledge of corrosion and protection methods
- To understand the basic concepts and synthesis of various engineering materials, nano materials and fuels
- To familiarise the students with the principles, working process and application of energy storage devices

UNIT I	**WATER TREATMENT**	**9**

Water: Sources, impurities - Hardness of water: Types - Estimation of hardness (EDTA method) - Disadvantages of hard water in boilers (Scale, Sludge) – Softening methods: Internal treatment (Calgon, Sodium Aluminate) and External treatment (Demineralisation process). Domestic water treatment – Desalination of brackish water: RO and Solar desalination method.

UNIT II	**ELECTROCHEMISTRY AND CORROSION**	**12**

Electrochemical cell – Free energy and emf – Nernst equation and applications – Oxidation and reduction potential – Standard electrodes: Standard Hydrogen electrode, Saturated calomel electrode, Glass electrode – pH measurement – Conductometric titration (acid-base, precipitation) and Potentiometric titrations: Redox titration (Fe^{2+} x $Cr_2O_7^{2-}$).

Corrosion – Types: Chemical corrosion and Electrochemical corrosion – Corrosion control methods: Sacrificial anodic and Impressed current Cathodic protection method

UNIT III	**FUELS AND COMBUSTION**	**8**

Fuels - classification of fuels – Comparison of solid, liquid and gaseous fuel - Solid fuel - coal - analysis of coal (proximate only) – Liquid fuel - Petroleum – Refining of petroleum - manufacture of synthetic petrol (Bergius process) – Biodiesel – preparation, properties and uses. Gaseous fuel – CNG, LPG.

Combustion – Calorific value – Types (Gross and Net calorific value) – Dulong's formula – GCV and LCV calculation using Dulong's formula. Flue gas – Analysis of flue gas by Orsat method.

UNIT IV	**ENERGY STORAGE DEVICES**	**8**

Batteries – Types (Primary and Secondary) - Lead acid battery, Lithium ion battery - Super capacitors – Storage principle, types and examples – Electric vehicle – working principle - Fuel cells – microbial fuel cell and polymer membrane fuel cell.

Nanomaterials in energy storage – CNT –Types, properties and applications.		
UNIT V	**ENGINEERING MATERIALS**	**8**
Abrasives – Types: Natural and Artificial – SiC – preparation, properties and uses. Refractories – Types Acidic, Basic, Neutral – Refractoriness, RUL. Cement – Manufacture – Special cement – white cement and water proof cement. Glass – Manufacture, properties and uses		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Recall the basic concepts of water softening, nano materials and batteries
CO2:	Summarize the types of corrosion, fuels and energy storage devices
CO3:	Explain the basic principles of electrochemistry and engineering materials
CO4:	Identify suitable methods for water treatment, fuel and corrosion control
CO5:	Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors

TEXT BOOKS:

1.	P. C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015.
2.	S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.

REFERENCES:

1.	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2.	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi 2015.
3.	Sivasankar B. ''Engineering chemistry'', Tata McGraw Hill Publishing company Ltd, New Delhi, 2008.
4.	B.S.Murty, P.Shankar, Baldev Raj, B B Rath and James Murday, '' Text book of nano science and technology'' Universities press.
5.	O.G. Palanna, ―Engineering Chemistry‖ McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	1	2	-	-
CO3	3	2	2	1	-	-	1	-	-	-	-	1	2	-	-
CO4	3	2	2	1	-	-	2	-	-	-	-	1	2	-	-
CO5	3	2	2	1	-	-	2	-	-	-	-	1	2	-	-
CO	3	2	2	1	-	-	2	-	-	-	-	1	2	-	-

3-High, 2- Medium, 1-Low

CS22101	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics of algorithmic problem solving
- To learn to solve problems using Python conditionals and loops
- To define Python functions and use function calls to solve problems
- To use Python data structures - lists, tuples, and dictionaries to represent complex Data
- To do input/output with files in Python

UNIT I	INTRODUCTION TO COMPUTERS AND PROBLEM SOLVING STRATEGIES	9

Introduction- Components and functions of a computer system- Hardware and Software. Problem solving strategies- Program design tools: Algorithms, Flow charts, Pseudo code

UNIT II	DATA TYPES, EXPRESSIONS, STATEMENTS AND CONTROL FLOW	10

Features of Python -Variables and Identifiers – Data types: Numbers, Strings, Boolean, Tuples, List, Dictionary, Sets - Input operation - Comments, Reserved words, Indentation - Operators and Expressions – Type Conversion - Selection / Conditional Branching Statements - Basic Loop Structures / Iterative Statements - Nested Loops – break statement – continue statement – pass statement

UNIT III	FUNCTIONS AND STRINGS	9

Functions: Function Definition, function call- variable scope and lifetime – return statements. Strings: Definition, operations (concatenation, appending, multiply, slicing) - immutability, comparison, iterations, string methods

UNIT IV	LIST, TUPLES AND DICTIONARIES	9

Lists: Access, updating values- nested, cloning- list operations- list methods- looping in list. Tuples: Tuple operations- nested tuple; Dictionaries- Creating, Accessing, adding, modifying, deleting items

UNIT V	FILES, EXCEPTIONS AND PACKAGES	8

Files: Types of files, Opening and closing Files, Reading and writing files, File positions, Renaming and deleting files. Exceptions: Errors and exceptions, Handling exceptions, Packages

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

CO1:	Describe the algorithmic solutions to simple and complex computational problems
CO2:	Apply functions, modules and packages in Python program and use conditionals and loops for solving problems
CO3:	Analyze conditional branching statements

CO4:	Evaluate python programs
CO5:	Develop programs using compound data types and files

TEXT BOOKS	
1.	Reema Thareja, “Python Programming Using Problem Solving Approach”, 13th Edition, Oxford University Press, 2022.
2.	Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.

REFERENCES	
1.	Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and Programming”, 1st Edition, BCS Learning & Development Limited, 2017.
2.	Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
3.	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data”, Third Edition, MIT Press, 2021.
4.	Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
5.	Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-
CO	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-

3-High, 2- Medium, 1-Low

HS22102	**UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES:

- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education
- To facilitate the students to understand harmony at all the levels of human living, and live accordingly
- To create an awareness on Engineering Ethics and Human Values
- To understand social responsibility of an engineer

UNIT I	**INTRODUCTION TO VALUE EDUCATION**	**6**
Value Education - Definition, Concept and Need for Value Education, Basic Guidelines - The Content and Process of Value Education - Basic Guidelines for Value Education - Self exploration as a means of Value Education - Happiness and Prosperity as parts of Value Education.		
UNIT II	**HARMONY IN THE HUMAN BEING**	**6**
Human Being is more than just the Body- Harmony of the Self ('I') with the Body - Understanding Myself as Co-existence of the Self and the Body - Understanding Needs of the Self and the needs of the Body - Understanding the activities in the Self and the activities in the Body.		
UNIT III	**HARMONY IN THE FAMILY, SOCIETY AND HARMONY IN THE NATURE**	**6**
Family as a basic unit of Human Interaction and Values in Relationships - The Basics for Respect and today's Crisis: Affection, Guidance, Reverence, Glory, Gratitude and Love - Comprehensive Human Goal: The Five Dimensions of Human Endeavour - Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.		
UNIT IV	**SOCIAL ETHICS**	**6**
The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Order - Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.		
UNIT V	**PROFESSIONAL ETHICS**	**6**
Universal Human Values - Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies - Production System and Management Models.		
		TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Illustrate the significance of value inputs in a classroom and start applying them in their life and profession.
CO2:	Explain the role of a human being in ensuring harmony in society and nature.
CO3:	Demonstrate the value of harmonious relationship based on trust and respect in their life and profession.
CO4:	Compare values, skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO5:	Classify ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

TEXT BOOKS:

1	R R Gaur, R Sangal, G P Bagaria, "Human Values and Professional Ethics", Excel Books, New Delhi, 2010.
2	A.N. Tripathy, "Human Values", New Age International Publishers, New Delhi, 2004.

REFERENCES:

1.	Gaur. R.R., Sangal. R, Bagaria. G.P, "A Foundation Course in Value Education", Excel Books, 2009.

2.	Gaur. R.R., Sangal. R, Bagaria. G.P, "Teachers Manual" Excel Books, 2009.
3.	Gaur R R, R Sangal, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2009.
4.	William Lilly, "Introduction to Ethic" Allied Publisher.
5.	Nagarajan, R.S., Professional Ethics and Human values, New Age International Publishers, 2006.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
CO2	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
CO3	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
CO4	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
CO5	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3
CO	1	-	-	-	-	2	2	3	1	1	-	1	-	-	3

3-High, 2- Medium, 1-Low

EN22101	COMMUNICATIVE ENGLISH	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To guide the learners on the basics of language including vocabulary and grammar
- To develop the receptive skills of the learners: Reading and Listening
- To develop the productive skills of the learners: Writing and Speaking
- To make the learners realize the importance of accuracy and fluency
- To help the learners use the language in real situations

UNIT I	VOCABULARY AND LANGUAGE STUDY	6

Vocabulary – Synonyms and Antonyms, Word building – Prefixes and Suffixes – Word formation- Definitions - One word substitutes - Reading for vocabulary and language development- Note making and Summarising - Developing Hints.

UNIT II	READING AND LANGUAGE DEVELOPMENT	6

Parts of speech, Types of sentences – Statement, Interrogative, Imperative, Exclamatory, Wh-questions, **Yes** or **No** questions and tag questions, Formal Letters – Academic, Official, and Business Letters

UNIT III	GRAMMAR AND LANGUAGE DEVELOPMENT	6

Tense and Voice, Auxiliary verbs (be, do, have), Modal verbs - *Types of Reading* : Intensive Reading and Extensive Reading- *Strategies*: Predicting- Skimming and Scanning -Reading for facts - Understanding the parts of paragraph- Learning the transitional signals used in the passage to classify the text

UNIT IV	**FUNDAMENTALS OF WRITING**	**6**
Punctuation and Capitalization- **Sentence formation**: Word order-Completion of sentences-Conjunctions-Transitional signals- sentence and sentence structures- Informal Letters.		
UNIT V	**EXTENDED WRITING**	**6**
Degrees of Comparison – Reported speech **-Paragraph writing**-Topic sentence, supporting sentences and concluding sentence-Informal and Formal expressions		
		TOTAL : 30 PERIODS
PRACTICAL EXERCISES		
Listening (Receptive skill**)** *Intensive Listening: Effective and Attentive Listening*		
Exercises		
1) Listening for gist from recorded speeches		
2) Listening for specific information from recorded conversations		
3) Listening for strengthening vocabulary skills.		
4) Listening to variety of situations and voices- Listening for language development		
5) Listening for pronunciation: syllables, stress and intonation.		
Speaking (Productive Skill)		
Exercises		
1) Introducing oneself and others		
2) Asking for / giving personal information		
3) Practicing dialogues in pairs		
4) Giving directions-Informal and formal dialogues		
5) Speaking in connected speech		
6) Responding to questions		
7) Short presentations		
8) Speaking in small and big groups		
9) Learning and practicing the essential qualities of a good speaker		
		TOTAL: 30 PERIODS
		TOTAL(T+P): 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Apply and practice the correct usages of language
CO2:	Receive the language effectively and meaningfully through receptive skills
CO3:	Produce the language appropriate to the needs and situations exercising productive skills
CO4:	Transfer or interpret any piece of information with accuracy and fluency
CO5:	Apply the language intellectually and confidently

TEXT BOOKS:

1. Shobha. K.N, Rayen, Joavani, Lourdes, “Communicative English”, Cambridge University Press, 2018.
2. Sudharshana.N.P and Saveetha. C, “English for Technical Communication”, Cambridge University Press: New Delhi, 2016.

REFERENCES:

1.	Kumar, Suresh. E., "Engineering English", Orient Blackswan, Hyderabad, 2015.
2.	Means, L. Thomas and Elaine Langlois, "English & Communication for Colleges", Cengage Learning, USA: 2007.
3.	Greendaum, Sydney and Quirk, Randolph, "A Student's Grammar of the English Language", Pearson Education.
4.	Wood F.T, "Remedial English Grammar", Macmillan, 2007.
5.	Kumar, Sanjay and Pushp Lata, ―Communication Skills: A Workbook‖, New Delhi: OUP, 2018.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	-	1	1	-	2	-	-	1
CO2	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO3	-	-	-	-	-	-	-	-	1	1	-	2	-	-	1
CO4	-	-	-	-	-	-	-	-	2	2	-	2	-	-	1
CO5	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO	-	-	-	-	-	-	-	-	2	2	-	2	-	-	1

3-High, 2- Medium, 1-Low

BS22101	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

PHYSICS LABORATORY

OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS

1.	Non-uniform bending – Determination of Young's modulus.
2.	SHM of Cantilever – Determination of Young's modulus.
3.	Poiseuille's flow – Coefficient of viscosity of liquid
4.	Torsional pendulum - Determination of Rigidity modulus.
5.	Newton's ring – Radius of curvature of convex lens.
6.	Lee's Disc – Determination of coefficient of thermal conductivity of bad conductor.

TOTAL: 30 PERIODS

CHEMISTRY LABORATORY	
OBJECTIVES	
• To inculcate experimental skills to test basic understanding of water quality parameters such as, acidity, alkalinity and hardness.	
• To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.	
LIST OF EXPERIMENTS	
1.	Determination of total hardness of water by EDTA method.
2.	Conductometric titration of strong acid and strong base.
3.	Determination of strength of given hydrochloric acid using pH meter.
4.	Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4.
5.	Determination of alkalinity in water sample.
6.	Estimation of iron content of the given solution using potentiometer.
TOTAL: 30 PERIODS	
TOTAL: 60 PERIODS	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Determine different moduli of elasticity used in day to day engineering applications.
CO2:	Calculate the viscosity of liquids and radius of curvature of convex lens
CO3:	Estimate the coefficient of thermal conductivity of bad conductors
CO4:	Determine the water quality parameters of the given water sample.
CO5:	Analyze quantitatively the metals (Fe, Ni,) in the any sample volumetrically as well as by using spectroanalytical methods.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	-	-	-	-	-	-	2	1	-	1	2	-	-
CO2	3	1	-	-	-	-	-	-	2	1	-	1	2	-	-
CO3	3	1	-	-	-	-	-	-	2	1	-	1	2	-	-
CO4	3	1	-	-	-	2	2	-	1	-	-	-	2	-	-
CO5	3	1	-	-	-	2	2	-	1	-	-	-	2	-	-
CO	3	1	-	-	-	2	2	-	2	1	-	1	2	-	-

3-High, 2- Medium, 1-Low

CS22102	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To understand the problem solving approaches
- To learn the basic programming constructs in Python
- To practice various computing strategies for Python-based solutions to real world problems
- To use Python data structures - lists, tuples, dictionaries
- To do input/output with files in Python

LIST OF EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and
2. Python programming using simple statements and expressions
3. Scientific problems using Conditionals and Iterative loops
4. Implementing real-time/technical applications using Lists, Tuples
5. Implementing real-time/technical applications using Sets, Dictionaries
6. Implementing programs using Functions
7. Implementing programs using Strings
8. Implementing real-time/technical applications using File handling
9. Implementing real-time/technical applications using Exception handling
10. Exploring Pygame tool
11. Developing a game activity using Pygame like bouncing ball

TOTAL PERIODS: 60

COURSE OUTCOMES

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

CO1:	Develop algorithmic solutions to simple computational problems.
CO2:	Develop and execute simple Python programs.
CO3:	Implement programs in Python using conditionals, loops and functions for
CO4:	Process compound data using Python data structures
CO5:	Utilize Python packages in developing software applications

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	P	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	1	3	-	-

CO5	3	3	3	3	2	-	-	-	-	-	-	1	3	-	-
CO	3	3	3	3	2	-	-	-	-	-	-	1	3	-	-

3-High, 2- Medium, 1-Low

HS22101	**HIGHER ORDER THINKING**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVES:

- Teaching the students the sources and dynamics of thinking
- Teaching the students the basics of systematic and scientific thinking
- Initiating the students into critical thinking and to use critical thinking in practical life
- Initiating students into creative thinking

UNIT I	**INTRODUCTION TO COGNITION, KNOWLEDGE AND THINKING**	**3**

Cognition - Different Cognitive functions - Cognition and intelligence - Cognitive development: till adolescence and post adolescence - possibility of true knowledge - The sources of Knowledge. Sensation, perception. Reality of perception - Concept formation, abstraction. Memory and retrieving - Introduction to thinking and types of thinking. Systematic thinking

UNIT II	**LOGIC AND REASONING**	**3**

Commonsense and scientific knowledge. Pursuit of truth.- Syllogistic Logic. Greek and Indian. - Exercises

UNIT III	**CRITICAL THINKING SKILLS AND DISPOSITIONS**	**3**

Critical Thinking Skills & Dispositions. Critical Thinking Exercises

UNIT IV	**ANALYSIS OF ARGUMENTS**	**3**

Propositions and fallacies. - Analyzing arguments. - Exercises.

UNIT V	**CREATIVE THINKING AND INNOVATIVE THINKING**	**3**

Evolution of Scientific Thinking and Paradigm Shift. - Dynamics of Thoughts: Hegel. - Convergent thinking and divergent thinking (out of the box thinking). - Problem solving and Planning.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Demonstrate the sources of knowledge and the process of thinking
CO2:	Demonstrate critical thinking skills and dispositions of critical thinking
CO3:	Confidently engage in creative thinking and problem solving

REFERENCES:

1	Introduction to Logic, Irving M. Copi, Carl Cohen and Kenneth McMahon, Fourteenth Edition, Pearson Education Limited, 2014.
2	Teaching Thinking Skills: Theory and Practice, Joan Boykoff Baron and Robert J. Sternberg, W.H. freeman and Company, New York.
3	Cognitive Psychology, Robert J. Sternberg, Third Edition, Thomson Wadsworth, UK

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	-	3	-
CO2	3	2	2	1	-	-	-	-	-	-	-	1	-	3	-
CO3	3	2	2	1	-	-	1	-	1	-	1	1	-	3	-
CO	3	2	2	1	-	-	2	-	2	-	1	1	-	3	-

3-High, 2- Medium, 1-Low

SEMESTER II

MA22201	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To provide the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- 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 solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various numerical methods of solving ordinary differential equations.

UNIT I	TESTING OF HYPOTHESIS	12

Statistical hypothesis -Type I and Type II errors - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t distribution for single mean and equality of means - Test based on F distribution for equality of variances - Chi square test for single variance and goodness of fit - Independence of attributes - Contingency table : Analysis of $r \times c$ tables.

UNIT II	DESIGN OF EXPERIMENTS	12

General principles – Analysis of variance (ANOVA) - One way classification - Completely randomized design (CRD) – Two way classification - Randomized block design (RBD) – Three way classification -Latin square design(LSD) – Two factor experiments: 2^2 factorial design

UNIT III	NUMERICAL SOLUTION OF EQUATIONS	12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel .		
UNIT IV	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION**	**12**
Newton's forward and backward interpolation – Interpolation with unequal intervals - Lagrange's interpolation- Divided differences - Newton's divided difference - Approximation of derivates using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's 1/3, 3/8 rules- Numerical double integration: Trapezoidal and Simpson's rules.		
UNIT V	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	**12**
Single step methods : Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.		
		TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.
CO2:	Discuss the techniques of statistical tests and design of experiments.
CO3:	Explain the solution of equations, ODE, single and multistep methods, interpolations, differentiation and integration.
CO4:	Apply the concept of testing of hypothesis and design of experiment in real life.
CO5:	Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration.

TEXT BOOKS:

1.	Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.
2.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.

REFERENCES:

1.	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3.	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.
4.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics, 4th Edition, Tata McGraw Hill Edition, 2012.
5.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2012.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-

3-High, 2- Medium, 1-Low

ES22202	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the basic circuit components
- To educate on the working principles and applications of electrical machines
- To explain the construction and working of semiconductor devices
- To educate on logic gates, flip flops and registers
- To introduce the functional elements and working of measuring instruments

UNIT I	INTRODUCTION TO ELECTRICAL ENGINEERING	9

Introduction-Conductors, semiconductors and Insulators-Electrostatics – Electric Current-Electromotive Force-Electric Power- Ohm's Law-Basic circuit components-Electromagnetism related laws-Kirchhoff's Laws.

UNIT II	ELECTRICAL MACHINES	9

Construction, working principle and types of DC Generator – Motor- single phase Transformer - single phase and three phase Induction motor -Applications.

UNIT III	ANALOG ELECTRONICS	9

Classification of Semiconductors– Construction, Characteristics and working -PN Junction Diode- Zener Diode - Bipolar Junction Transistor-IGBT- SCR- MOSFET.

UNIT IV	DIGITAL ELECTRONICS	9

Review of number systems, binary codes- Boolean Algebra-Logic gates -Implementation of Boolean expression using K-map –Types of flip flops, Registers.

UNIT V	MEASUREMENTS AND INSTRUMENTATION	9

Functional elements of an instrument –Static and dynamic characteristics of instruments, Errors, Principles of electrical indicating instruments- Types of indicating instruments - Moving Coil and Moving Iron instruments- DSO -Transducers-Resistive Transducers.

	TOTAL PERIODS: 45
COURSE OUTCOMES	
After completing this course, the students will be able to	
CO1:	Apply the basic laws to determine circuit parameters.
CO2:	Explain the construction, working and application of electrical machines.
CO3:	Explain the construction and working of semiconductor devices.
CO4:	Interpret the function of combinational and sequential circuits
CO5:	Interpret the operating principles of measuring instruments.
TEXT BOOKS	
1	M .S.Sukhja ,T.K.Nagsarkar "Basic Electrical and Electronics Engineering" Oxford Higher Education First Edition ,2018.
2	S. Salivahanan, R.Rengaraj "Basic Electrical and Instrumentation Engineering" McGraw Hill Education ,First Edition,2019.
REFERENCES	
1	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw HillEducation, 2019.
2	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.
3	V. K. Mehta, Rohit Mehta "Basic Electrical Engineering", S.Chand & Company Pvt. Ltd, New Delhi, 2012.
4	S.K.Sahdev, Basic of Electrical Engineering, Pearson, 2015
5	B.L Theraja, Fundamentals of Electrical Engineering and Electronics. Chand & Co, 2008.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	-	-	-	1	-	-	-	-	-	1	-	2	-
CO2	2	-	-	-	-	1	-	-	-	-	-	1	-	2	-
CO3	2	-	-	-	-	1	-	-	-	-	-	1	-	2	-
CO4	2	-	-	-	-	1	-	-	-	-	-	1	-	2	-
CO5	2	-	-	-	-	1	-	-	-	-	-	1	-	2	-
CO	2	2	-	-	-	1	-	-	-	-	-	1	-	2	-

3-High, 2- Medium, 1-Low

CS22201	PROGRAMMING IN C	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings.
- To develop applications in C using functions, pointers and structures.
- To do input/output and file handling in C.

UNIT I	BASICS OF C PROGRAMMING	9

Introduction to C programming - Applications of C Language - Structure of C program – C programming: Tokens - Character Set – Keywords – Identifiers - Data Types – Variables – Constants - Storage Classes - Operators and Expressions - Precedence and Associativity – Input / Output statements - Assignment statements - Conditional Branching Statements - Iterative Statements - Nested Loops - Break and Continue Statements- goto Statement

UNIT II	ARRAYS AND POINTERS	9

Introduction to Arrays: One Dimensional Arrays - Declaration of Arrays - Storing Values in Arrays - Accessing the Elements of an Array – Searching Algorithms (Linear Search, Binary Search) - Two Dimensional Arrays - Pointers - Pointer Arithmetic - Array of Pointers - Pointer to Array - Void and Null Pointers.

UNIT III	STRINGS AND FUNCTIONS	9

Functions – Classification of Functions – Strings - String Library Functions – User Defined Functions: Function Declaration/Function Prototype - Function Definition - Function Call - Return Statement - Passing Parameters to Functions (Pass by value, Pass by reference) - Recursion - Sorting Algorithms (Selection Sort, Insertion Sort).

UNIT IV	STRUCTURES AND UNION	9

Structure - Nested Structures - Array of Structures – Structures and Functions - Pointer to Structure - typedef - Dynamic Memory Allocation - Self-referential structures: Singly Linked List - Union.

UNIT V	FILE PROCESSING	9

Files – Types of Files – File Handling Functions - Sequential Access File Processing - Random Access File Processing - Command Line Arguments - Preprocessor Directives.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

CO1:	Explore simple applications in C using basic programming constructs.
CO2:	Develop C programs using arrays and strings.
CO3:	Develop modular programs in C using functions and pointers.
CO4:	Build applications in C using structures.

CO5:	Demonstrate applications using sequential and random-access file processing.

TEXT BOOKS	
1.	ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

REFERENCES	
1	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2	Yashwant Kanetkar, "Let us C", 17th Edition, BPB Publications, 2020.
3	Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
4	Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
5	E. Balagurusamy , "Programming in ANSI C", McGraw Hill Education; Eighth edition:2019, ISBN: 978-9351343202 .

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

ME22201	**ENGINEERING GRAPHICS**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES
The main learning objective of this course is to prepare the students for:
• To draw the engineering curves.
• To draw orthographic projection of points and lines.

- To draw orthographic projection of solids and section of solids.
- To draw the development of surfaces.
- To draw the isometric projections of simple solids and freehand sketch of simple objects.

CONCEPTS AND CONVENTIONS (Not for Examination)

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**	**12**

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

UNIT II	**PROJECTION OF POINTS, LINES AND PLANES**	**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 any one principal plane.

UNIT III	**PROJECTION OF SOLIDS**	**12**

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

UNIT IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**	**12**

Sectioning of solids (Prisms, pyramids cylinders and cones) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

UNIT V	**ISOMETRIC PROJECTIONS AND FREEHAND SKETCHING**	**12**

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids & cylinders, in simple vertical positions.

Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of projection of simple objects by CAD Software (Demonstration purpose only).

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of the course the students will be able to

CO1:	Recall the existing national standards and interpret a given three dimensional drawing.
CO2:	Understand graphics as the basic communication and methodology of the design process.
CO3:	Acquire visualization skills through the concept of projection.
CO4:	Develop the sectioned solids and discover its true shape.
CO5:	Develop imagination of physical objects to be represented on paper for engineering communication.

TEXT BOOKS	
1.	Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
2.	Jeyapoovan T., "ENGINEERING GRAPHICS using AutoCAD", Vikas Publishing House, 7th Edition, 2015.

REFERENCES:	
1.	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
2.	Julyes Jai Singh S., "Engineering Graphics", SRM tri sea publishers, Nagercoil,7th Edition,2015.
3.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
4.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
5.	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.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	1	-	-	-	-	-	-	-	2	-	-	-	2	-
CO2	3	1	-	-	-	-	-	-	-	2	-	-	-	2	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	2	-

CO4	3	1	-	-	-	-	-	-	-	2	-	-	-	2	-
CO5	3	1	-	-	-	-	-	-	-	2	-	-	-	2	-
CO	3	1	-	-	-	-	-	-	-	2	-	-	-	2	-

3-High, 2- Medium, 1-Low

GE3152	**தமிழர் மரபு**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVES:

- தமிழ் மொழியின் மதிப்புகள், இந்தியாவில் உள்ள அடிப்படை மொழிக்குடும்பங்கள் மற்றும் தமிழ் இலக்கிய வகைகளை மாணவர்கள் புரிந்துகொள்ள உதவுதல்.
- மாணவர்கள் பாறை ஓவியங்கள், சிற்பக்கலைகள் மற்றும் இசைக்கருவிகளின் வழி தமிழ் பாரம்பரியத்தைப் புரிந்துகொள்ள வசதி செய்தல்
- தமிழர்களின் கலை மற்றும் வீர விளையாட்டுகளைப் புரிந்து கொள்வதற்கு மாணவர்களுக்கு உதவுதல்.
- தமிழர்களின் திணைக் கருத்துக்கள் மற்றும் அவர்களின் வாழ்க்கை நெறிகளைப் பற்றி மாணவர்களுக்கு விழிப்புணர்வை ஏற்படுத்துதல்
- இந்திய கலாச்சாரத்தில் தமிழர்களின் பங்களிப்பையும் அதன் தாக்கத்தையும் மாணவர்கள் புரிந்துகொள்ள செய்தல்.

அலகு I	**மொழி மற்றும் இலக்கியம்**	**3**

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II	**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை.**	**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, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு

அலகு III	**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**	**3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுக்கள்.

அலகு IV	**தமிழர்களின் திணைக் கோட்பாடுகள்.**	**3**

துமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை

முகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.		
அலகு V	**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு 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.		
		TOTAL: 15 PERIODS

COURSE OUTCOMES:	
இப்பாடத் திட்டத்தின் மூலம் மாணவர்கள் பெறும் பயன்கள்:	
CO1:	தமிழ் மொழியின் முக்கியத்துவம் மற்றும் இலக்கிய வகைகளை விவரிக்க முடியும்.
CO2:	பாறை ஓவியங்கள் முதல் நவீன கலைகள் வரை அவர்களின் அறிவை விவரிக்க முடியும்.
CO3:	தற்காப்புக் கலைளின் வலுவான அடித்தள அறிவை விவரிக்க முடியும்.
CO4:	தமிழர்களின் திணைக் கருத்துக்கள் மற்றும் அதன் மதிப்புகளை விளக்க முடியும்.
CO5:	இந்திய கலாச்சாரத்தில் தமிழர்களின் பங்களிப்பை விவரிக்க இயலும்.

TEXT & REFERENCE BOOKS:	
1.	தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியல் பணிகள் கழகம்.
2.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.
3.	Dr.S.Singaravelu, “Social Life of the Tamils - The Classical Period”, International Institute of Tamil Studies.
4.	Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, “Historical Heritage of the Tamils”, International Institute of Tamil Studies.
5.	Dr.M.Valarmathi, “ The Contributions of the Tamils to Indian Culture”, International Institute of Tamil Studies.
6.	Dr.K.K.Pillay, “Studies in the History of India with Special Reference to Tamil Nadu”.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

EN22201	TECHNICAL ENGLISH	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To widen strategies and skills to augment ability to read and comprehend engineering and technology texts.
- To develop writing skill to make technical presentations.
- To draft convincing job applications and effective reports.
- To strengthen listening skills to comprehend technical lectures and talks in their areas of specialization.
- To cultivate speaking skills both technical and general.

UNIT I	LANGUAGE STUDY	12

Technical Vocabulary- synonyms, antonyms, prefix and suffix, word formation, Homonyms and Homophones - puzzles,- Reading: skimming a reading passage – scanning for specific information- Instruction- Interpreting – Writing: Recommendation- Checklist.

UNIT II	READING AND STUDY SKILLS	6

Active and Passive voice- Extended Definitions- Imperatives- Numerical Adjectives- Purpose Statement – Reading: Critical reading- Newspaper articles- journal reports- editorials and opinion blogs - Report Writing: Fire Accident, Industrial visit, Project report, feasibility report, survey report, business report.

UNIT III	WRITING SKILLS- INTRODUCTION TO PROFESSIONAL WRITING	6

Error Spotting/Common Errors- Concord-Compound words- Abbreviations and Acronyms- Discourse Markers - Finding key information – shifting facts from opinion- interpreting visual material- making inference from the reading passage - Interpretation of charts- - Minutes of the meeting- Paraphrasing- Proposal writing.

UNIT IV	TECHNICAL WRITING AND GRAMMAR	6

If Conditional Clauses- Prepositional Phrases- Fixed and semi fixed expressions- -e-mail communication- reading the attachment files having a poem /joke / proverb/sending their responses through e-mail.- Job application letter and Resume/CV/ Bio-data.

UNIT V	EXTENDED WRITING AND LANGUAGE STUDY	6

Articles- Cause and Effect expressions- Collocations- Sequencing words- Reading longer technical texts and taking down notes- Structure of Essay- Types of Essay: Narrative essay- Descriptive Essay- Analytical Essay- Cause and Effect Essay – Compare and contrast essays.

TOTAL – 30 PERIODS

PRACTICAL EXERCISES

Listening Skills – Listening for professional Development

Listening to UPSC Toppers Mock Interviews- Listening to debates/discussions/different viewpoints /scientific lectures/event narrations/documentaries/telephonic conversations

Speaking Skills –emphasizing communicative establishment

Seeking Information -asking and giving directions- narrating personal experiences/ events- answering interview questions- picture description- presenting a product and giving instruction to use a product – mini presentations-role plays- speaking in formal and informal situations-speaking about one's locations - speaking about great personalities –describing a simple process- telephone skills and etiquette	
TOTAL: 30 PERIODS	
TOTAL (T+P) = 60 PERIODS	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas.
CO2:	Analyze technical contents written on par with international standards and rewrite contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.
CO3:	Present reports and job letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read .
CO4:	Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world
CO5:	Appraise the need for new products and write feasibility and survey reports following the format prescribed in a way to create awareness.
TEXT BOOKS:	
1.	Mike Markrl, " Technical Communication", Palgrave Macmillan, London, 2012.
2.	Sumant,S and Joyce Pereira, "Technical English II", Chennai: Vijay Nicole Imprints Private Limited, 2014.
REFERENCES:	
1.	Raman, Meenakshi & Sangeetha Sharma, "Communication Skills", New Delhi: OUP, 2018.
2.	Rizvi M, Ashraf, " Effective Technical Communication", New Delhi: Tata McGraw-Hill Publishing Company Limited, 2007.
3.	Kumar, Sanjay and Pushp Lata, "Communication Skills: A Workbook", New Delhi: OUP, 2018.
4.	Means, L. Thomas and Elaine Langlois, ―English & Communication for Colleges‖, Cengage Learning, USA: 2007. 5. Greendaum, Sydney and Quirk.
5.	Greendaum, Sydney and Quirk, Randolph, ―A Student's Grammar of the English Language‖, Pearson Education.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**

CO1	-	-	-	-	-	-	-	-	-	3	-	2	-	-	1
CO2	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO3	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO4	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO5	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1
CO	-	-	-	-	-	-	-	-	2	3	-	2	-	-	1

3-High, 2- Medium, 1-Low

PH22203	**PHYSICS FOR INFORMATION SCIENCE**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To understand the concepts of light, electron transport properties and the essential principles of semiconductors.
- To become proficient in magnetic properties of materials and the functioning of optical devices.
- To know the basics of quantum structures and Single electron transistor.
- To induce the students to design new devices that serve humanity by applying the knowledge gained during the course.

UNIT I	**PHOTONICS**	**6**

Interference – Air wedge – LASER – population inversion - Einstein coefficient's –NdYAG Laser - CO2 laser – semiconductor laser – Optical fibre – Total internal reflection – propagation of light – Numerical Aperture and Acceptance angle – Fiber optic communication system – Endoscopy.

UNIT II	**ELECTRICAL PROPERTIES OF MATERIALS**	**6**

Classical free electron theory - Expression for electrical conductivity and Thermal conductivity, Wiedemann-Franz law – Success and failures - Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Band theory of solids - Electron effective mass – concept of hole.

UNIT III	**SEMICONDUCTING MATERIALS**	**6**

Semiconductors –direct and indirect band gap semiconductors – Intrinsic semiconductors Carrier concentration, band gap in intrinsic semiconductors – extrinsic semiconductors - N-type & P-type semiconductors – Variation of carrier concentration and Fermi level with temperature - Hall effect - measurement of Hall coefficient – applications

UNIT IV	**MAGNETIC PROPERTIES OF MATERIALS**	**6**

Magnetic dipole moment – atomic magnetic moment, permeability, susceptibility- Magnetic material classification: diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism,

ferrimagnetism – Domain Theory- B-H curve – Hard and soft magnetic materials – Magnetic storage devices: Magnetic hard disc with GMR sensor		
UNIT V	**OPTOELECTRONIC AND NANODEVICES**	**6**
Carrier generation and recombination processes - Photo diode – solar cell - Organic LED – Optical data storage - Quantum confinement – Quantum structures - single electron phenomena and single electron transistor - Quantum dot laser		
		TOTAL: 30 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Relate the concepts of light, electron transport properties of conductors and basic principles of semiconductors.
CO2:	Define the magnetic properties of materials and the principles of optoelectronic and nano devices.
CO3:	Illustrate laser and fiber optics, classical and quantum concepts of conducting materials, physics of semiconducting materials.
CO4:	Summarize the functioning of various magnetic, optoelectronic and nano devices.
CO5:	Demonstrate the concepts of optics, fibre optics, moduli of elasticity and thermal energy, behavior of conductors, semiconductors and functioning of magnetic, optical and nano devices in various engineering applications.

TEXT BOOKS:	
1.	Gaur, R.K & Gupta.S.L, Engineering Physics, Dhanpat Rai Publishers, 2016.
2.	Kasap,S.O. Principles of Electronic Materials and Devices, McGraw-Hill Education, 2017.
REFERENCES:	
1.	Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley 2012.
2.	Kittel, C. Introduction to Solid State Physics. Wiley, 2017.
3.	Garcia,N. & Damask, A. Physics for Computer Science Students, Springer-Verlag, 2012.
4.	Hanson, G.W. ―Fundamentals of Nanoelectronics, Pearson Education, 2009.
5.	Rogers, B., Adams, J. & Pennathur, S. Nanotechnology: Understanding Small Systems, CRC Press, 2014.

LIST OF EXPERIMENTS	
1.	Uniform bending – Determination of Young’s modulus
2.	Air-wedge – Thickness of thin wire
3.	Spectrometer – Grating
4.	LASER – Wavelength and particle size determination
5.	Optical fibre – Acceptance angle and Numerical aperture
6.	Band gap determination
	TOTAL: 30 PERIODS
	TOTAL (T+P) = 60 PERIODS

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	1	2	-	-
CO5	3	3	-	-	-	-	-	-	2	1	-	1	2	-	-
CO	2	1	-	-	-	-	-	-	2	1	-	1	2	-	-

3-High, 2- Medium, 1-Low

CH22201	ENVIRONMENT AND SUSTAINABILITY	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To understand the concept of ecosystem and biodiversity.
- To conversant with various types of pollution and its effects.
- To obtain knowledge on natural resources and its exploitation.
- To understand the social issues related to environment and methods to protect.
- To gain knowledge on sustainability and environment.

UNIT I	ECOSYSTEM AND BIODIVERSITY	6

Environment – Ecosytem – Structure and function of an ecosystem – Energy flow in an ecosystem – Food chain and food web –.Biodiversity – Types – Values, threats and conservation of biodiversity – Endangered and endemic species – Hot spot of biodiversity – Biodiversity at state level, national level and global level.

UNIT II	NATURAL RESOURCES	6

Introduction – Forest resources – Uses and Overexploitation - Deforestation – causes and consequences – Water resources – effect of over utilisation of water – Food resources – Impacts of modern agriculture (pesticides, fertilizers, water logging, salinity) – Sustainable Energy resources – Wind, Solar, hydroelectric power, geothermal – Land resources – Desertification, soil erosion – Role of an individual in the conservation of natural resources.
Case study – Deforestation, water conflicts, fertilizer and pesticide problem.

UNIT III	ENVIRONMENTAL POLLUTION AND MANAGEMENT	7

Definition, causes, effects and control measures of air pollution, water pollution, noise pollution, thermal pollution and marine pollution – Waste water treatment - Waste management – solid waste, bio waste, e-waste - Disaster management – Flood, cyclone, earthquake

UNIT IV	SOCIAL ISSUES AND HUMAN HEALTH	6

Population explosion and its effects on environment — variation of population among nations - Environmental issues and Human health – Food adulteration – Risk of food adulteration – Detection and prevention of food adulteration - COVID-19 – Human rights – Value education

UNIT V	SUSTAINABLE DEVELOPMENT AND ENVIRONMENT	5

Sustainable development – needs and challenges — Goals – Aspects of sustainable development – Assessment of sustainability - Environmental ethics – Green chemistry – Eco mark, Eco products – EIA – Regional and local environmental issues and possible solutions - Role of engineering in environment and human health

TOTAL: 30PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Recall the basic concepts of environment and sustainable development.
CO2:	Summarize the types of pollution, various natural resources and food adulterants.
CO3:	Explain the methods for waste management and detection of adulterants.
CO4:	Apply the gained knowledge to overcome various issues related to health and

	environment.
CO5:	Identify suitable methods for local environmental issues and sustainability.
TEXT BOOKS:	
1.	Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, New Delhi, 2017.
2.	Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2ndEdition, Pearson Education, 2015.
REFERENCES:	
1.	Erach Bharucha, "Text book of Environmental studies" Universities Press (I) PVT LTD, Hyderabad, 2015.
2.	Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2015.
3.	G. Tyler Miller and Scott E. Spoolman, —"Environmental Science", Cengage Learning India PVT LTD, 2014.
4.	Ruth F. Weiner and Robin A. Matthews. Butterworth, —Environmental Engineering‖, Heineman Publications, 4th Edition
5.	Dash M.C, —Concepts of Environmental Management for Sustainable Development‖, Wiley Publications, 2019.
EXPERIMENTS	
1.	Determination of DO content of waste water sample (Winkler's method).
2.	Determination of chloride content of water sample by Argentometric method
3.	Estimation of copper content in water by Iodometry.
4.	Determination of Ca / Mg in waste water sample
5.	Detection of adulterant in ghee/edible oil/coconut oil.
6.	Detection of adulterant in sugar/honey/chilli powder.
	TOTAL:30 PERIODS
	TOTAL (T+P) = 60 PERIODS

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
CO2	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
CO3	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
CO4	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
CO5	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2
CO	3	-	-	-	-	-	3	-	1	1	-	1	-	-	2

3-High, 2- Medium, 1-Low

CS22202	C PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To familiarize with C programming constructs.
- To develop programs in C using basic constructs.
- To develop programs in C using arrays.
- To develop applications in C using strings, pointers, functions.
- To develop applications in C using structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS

1. I/O statements – Operators
2. Decision-making constructs.
3. Loops Statements.
4. Arrays: 1-Dimensional and 2 -Dimensional Arrays
5. Strings and its Operations
6. User Defined Functions
7. Recursive Functions.
8. Pointers
9. Structures and Union
10. File Handling and Pre-Processor Directives
11. Command Line Arguments.

TOTAL PERIODS: 60

COURSE OUTCOMES

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

CO1:	Demonstrate the knowledge on writing, compiling and debugging the C program.
CO2:	Develop programs in C using basic constructs.
CO3:	Develop programs in C using arrays.
CO4:	Develop applications in C using strings, pointers, functions.
CO5:	Develop applications in C using structures and file processing.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

ES22203	**ENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES

The main learning objective of this course is to prepare the students for

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in commonhousehold wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipment; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP - A (CIVIL & MECHANICAL)

PART I	**CIVIL ENGINEERING PRACTICES**	**15**
PLUMBING WORK	❖ Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers,elbows and other components which are commonly used in household.	
	❖ Preparing plumbing line sketches.	
	❖ Laying pipe connection to the suction side of a pump	
	❖ Laying pipe connection to the delivery side of a pump.	
	❖ Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.	
	❖ Sawing	

WOOD WORK	❖ Planning and	
	❖ Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.	
PART II	**MECHANICAL ENGINEERING PRACTICES**	**15**
WELDING WORK	❖ Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.	
	❖ Practicing gas welding.	
BASIC MACHINING WORK	❖ Perform turning operation in the given work piece.	
	❖ Perform drilling operation in the given work piece.	
	❖ Performing tapping operation in the given work piece.	
ASSEMBLY WORK	❖ Assembling a centrifugal pump.	
	❖ Assembling a household mixer.	
SHEET METAL WORK	❖ Making of a square tray	
GROUP - B (ELECTRICAL AND ELECTRONICS)		
PART-I	**ELECTRICAL ENGINEERING PRACTICES**	**15**
❖ One lamp controlled by one switch.		
❖ Series and parallel wiring.		
❖ Staircase wiring.		
❖ Fluorescent Lamp wiring.		
❖ Residential wiring		
❖ Iron Box wiring and assembly.		
PART-II	**ELECTRONIC ENGINEERING PRACTICES**	**15**
❖ Introduction to electronic components and equipment's		
❖ Calculation of resistance using colour coding		
❖ Verify the logic gates AND, OR, EX-OR and NOT.		
❖ Measurement of AC signal parameters using CRO		
❖ Soldering simple electronic circuits on a small PCB and checking continuity.		
TOTAL PERIOD: 60		
COURSE OUTCOMES		
At the end of the course the students will be able to		
CO1:	Prepare various pipe and furniture fittings used in common household.	
CO2:	Perform the given metal joining and metal removal operation in the given work piece as per the dimensions.	

CO3:	Apply the fundamental concepts involved in Electrical Engineering.
CO4:	Explain the basic electrical wiring procedures.
CO5:	Assemble basic electronic components.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	-	3	1	-	1	-	-	1
CO2	3	-	-	-	-	-	-	-	3	1	-	1	-	-	1
CO3	3	-	-	-	-	-	-	-	3	1	-	1	-	-	1
CO4	2	-	-	-	-	-	-	-	3	1	-	1	-	-	1
CO5	3	-	-	-	-	-	-	-	3	1	-	1	-	-	1
CO	3	-	-	-	-	-	-	-	3	1	-	1	-	-	1

3-High, 2- Medium, 1-Low

SEMESTER III

MA22302	DISCRETE MATHEMATICS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To introduce Propositional Logic and their rules for validity of statements.
- To introduce Predicates Calculus for validating arguments and programs.
- To give the counting principles for solving combinatorial problems.
- To introduce abstract notion of Algebraic structures for studying cryptography and its related areas.
- To introduce Boolean algebra as a special algebraic structure for understanding logical circuit problems.

UNIT I	PROPOSITIONAL CALCULUS	12

Propositions and notations- Propositional logic – Propositions and truth tables – Propositional equivalences – Conditional propositions – Converse, Contrapositive and Inverse-Tautologies and Contradictions –Normal Forms - Theory of Inference for the statement calculus (Validity using Truth Tables).

UNIT II	PREDICATE CALCULUS	12

Predicates –Statement function - Variables and Quantifiers – Nested quantifiers – Predicate formulae –Valid formulas and equivalences –Theory of Inference for the Predicate Calculus - Introduction to proofs – Proof methods and strategy.

UNIT III	COMBINATORICS	12

Mathematical induction – The pigeonhole principle - Permutations and Combinations – Recurrence relations – Solving linear recurrence relations - Inclusion and exclusion principle(without proof) and its applications.

UNIT IV	ALGEBRAIC STRUCTURES	12

Algebraic systems – Semi groups and Monoids – Groups – Subgroups – Cosets – Lagrange's theorem – Definition: Rings and Fields – Problems on integer modulo *n*.		
UNIT V	**LATTICES AND BOOLEAN ALGEBRA**	12
Relations - Equivalence Relation and Partition - Partial order Relations – Partially Ordered Sets – Representation for Partially Ordered Sets - Hasse diagram - Lattices as Partially Ordered Sets (Definition and Examples)– Boolean algebra (Definition and Examples).		
		TOTAL: 60 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Construct truth tables and their rules for validity of statements.
CO2:	Apply the rules for validating arguments and programs.
CO3:	Establish the counting principles and recurrence relations.
CO4:	Apply the concepts and properties of groups and rings in the area of coding theory.
CO5:	Develop the significance of relations and boolean algebra.

TEXT BOOKS:	
1.	Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
2.	Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2018.
REFERENCES:	
1.	Swapan Kumar Sarkar, "Discrete Mathematics", S.Chand & Company Ltd.,New Delhi, 2008.
2.	David Makinson, "Sets, Logics and Maths for Computing", Springer Indian Reprint, 2011.
3.	Ralph.P.Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.
4.	Seymour Lipschutz and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Third Edition, 2010.
5.	Sengadir.T. "Discrete Mathematics and Combinatorics", Pearson Education, New Delhi, 2009.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

IT22301	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories and to learn the different ways of communication with I/O devices.

UNIT I	BASIC STRUCTURE OF A COMPUTER SYSTEM	9

Functional Units – Basic Operational Concepts – Performance – Instructions and Instruction sequencing – Logical operations – decision making – MIPS Addressing.

UNIT II	ARITHMETIC FOR COMPUTERS	9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism.

UNIT III	PROCESSOR AND CONTROL UNIT	9

Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV	PARALLELISIM	9

Parallel processing challenges – Flynn‘s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V	MEMORY & I/O SYSTEMS	9

Memory Hierarchy - memory technologies – Cache memories – Performance Considerations – virtual memories– Accessing I/O Devices – Interrupts – Direct Memory Access – Buses – Standard I/O Interfaces –Interface circuits

TOTAL PERIODS: 45

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1:	Explain the functional units of digital computer, instruction formats and the operation of a digital computer
CO2:	Solve the fixed point and floating-point arithmetic for ALU operation.
CO3:	Demonstrate the working of processor and control units with and without pipeline.
CO4:	Apply multithreading, multiprocessing and parallel processing architectures.
CO5:	Illustrate the organization of different memory systems, parallel processing architectures, I/O processors and its communication.

TEXT BOOKS

1.	David A. Patterson and John L. Hennessy, Computer Organization and Design: TheHardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

2.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.
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, TataMcGraw Hill, 2012.
3.	John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
4.	Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications",Second edition, McGraw-Hill Education India Pvt Ltd, 2014.
5.	Miles J. Murdocca and Vincent P. Heuring, "Computer Architecture and Organization: An Integrated approach", Second edition, Wiley India Pvt Ltd, 2015.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

IT22302	DIGITAL SYSTEMS	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES					
• To apply the fundamentals of the number system, binary codes, logic gates, Karnaugh, Map and memory system.					
• To design combinational logic circuits.					
• To design synchronous sequential logic circuits.					
• To design asynchronous sequential logic circuits.					
• To understand the memory and programmable logic.					
UNIT I	**BOOLEAN ALGEBRA AND LOGIC GATES**				**9**
Number Systems – Arithmetic Operations – Binary Codes- Boolean Algebra and Logic Gates – Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions using Karnaugh Map – Logic Gates – NAND and NOR Implementations.					
UNIT II	**COMBINATIONAL LOGIC**				**9**

Combinational Circuits – Analysis and Design Procedures – Binary Adder-Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers.		
UNIT III	**SYNCHRONOUS SEQUENTIAL LOGIC**	**9**
Sequential Circuits – Storage Elements: Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Design Procedure – Registers and Counters.		
UNIT IV	**ASYNCHRONOUS SEQUENTIAL LOGIC**	**9**
Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.		
UNIT V	**MEMORY AND PROGRAMMABLE LOGIC**	**9**
RAM – Memory Decoding – Error Detection and Correction – ROM – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.		
TOTAL PERIODS: 45		

COURSE OUTCOMES	
Upon completion of the course, students will be able to	
CO1:	Apply the fundamentals of number system, binary codes, logic gates, Karnaugh Map and memory system.
CO2:	Design combinational logic circuits.
CO3:	Design synchronous sequential logic circuits.
CO4:	Design asynchronous sequential logic circuits.
CO5:	Design memory arrays using programmable logic devices.

TEXT BOOKS	
1.	M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL and System Verilog", 6th Edition, Pearson Education, 2018.
2.	John M. Yarbrough, "Digital logic applications and design", Thomson publications, 2nd Edition, 2006.

REFERENCES:	
1.	G. K. Kharate, "Digital Electronics", Oxford University Press, 2010.
2.	John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3.	Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013.
4.	Donald D. Givone, Digital Principles and Design, Tata Mc Graw Hill, 2003
5.	Digital Systems, Principles and Applications Twelfth Edition, Neal S Widmer, Greg Moss, Ronald J. Toccy, Publisher(s): Pearson, 2022.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

CS22301	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics 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
- To design and build simple Graphical User Interfaces

UNIT I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	9

Object Oriented Programming concepts - Characteristics of Java –Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – Access specifiers - Comments, Data Types, Variables, Operators, Control Flow, Methods, Static members - Arrays-Strings- JavaDoc comments.

UNIT II	INHERITANCE AND INTERFACES	9

Constructors in java - Packages - Inheritance – Super classes- Sub classes –Protected members – Constructors in sub classes- the Object class – Abstract classes and methods- Final methods and classes – Interfaces – Defining an interface, Implementing interface, Differences between classes and interfaces and extending interfaces

UNIT III	EXCEPTION HANDLING AND I/O	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 – Reading and Writing Console – Reading and Writing Files.

UNIT IV	COLLECTIONS, MULTITHREADING AND GENERICS	9

The Collections Framework: Collections Overview - The Collection Interface: The List Interface - The Set Interface- The Collection Classes: The ArrayList Class - The LinkedList Class - Accessing a Collection via an Iterator – The For-Each Alternative to Iterators. Multithreading: Differences between multi-threading and multitasking, Thread life cycle, Creating threads,

Synchronizing threads, Inter-thread communication, Daemon threads, Thread groups. Generic Programming: Generic classes – Generic Methods.		
UNIT V	**JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS**	9
JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Describe the basic concepts of OOP and fundamentals in Java.
CO2:	Implement the principles of packages, inheritance and interfaces
CO3:	Develop Java applications using exception handling techniques and I/O operations.
CO4:	Write Java applications using multithreading, collections and generics concepts.
CO5:	Design interactive GUI based applications using the concepts of event handling and JavaFX components.

TEXT BOOKS:	
1.	Herbert Schildt, "Java The Complete Reference", Tenth Edition, McGraw Hill Education, 2019.
2.	Herbert Schildt, "Introducing JavaFX 8 Programming", First Edition, McGraw Hill Education, New Delhi, 2015

REFERENCES:	
1.	Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", Ninth Edition, Prentice Hall, 2013.
2.	Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", Third Edition, Pearson, 2015.
3.	Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.
4.	Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
5.	E Balagurusamy, "Programming with Java", McGraw Hill Education, 2019.

Mapping of Course Outcomes to Programme Outcomes

ourse outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

CS22302	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of ADTs.
- To learn linear data structures – lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To understand sorting, searching and hashing algorithms.
- To apply Tree and Graph structures.

UNIT I	LISTS	9

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multi lists.

UNIT II	STACKS AND QUEUES	9

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

UNIT III	TREES	9

Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Threaded Trees -Priority Queue (Heaps) – Binary Heap - B-Tree.

UNIT IV	GRAPHS	9

Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth-first traversal – Topological Sort – Shortest path algorithms - Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm

UNIT V	SEARCHING, SORTING AND HASHING	9

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing –Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Explain the linear data structure List.
CO2:	Implement stack and queue data structures.
CO3:	Use appropriate non–linear data structure operations for solving a given problem.
CO4:	Apply appropriate graph algorithms for graph applications.
CO5:	Apply different searching, sorting and hashing techniques.

TEXT BOOKS:

1.	Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2.	Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007.
REFERENCES:	
1.	Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
3.	Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.
4.	Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.
5.	Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2nd Edition, Universities Press, 2008.

Mapping of Course Outcomes to Programme Outcomes

ourse outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	2	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	2	3	-	-

3-High, 2- Medium, 1-Low

GE3252	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To facilitate the students to understand weaving and ceramic technology of sangam Age.
- To create an awareness on structural design of Tamils during sangam age.
- To help students to distinguish between all the levels of manufacturing technology in ancient period.
- To understand the ancient Knowledge of agriculture and irrigation technology.
- To enable the students to understand the digitalization of Tamil language.

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	3

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

UNIT II	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.		
UNIT III	**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.		
UNIT IV	**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 Specific Society.		
UNIT V	**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.		
		TOTAL: 15 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Describe the importance of weaving and ceramic technology of sangam Age.
CO2:	Illustrate the knowledge on structural design of Tamils during sangam age.
CO3:	Demonstrate a strong foundational knowledge in manufacturing technology of ancient Tamils.
CO4:	Describe the importance of ancient agriculture and irrigation technology of Tamils.
CO5:	Explain the concept of digitalization of Tamil language.

TEXT & REFERENCE BOOKS:

1.	கணிணித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)
2.	கீழடி – வைகை நதிக்கரயில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு) / Keeladi - 'Sangam City Civilization on the banks of river Vaigai', Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
3.	பொருநை – ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு) / "Porunai Civilization", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
4.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.
5.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
6.	R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

GE3252	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- சங்க காலத்தின் நெசவு மற்றும் பீங்கான் தொழில் நுட்பத்தை மாணவர்கள் புரிந்துகொள்ள வசதி செய்தல்.
- சங்க காலத் தமிழர்களின் வடிவமைப்பு தொழில்நுட்பம் பற்றிய விழிப்புணர்வை ஏற்படுத்துதல்.
- பண்டைய கால உற்பத்தி தொழில்நுட்பத்தின் அனைத்து நிலைகளையும் வேறுபடுத்தி அறிய மாணவர்களுக்கு உதவுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பத்தின் பண்டைய அறிவைப் புரிந்துக் கொள்ள செய்தல்.
- தமிழ் மொழியின் டிஜிட்டல் மயமாக்கல் பற்றிப் புரிந்துக் கொள்ள செய்தல்.

அலகு I	நெசவு மற்றும் பானைத் தொழில்நுட்பம	3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்

அலகு II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம	3

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

அலகு III	உற்பத்தித் தொழில் நுட்பம்	3

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

அலகு IV	வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம	3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்கான வடிவமைக்கபட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	3

அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	சங்க காலத்தின் நெசவு மற்றும் பீங்கான் தொழில் நுட்பத்தின் முக்கியத்துவத்தை விவரிக்க முடியும்.

CO2:	சங்க காலத் தமிழர்களின் வடிவமைப்பு தொழில்நுட்பம் பற்றிய அறிவை விளக்க முடியும்.
CO3:	பண்டைய தமிழர்களின் உற்பத்தி தொழில்நுட்பம் பற்றிய வலுவான அடித்தள அறிவை வெளிப்படுத்த முடியும்.
CO4:	தமிழர்களின் விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பத்தின் பண்டைய அறிவை விவரிக்க முடியும்.
CO5:	தமிழ் மொழியின் டிஜிட்டல் மயமாக்கல் பற்றிய கருத்தை விளக்க முடியும்.

TEXT & REFERENCE BOOKS:

1.	கணிணித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)
2.	கீழடி – வைகை நதிக்கரயில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு) / Keeladi - 'Sangam City Civilization on the banks of river Vaigai', Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
3.	பொருநை – ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு) / "Porunai Civilization", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
4.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.
5.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
6.	R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-

3-High, 2- Medium, 1-Low

CS22305	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.

- To develop applications using event handling.

LIST OF EXPERIMENTS

1. Write simple java applications using if-else, switch -case, loops, array
2. Develop a java application to implement packages.
3. Develop a java application to implement inheritance.
4. Develop a java application to implement an interface.
5. Develop a java application to implement abstract classes.
6. Write a Java program to implement user defined exception handling.
7. Write a Java program that performs file operations.
8. Write a java program that implements a multi-threaded application.
9. Design a simple calculator using event-driven programming paradigm of Java.
10. Develop a mini project for any application using Java concepts.

TOTAL PERIODS: 60

Lab Requirements: for a batch of 30 students
Operating Systems: Linux / Windows
Front End Tools: Eclipse IDE / Netbeans IDE

COURSE OUTCOMES

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

CO1:	Develop Java programs for simple applications that make use of classes, packages and interfaces.
CO2:	Develop Java programs to implement inheritance, exception handling and multithreading concepts.
CO3:	Design applications using file operations.
CO4:	Design applications using JAVAFX and event handling.
CO5:	Develop a mini project for any application.

Mapping of Course Outcomes to Programme Outcomes

Course Outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

CS22306	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To implement linear and non-linear data structures
- To apply the different operations of search trees
- To implement graph traversal algorithms
- To apply sorting and searching algorithms

LIST OF EXPERIMENTS

1.	Linked list implementation of List ADT, Stack ADT and Queue ADT.
2.	Implementation of Doubly Linked List and Circularly Linked List.
3.	Polynomial Addition, Subtraction and Multiplication using Linked List.
4.	Balancing Symbols, Evaluation of Postfix Expression and Infix to Postfix conversion.
5.	Implementation of Double Ended Queue.
6.	Implementation of binary tree and its operations with relevant traversals.
7.	Implementation of binary search tree.
8.	Graph representations, Implementation of BFS & DFS.
9.	Shortest path using Dijkstra's algorithm.
10.	Minimum spanning tree using Prim's algorithm.
11.	Implementation of Sorting Algorithms and Searching Algorithms
12.	Hashing using separate chaining & open addressing.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Write functions to implement linked list.
CO2:	Use appropriate linear / non-linear data structure operations for solving a given problem.
CO3:	Use graph traversal algorithms.
CO4:	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.
CO5:	Write functions to implement searching and sorting algorithms.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	2	1	2	-	-	-	-	-	-	2	-	3	-
CO2	3	3	1	1	2	-	-	-	-	-	-	3	-	3	-
CO3	2	1	3	2	2	-	-	-	-	-	-	3	-	3	-
CO4	3	2	1	2	2	-	-	-	-	-	-	1	-	3	-
CO5	2	2	2	1	2	-	-	-	-	-	-	2	-	3	-
CO	2	2	2	1	2	-	-	-	-	-	-	2	-	3	-

3-High, 2- Medium, 1-Low

SD22301	CODING SKILLS AND SOFT SKILLS TRAINING – PHASE II	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To make the students to solve basic programming logics.
- To help the students develop logics using decision control statements.
- To make them develop logics using looping statements and arrays.
- To train the students for effective communication and identify the common errors in formal writings.
- To guide and motivate the students for setting their goals with positive thinking.

UNIT I	FUNDAMENTALS IN PROGRAMMING	8

Output of Programs: I/O Functions, Data types, Constants, Operators – Mathematical Problems – Debugging – Puzzles - Company Specific Programming Examples.

UNIT II	DECISION CONTROL STATEMENTS	8

Logic Building Using Conditional Control Statements – Output of Programs – Mathematical Problems - Puzzles – Company Specific Programming Examples

UNIT III	LOOPING STATEMENTS AND ARRAYS	14

Logic Building Using Looping Statements – Number Programs – Programs on Patterns – Array Programs – Programs on Sorting and Searching - Matrix Programs – Puzzles - Output of Programs - Company Specific Programming Examples

UNIT IV	COMMUNICATION IN GENERAL	15

Introduction to communication-Types of communication – Effective Communication-Barriers to communication. Language Study: Vocabulary-Formation of sentences-Sentence and sentence structures-Common errors – Writing paragraphs & essays. Professional writing: Job application & Resume writing

UNIT V	PERSONALITY DEVELOPMENT	15

Study of personality & ways to improve. Soft Skills: Self-evaluation / self-awareness – Goal setting and positive thinking – Self-esteem and confidence – Public speaking – Extempore – Body language and Observation skills

SUGGESTIVE ASSESSMENT METHODS:

1) Pre Assessment Test – To check the student's previous knowledge in Programming skills.
2) Internal Assessment I for coding skills will be conducted for 100 marks which are then calculated to 20.
3) Internal Assessment II for coding skills will be conducted for 100 marks which are then calculated to 20.
4) Model Exam for coding skills will be conducted for 100 marks which are then calculated to 20.
5) A test for Communication skills will be conducted for 100 marks which will be then calculated to 40.

6) For assignments, students should attend all the practice tests conducted online on HackerRank. Each assignment will be for 100 marks and finally the total marks obtained by a student in all tests will be reduced to 40 marks.	
7) The total of 100 marks obtained from the tests will be then calculated to 60 marks and additional of 40 marks will be given for assignments which will make it a total of 100.	
TOTAL PERIODS: 60	
COURSE OUTCOMES	
Upon completion of the course, the students will be able to.	
CO1:	Solve problems on basic I/O constructs.
CO2:	Develop problem solving skills using decision control statements.
CO3:	Develop logics using looping statements and arrays.
CO4:	Avoid / fix the common errors they commit in academic and professional writings and prepare standard resumes and update the same for future career.
CO5:	Recognize the value of self-evaluation and grow with self-confidence.
TEXT BOOKS	
1.	Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2.	Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
REFERENCE BOOKS	
1.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
2.	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
3.	E Balagurusamy, "Programming in ANSI C", Eighth edition, Mc GrawHill Publications, 2019.
4.	S.Sobana, R.Manivannan, G.Immanuel,'Communication and Soft Skills' VK Publications', 2016.
5.	Zed Shaw, " Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding", Zed Shaw's Hardway Series, 2015.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2	-	1	1	1	-	-	-	1	2	2	1	2

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

3-High, 2- Medium, 1-Low

AC22301	**CONSTITUTION OF INDIA**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES

- Teach history and philosophy of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT I	**INTRODUCTION**	**6**

History of Making of the Indian Constitution - Drafting Committee - Philosophy of the Indian Constitution - Preamble - Salient Features.

UNIT II	**CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES**	**6**

Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Fundamental Duties.

UNIT III	**ORGANISATIONS OF GOVERNANCE**	**7**

Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges - Qualifications, Powers and Functions.

UNIT IV	**EMERGENCY PROVISIONS**	**4**

Emergency Provisions - National Emergency, President Rule, Financial Emergency.

UNIT V	**LOCAL ADMINISTRATION**	**7**

District's Administration head - Role and Importance -Municipalities - Introduction- Mayor and role of Elected Representative - CEO of Municipal Corporation -Pachayati raj - Introduction - PRI- Zila Pachayat-Elected officials and their roles.

TOTAL PERIODS: 30

COURSE OUTCOMES

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

CO1:	Understand history and philosophy of Indian Constitution.
CO2:	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3:	Understand powers and functions of Indian government.
CO4:	Understand emergency rule.

CO5:	Understand structure and functions of local administration.
TEXT BOOKS	
1.	Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2.	Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.
3.	Jain M P, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4.	The Constitution of India (Bare Act), Government Publication,1950.
REFERENCES:	
1	M.V.Pylee, "Introduction to the Constitution of India",4th Edition, Vikas publication,2005.
2.	Durga Das Basu (DD Basu), "Introduction to the constitution of India", (Student Edition),19th Edition, Prentice-Hall EEE, 2008.
3.	Merunandan, "Multiple Choice Questions on Constitution of India", 2nd Edition, Meraga publication, 2007.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	1	-	-	1	1	-	1	-	-	-	1	-	-	2
CO2	-	1	-	-	-	1	-	1	-	1	-	-	-	-	2
CO3	-	1	1	-	-	1	-	1	-	1	-	-	-	-	2
CO4	-	-	-	1	-	-	1	-	1	1	1	1	-	-	2
CO5	-	-	-	-	-	-	1	-	-	1	-	1	-	-	2
CO	-	1	1	1	1	1	1	1	1	1	1	1	-	-	2

3-High, 2- Medium, 1-Low

HS22301	VALUE EDUCATION – I	L	T	P	C
		1	0	0	0

COURSE OBJECTIVES

- To give the students a deeper understanding about the purpose of life.
- To animate the students to have a noble vision and a right value system for their life.
- To help the students to set short term and long-term goals in their life.

UNIT I	MY LIFE AND MY PLACE IN THE UNIVERSE	4

Value of my life – My Uniqueness, strengths and weakness – My self-esteem and confidence – My identity in the universe.

UNIT II	MY LIFE AND THE OTHER	4

Realising the need to relate with other persons and nature – My refined manners and conduct in relationships – Basic communication and relationship skills – Mature relationship attitudes.

UNIT III	MY LIFE IS MY RESPONSIBILITY	3

Personal autonomy – developing a value system and moral reasoning skills – setting goals for life.		
UNIT IV	**UNDERSTANDING MY EDUCATION AND DEVELOPING MATURITY**	**4**
Importance of my Engineering education – Managing emotions - personal problem solving skills.		
		TOTAL PERIODS: 15

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1:	Explain the importance of value-based living.
CO2:	Set realistic goals and start working towards them.
CO3:	Apply the interpersonal skills in their personal and professional life.
CO4:	Emerge as responsible citizens with a clear conviction to be a role model in the society.
REFERENCE BOOKS	
1.	David Brooks. The Social Animal: The Hidden Sources of Love, Character, and Achievement. Random House, 2011.
2.	Mani Jacob. Resource Book for Value Education. Institute of Value Education, 2002.
3.	Eddie de Jong. Goal Setting for Success. CreateSpace Independent Publishing, 2014.
4.	Dr.Abdul kalam. My Journey-Transforming Dreams into Actions. Rupa Publications, 2013.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
CO2	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
CO3	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
CO4	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1
CO	-	-	-	-	-	2	-	1	1	2	-	2	-	-	1

3-High, 2- Medium, 1-Low

SEMESTER IV

IT22401	FUNDAMENTALS OF ALGORITHM ANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand and apply the algorithm analysis techniques and critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand Brute Force and Divide and Conquer algorithm design techniques
- To understand dynamic programming and greedy algorithm design techniques
- To make the students understand and solve problems using iterative method
- To understand the limitations of Algorithmic power

UNIT I	INRODUCTION	9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency – Analysis Framework – Asymptotic Notations and their properties. Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT II	BRUTE FORCE AND DIVIDE-AND-CONQUER	9

Brute Force –String Matching – Closest-Pair and Convex-Hull Problems – Exhaustive Search – Travelling Salesman Problem – Knapsack Problem – Assignment problem. Divide and Conquer Methodology –Merge sort – Quick sort – Binary Search.

UNIT III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	9

Dynamic programming – Computing a Binomial Coefficient –Optimal Binary Search Trees – Warshall's and Floyd's algorithm. Greedy Technique – Prim's algorithm, Dijkstra's Algorithm and Kruskal's Algorithm – Huffman Trees.

UNIT IV	BACKTRACKING AND BRANCH-AND-BOUND	9

Backtracking – n-Queen problem – Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem.

UNIT V	ITERATIVE IMPROVEMENT & LIMITATIONS OF ALGORITHMIC POWER	9

The Simplex Method – The Maximum-Flow Problem – Bipartite Graphs - Stable marriage Problem. Lower – Bound Arguments – P, NP NP- Complete and NP Hard Problems. Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

CO1: .	Describe the algorithm design and analytical principles for various computing problems
CO2:	Implement the problems using brute force and divide and conquer techniques
CO3:	Solve problems using dynamic programming and greedy technique
CO4:	Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound techniques
CO5:	Modify the problems using iterative improvement techniques for optimization
TEXT BOOKS	
1.	Anany Levitin, ―Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2012.
2.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/C++, Second Edition, Universities Press, 2007.
REFERENCE BOOKS	
1.	Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3.	Harsh Bhasin, "Algorithms Design and Analysis", Oxford university press, 2016.
4.	S. Sridhar, "Design and Analysis of Algorithms", Oxford university press, 2014.
5.	http://nptel.ac.in/

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

CS22402	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the fundamental concepts of database, 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	10

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

UNIT II	DATABASE DESIGN	8

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

UNIT III	TRANSACTIONS	9

Transaction Concepts – ACID Properties – Schedules – Serializability – Need for Concurrency – Concurrency control –Two Phase Locking- Deadlock Handling -Timestamp based Protocols – Recovery Concepts – Recovery based on deferred and immediate update – ARIES Algorithm

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.

UNIT V	ADVANCED TOPICS	9

NoSQL Databases - Evolution of NoSQL databases. Different types of NoSQL databases. CAP Theorem, Consistency levels. Advantages of NoSQL databases, Scalability and performance.Introducing MongoDB: History, MongoDB Design Philosophy, Speed, Scalability, and Agility, Non-Relational Approach, JSON-Based Document Store, Performance vs. Features.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

CO1:	Outline the basic concepts of Relational databases

CO2:	Illustrate database using ER model and normalize the database
CO3:	Summarize transaction concepts and locking mechanisms.
CO4:	Identify the various indexing and hashing strategies to tune the performance of the database
CO5:	Examine how does advanced databases differ from relational databases and find a suitable database for the given requirement
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.
REFERENCES:	
1.	C.J.Date, A.Kannan, S.Swamynathan, -An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
2.	Anirudha Kolpyakwar , Pallavi Chaudhari ", Database Management System with NoSQL"Lampert Academic Publishing,2018.
3.	Saeed K. Rahimi, Frank S. Haug, "Distributed database management system. A Practical approach" John Wiley & Sons, 2010.
4.	B. Prabhakaran ,"Multimedia Database Management Systems" The Springer International Series , 2012.
5.	Akmal Chaudhri, Awais Rashid , Roberto Zicari, "XML Data Management: Native XML and XML-Enabled Database Systems", Addison-Wesley Professional, First Edition, 2003.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

CS22403	**OPERATING SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.

- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.
- To analyze Scheduling algorithms.

UNIT I	OPERATING SYSTEM OVERVIEW	7

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview- Objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II	PROCESS MANAGEMENT	10

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors;

UNIT III	PROCESS SYNCHRONISATION	10

CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT IV	STORAGE MANAGEMENT	`9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, Disk structure- Disk scheduling- swap space management- Directory and disk structure, Directory implementation, Allocation Methods.

UNIT V	VIRTUAL MACHINES	9

Virtual machines – Distributed systems – Types of network based operating system - Linux System – Design Principles, Kernel Modules - Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Describe the basic concepts, services and structure of operating systems.
CO2:	Interpret process management, process synchronization and multithreading concepts.
CO3:	Apply CPU scheduling algorithms and deadlock detection and avoidance algorithms.
CO4:	Apply various storage management schemes.
CO5:	Compare different types of operating systems.

TEXT BOOKS:

1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Tenth Edition, John Wiley and Sons Inc., 2018.

2.	Andrew. Tanenbaum, “Modern Operating Systems”, Adison Wesley, Fourth Edition, 2014.
REFERENCES:	
1.	Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.
2.	Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016.
3.	D M Dhamdhere, “Operating Systems: A Concept-Based Approach, Third Edition, Tata McGraw Hill 2017.
4.	William Stallings, “Operating Systems: Internals and Design Principles”, Seventh Edition, Prentice-Hall, 2013.
5.	Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill, 2012.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	3	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	1	2	-	-
CO4	3	1	2	2	-	-	-	-	-	-	-	1	2	-	-
CO5	3	3	1	2	-	-	-	-	-	-	-	1	3	-	-
CO	3	1	1	2	-	-	-	-	-	-	-	1	2	-	-

3-High, 2- Medium, 1-Low

IT22402	PROBABILITY AND MACHINE LEARNING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To introduce the fundamentals of probability and random variables.
- To introduce the fundamentals of two-dimensional random variables.
- To provide a basic understanding on machine learning concepts.
- To provide an in-depth introduction to supervised learning algorithms.
- To provide an in-depth introduction to unsupervised learning algorithms.

UNIT I	PROBABILITY AND RANDOM VARIABLES	6

Probability – Axioms of probability – Conditional probability – Baye‘s theorem - Discrete and continuous random variables – Moments –Probability distributions: Binomial, Poisson and Normal distributions.

UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	6

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem.

UNIT III	MACHINE LEARNING AND DATA PREPROCESSING	6

Definitions, goals and history of Machine Learning, Taxonomy of Machine Learning, Data preprocessing, standardization, dimension reduction, feature selection, Train-Test splitting, loss function, optimization, model selection, cross validation.		
UNIT IV	**SUPERVISED LEARNING**	**6**
Supervised Learning: Parametric/Non-parametric learning, Naive Bayes classifier, support vector machine, Regularization, Classification errors, Decision Tree, K-Nearest Neighbors, Neural Networks.		
UNIT V	**UNSUPERVISED AND REINFORCED LEARNING**	**6**
Clustering: K-means, K-medoids, hierarchical clustering algorithms, Dimensionality reduction, kernel methods, Learning theory: bias/variance trade-offs, VC theory, large margins. Introduction to reinforcement learning. Applications of machine learning.		
		TOTAL PERIODS: 30

PRACTICAL EXERCISES	
1.	Implementation of Data Pre-processing techniques.
2.	Build Linear Regression models.
3.	Implement Naïve Bayes models.
4.	Build decision trees.
5.	Build SVM models.
6.	Implement K-Means clustering algorithms.
7.	Build simple NN models.
	TOTAL PERIODS: 30

COURSE OUTCOMES	
Upon completion of the course, the students will be able to	
CO1:	Solve the problems using the concepts of probability and standard distributions.
CO2:	Apply the concepts of two-dimensional random variables.
CO3:	Explore the concepts of machine learning and data preprocessing techniques.
CO4:	Apply supervised learning algorithms for real world problems.
CO5:	Apply unsupervised learning techniques.

TEXT BOOKS	
1	Johnson, R.A., Miller, I and Freund J., "Miller and Freund‘s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2	Mitchell, Tom. Machine Learning. New York, NY: McGraw-Hill, 1997.

REFERENCES:	
1.	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2.	Bishop, C. M., Pattern Recognition and Machine Learning, Springer, 2006.
3.	Hastie, T., R. Tibshirani, and J. H. Friedman. The Elements of Statistical Learning: Data Mining, Inference and Prediction, Second Edition, Springer, 2009 .
4.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning, New Delhi, 8th Edition, 2014.

5.	Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1	-	-	-	-	-	-	-	1	-	3	-
CO2	3	3	3	1	-	-	-	-	-	-	-	1	-	3	-
CO3	3	3	3	1	2	-	-	-	-	-	-	1	-	3	-
CO4	3	3	3	2	2	-	-	-	-	-	-	1	-	3	-
CO5	3	3	3	2	2	-	-	-	-	-	-	1	-	3	-
CO	3	3	3	1	2	-	-	-	-	-	-	1	-	3	-

3-High, 2- Medium, 1-Low

IT22403	WEB ESSENTIALS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To comprehend and analyze the basic concepts of web programming and internet protocols.
- To describe how the client-server model of Internet programming works.
- To demonstrate the uses of scripting languages
- To write simple scripts for the creation of web sites
- To create database applications

UNIT I	WEBSITE BASICS	6

Internet Overview - Fundamental computer network concepts - Web Protocols - URL – Domain Name- Web Browsers and Web Servers- Working principle of a Website –Creating a Website - Client-side and server-side scripting.

UNIT II	WEB DESIGNING	6

HTML – Form Elements - Input types and Media elements - CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

UNIT III	CLIENT-SIDE PROCESSING AND SCRIPTING	6

JavaScript Introduction – Variables and Data Types-Statements – Operators - Literals-Functions- Objects-Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation.

UNIT IV	SERVER-SIDE PROCESSING AND SCRIPTING	6

PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - File Uploading – Email Basics - Email with attachments - PHP and HTML - Simple PHP scripts - Databases with PHP.		
UNIT V	**SERVLETS AND DATABASE CONNECTIVITY**	**6**
Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions - Sessions – Cookies – Database connectivity - JDBC Creation of simple interactive applications - Simple database applications.		
		TOTAL PERIODS: 30

PRACTICAL EXERCISES	
1.	Creation of interactive web sites - Design using HTML and authoring tools
2.	Form validation using JavaScript
3.	Creation of simple PHP scripts
4.	Handling multimedia content in web sites
5.	Write programs using Servlets to invoke servlets from HTML forms
6.	Creation of information retrieval system using web, PHP and MySQL
7.	Creation of personal Information System
	TOTAL PERIODS: 30

COURSE OUTCOMES	
Upon completion of the course, students will be able to	
CO1:	Explain the basic concepts of web programming and internet protocols.
CO2:	Demonstrate simple web-applications
CO3:	Apply JavaScript, HTML and CSS effectively to create interactive and dynamic websites.
CO4:	Construct simple PHP scripts.
CO5:	Construct multimedia components and database applications.

TEXT BOOKS	
1.	Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'Reilly publishers, 2014.
2.	Paul Deitel, Harvey Deitel, Abbey Deitel, “Internet & World Wide Web - How to Program”, 5th edition, Pearson Education, 2012.

REFERENCE BOOKS	
1.	Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2.	James F. Kurose, “Computer Networking: A Top-Down Approach”, Sixth Edition, Pearson Education, 2012
3.	Steven Holzener , “PHP – The Complete Reference”, 1st Edition, Mc-Graw Hill, 2017
4.	Fritz Schneider, Thomas Powell , “JavaScript – The Complete Reference”, 3rd Edition, Mc- Graw Hill Publishers, 2017
5.	Bates, “Developing Web Applications”, Wiley Publishers, 2006

Mapping of Course Outcomes to Program Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	1	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	1	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
CO	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-

3-High, 2- Medium, 1-Low

CS22405	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE 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.

LIST OF EXPERIMENTS

1.	Create a database table, add constraints (primary key, unique, check, not null), insert rows, update and delete rows using SQL DDL and DML commands.
2.	Create a set of tables, add foreign key constraints and incorporate referential integrity.
3.	Query the database tables using different ‘where’ clause conditions and also implement aggregate functions.
4.	Query the database tables and explore sub queries and simple join operations.
5.	Query the database tables and explore natural, equi and outer joins.
6.	Write user defined functions and stored procedures in SQL.
7.	Execute complex transactions and realize DCL and TCL commands.
8.	Write SQL Triggers for insert, delete, and update operations in a database table.
9.	Create View and index for database tables with a large number of records.
10.	Create an XML database and validate it using XML schema.
11.	Create Document, column and graph based data using NOSQL database tools.

12.	Data manipulation using MongoDB.
	TOTAL: 60 PERIODS
List of Equipment: (30 Students per Batch) MYSQL / SQL: 30 Users	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Construct databases with different types of key constraints.
CO2:	Develop simple and complex SQL queries using DML and DCL commands.
CO3:	Experiment with advanced features such as stored procedures and triggers and incorporate in GUI based application development.
CO4:	Build an XML database and validate with meta-data (XML schema).
CO5:	Model and manipulate data using NOSQL database.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

3-High, 2- Medium, 1-Low

IT22404	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
• To learn Unix commands and shell programming.
• To implement various CPU Scheduling Algorithms.
• To implement Process Creation and Inter-Process Communication.
• To implement Deadlock Avoidance Algorithms.
• To implement Page Replacement Algorithms.
• To implement File Allocation Strategies.
LIST OF EXPERIMENTS
1. Basics of UNIX commands.
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. Shell Programming.
4. Write C programs to implement the various CPU Scheduling Algorithms.
5. Implementation of Semaphores.
6. Implementation of Shared memory and IPC.

7. Bankers Algorithm for Deadlock Avoidance.
8. Write C program to implement Threading & Synchronization Applications.
9. Implementation of the following Memory Allocation Methods for fixed partition a) First Fit b) Worst Fit c) Best Fit
10. Implementation of Paging Technique of Memory Management.
11. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
12. Implementation of the following File Allocation Strategies a) Sequential b) Indexed c) Linked
LAB REQUIREMENTS: For a batch of 30 students Operating Systems: Linux / Windows Compiler: C/C++/JAVA
TOTAL PERIODS: 60

COURSE OUTCOMES	
At the end of the course, the student should be able to	
CO1:	Implement UNIX commands and shell programming.
CO2:	Implement the various CPU Scheduling Algorithms.
CO3:	Implement Process Creation and Inter Process Communications.
CO4:	Implement Deadlock Avoidance and Deadlock Detection Algorithms.
CO5:	Implement Page Replacement Algorithms, File organization and File allocation Strategies.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-

3-High, 2- Medium, 1-Low

SD22401	**CODING SKILLS AND SOFT SKILLS TRAINING – PHASE II**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES
• To help students on developing modular applications using functions.
• To train them on building logics using strings and pointers.
• To make them develop applications using user defined data types.
• To train the students on speaking skills for group discussions.

• To set them correctly on the track of presentation skills and management skills.		
UNIT I	**FUNCTIONS**	**12**
Logic Building Using Functions – Programs on Recursion – Puzzles - Output of Programs - Company Specific Programming Examples.		
UNIT II	**STRINGS AND POINTERS**	**12**
Logic Building Using Strings – Programs on Strings - Logic Building Using Pointers – Puzzles - Output of Programs - Company Specific Examples.		
UNIT III	**USER DEFINED DATATYPES**	**6**
Logic Building Using Looping Statements – Number Programs – Programs on Patterns – Array Programs – Programs on Sorting and Searching - Matrix Programs – Puzzles - Output of Programs - Company Specific Programming Examples		
UNIT IV	**COMMUNICATION SKILLS / LANGUAGE SKILLS**	**15**
Receptive Skills and productive skills - Skills together - Integration of skills - Input and output Receptive Skills: Listening and Reading - Lead-in - Pre-existent knowledge - General understanding of the audio or the written text - Discussion in pairs or small groups – feedback - Text-related task in detail - Focus on aspects of language in the text. Productive Skills: Speaking and Writing - lead-in - engaging students with the topic - setting the task - role-play - Monitoring the task - Giving the feedback-positive- task-related follow up - repetition / re-setting of task. Activities: Pronunciation: syllable, stress, intonation - Writing memos, e-mails and formal letters - Oral presentations / seminars - Written and Oral Descriptions Group discussions.		
UNIT V	**SOFT SKILLS: SEARCH AND FIND FOR CAREER DEVELOPMENTS**	**15**
Self-motivation: Interpersonal relationship - Attitudes and interpersonal integrity – Time management – prioritizing - Leadership quality – In the team: Team building and Team work - Memory technique Problem solving: – emotional intelligence – positive attitude towards life – taking up initiatives – developing mind set –openness to feed back – adaptability – active listening – work ethics. Presentation of skills: creative thinking – critical thinking – logical thinking - decision making. Management ability: empathy – selflessness – humility – cultural respectfulness – versatility – generosity – trustworthiness – planning and executing – target achievement – listening to others' views – friendliness - active participation – empowering healthy atmosphere – exchange of ideas – mediation – negotiation – qualities – updating the knowledge – pre-work for performance – respect for 4 rules and regulations.		
SUGGESTIVE ASSESSMENT METHODS:		
1) Pre Assessment Test – To check the student's previous knowledge in Programming skills.		
2) Internal Assessment I for coding skills will be conducted for 100 marks which are then calculated to 20.		
3) Internal Assessment II for coding skills will be conducted for 100 marks which are then calculated to 20.		
4) Model Exam for coding skills will be conducted for 100 marks which are then calculated to 20.		

5) A test for Communication skills will be conducted for 100 marks which will be then calculated to 40.	
6) For assignments, students should attend all the practice tests conducted online on HackerRank. Each assignment will be for 100 marks and finally the total marks obtained by a student in all tests will be reduced to 40 marks.	
8) The total of 100 marks obtained from the tests will be then calculated to 60 marks and additional of 40 marks will be given for assignments which will make it a total of 100.	
TOTAL PERIODS: 60	
COURSE OUTCOMES	
Upon completion of the course, the students will be able to.	
CO1:	Develop and implement modular applications using functions.
CO2:	Develop logics using strings and pointers.
CO3:	Develop applications in C using user defined datatypes.
CO4:	Practice both receptive skills (listening and reading) and productive skills (writing and speaking) and speak English with standard pronunciation using correct stress and intonation.
CO5:	Practice team building and team work procedures and develop memory techniques and manage abilities like empathy, selflessness, cultural respectfulness and trustworthiness preparing themselves for target achievement.
TEXT BOOKS	
1.	Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2.	Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
REFERENCE BOOKS	
1.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
2.	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
3.	E Balagurusamy, "Programming in ANSI C", Eighth edition, Mc GrawHill Publications, 2019.
4.	S.Sobana, R.Manivannan, G.Immanuel,'Communication and Soft Skills' VK Publications', 2016.
5.	Zed Shaw, " Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding", Zed Shaw's Hardway Series, 2015.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	1	1	1	-	-	-	1	2	2	1	2
CO2	3	2	2	-	1	1	1	-	-	-	1	2	2	1	2
CO3	3	2	2	-	1	1	1	-	-	-	1	2	2	1	2
CO4	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO5	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO	3	2	2	-	1	1	1	1	2	3	1	2	2	1	2

3-High, 2- Medium, 1-Low

AC22401	INDUSTRIAL SAFETY ENGINEERING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

- To explain the fundamental concept and principles of industrial safety.
- To apply the principles of maintenance engineering.
- To analyse the wear and its reduction.
- To evaluate faults in various tools, equipment and machines.
- To apply periodic maintenance procedures in preventive maintenance.

UNIT I	INDUSTRIAL SAFETY	6

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT II	MAINTENANCE ENGINEERING	6

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT III	WEAR AND CORROSION AND THEIR PREVENTION	6

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT IV	FAULT TRACING	6

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler,vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT V	PERIODIC AND PREVENTIVE MAINTENANCE	6
Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, Advantages of preventive maintenance. Repair cycle concept and importance.		
		TOTAL PERIODS: 30

COURSE OUTCOMES	
At the end of the course, the students would be able to	
CO1:	Explain the fundamental concept and principles of industrial safety.
CO2:	Apply the principles of maintenance engineering.
CO3:	Analyze the wear and its reduction.
CO4:	Evaluate faults in various tools, equipment and machines.
CO5:	Apply periodic maintenance procedures in preventive maintenance.

TEXT BOOKS	
1.	L M Deshmukh, Industrial Safety Management, Tata McGraw-Hill Education, 2005.
2.	Charles D. Reese, Occupational Health and Safety Management: A Practical Approach, CRC Press, 2003.

REFERENCES:	
1.	Edward Ghali, V. S. Sastri, M. Elboujdaini, Corrosion Prevention and Protection: Practical Solutions, John Wiley & Sons, 2007.
2.	Garg, HP, Maintenance Engineering, S. Chand Publishing.
3.	J Maiti, Pradip Kumar Ray, Industrial Safety Management: 21st Century Perspectives of Asia, Springer, 2017.
4.	R. Keith Mobley, Maintenance Fundamentals, Elsevier, 2011.
5.	W. E. Vesely, F. F. Goldberg, Fault Tree Handbook, Create space Independent Pub, 2014.

Mapping of Course Outcomes to Programme Outcomes

Course outcomes	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
CO2	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
CO3	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
CO4	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
CO5	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2
CO	2	1	2	-	-	2	1	-	-	-	-	1	-	-	2

3-High, 2- Medium, 1-Low