SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)

Pullipalayam, Morur (Po.), Sankari (Tk.),
Salem (Dt.) - 637 304.

B.E.
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM

CHOICE BASED CREDIT SYSTEM

REGULATIONS 2023
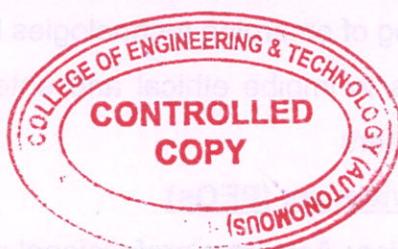
SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

B.E.
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI
CHOICE BASED CREDIT SYSTEM

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REGULATIONS 2023

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

Institute vision:

To be an institute of repute in all fields of education by implementing the best practices akin to global standards for fostering domain knowledge and developing research attitude among students to make them globally competent.

Institute Mission:

- Achieving excellence in Teaching & Learning process using state-of-the-art resources.
- Extending opportunity to upgrade faculty knowledge and skills.
- Implementing the best student training practices for requirements of industrial scenario of the state.
- Motivating faculty and students in research activity for real time application

Department of Electronics and Communication Engineering

Vision

To develop globally competitive Electronics and Communication engineers to solve real-time problems in industry and society.

Mission

M1   To provide solid fundamental knowledge and technical skills through effective teaching learning Methodologies

M2   To provide a conducive environment through collaborations with industry and academia

M3   To inculcate learning of emerging technologies leading to lifelong learning

M4   To enable students to imbibe ethical and enterprising characteristics to become socially responsible engineers

Program Educational Outcomes (PEOs)

PEO 1. Technical Expertise: Acquire a professional career and personal development in industries / higher studies / research / entrepreneurs.

PEO 2. Life-long learning: Sustain to develop their knowledge and skills throughout their career.

PEO 3. Ethical Knowledge: Exhibit professionalism, ethical attitude, communication skills, teamwork and adaptation to current trends.

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PROGRAM OUTCOMES (POs)

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

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Program Specific Outcomes (PSOs)

PSO1- Design and test modern electronic systems by adapting emerging technologies.

PSO2- Design and formulate solutions for industrial requirements using communication, networking, signal processing techniques, embedded systems and VLSI techniques

PSO3 - Develop solutions required in multidisciplinary engineering fields.

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SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Approved by AICTE, Affiliated to Anna University,
Accredited by NAAC, NBA (ECE/CSE/MECH) and ISO 9001:2015 Certified
Pullipalayam, Sankari, Salem (Dt.)

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION – 2023
CHOICE BASED CREDIT SYSTEM
CURRICULUM

Course Code	Course	Category	Periods / Week			C	CIA	ESE	Total
			L	T	P				
I SEMESTER									
Theory Course(s)									
23EN101	Communicative English	HSMC	3	0	0	3	40	60	100
23MA201	Engineering Mathematics-I	BSC	3	1	0	4	40	60	100
23PH201	Physics for Engineers	BSC	3	0	0	3	40	60	100
23CY201	Chemistry for Engineers	BSC	3	0	0	3	40	60	100
23CS301	Problem Solving and Python Programming	ESC	3	0	0	3	40	60	100
23TA101	Heritage of Tamils/தமிழர் மரபு	HSMC	1	0	0	1	100	-	100
Practical Course(s)									
23PC201	Physics and Chemistry Laboratory	BSC	0	0	4	2	60	40	100
23CS302	Problem Solving and Python Programming Laboratory	ESC	0	0	4	2	60	40	100
23EN102	Communication Laboratory	HSMC	0	0	2	1	60	40	100
Mandatory Course									
23MC801	Induction Programme	MC	2 Weeks			0	100	-	100
Total			16	1	10	22	580	420	1000

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II SEMESTER

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23MA202	Engineering Mathematics-II	BSC	3	1	0	4	40	60	100
23PH203	Semiconductor Physics	BSC	3	0	0	3	40	60	100
23EC301	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	40	60	100
23ME301	Engineering Graphics	ESC	3	1	0	4	40	60	100
23TA102	Tamils and Technology/தமிழரும் தொழில்நுட்பமும்	HSMC	1	0	0	1	100	-	100
Theory with Practical Course(s)									
23CS303	C Programming and Data Structures	ESC	3	0	2	4	50	50	100
Practical Course(s)									
23ME302	Engineering Practices Laboratory	ESC	0	0	4	2	60	40	100
Employability Enhancement Course(s)									
23ME701	Design Thinking	EEC	2	0	0	2	40	60	100
	Total		18	2	6	23	410	390	800

III SEMESTER

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23MA204	Engineering Mathematics-III	BSC	3	1	0	4	40	60	100
23EC401	Analog Electronic Circuits	PCC	3	0	0	3	40	60	100
23EC402	Signals and Systems	PCC	3	0	0	3	40	60	100
23EC403	Electromagnetic Fields	PCC	3	0	0	3	40	60	100
Theory with Practical Course(s)									
23EC404	Digital Electronics	PCC	3	0	2	4	50	50	100

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Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

23EC405	Circuit Analysis	PCC	3	0	3	4.5	50	50	100

Practical Course(s)

23EC407	Analog Circuits Laboratory	PCC	0	0	3	1.5	60	40	100

Employability Enhancement Course(s)

23HS701	Soft Skills -I	EEC	1	0	0	1	100	-	100
	Total		**19**	**1**	**8**	**24**	**420**	**380**	**800**

	IV SEMESTER								
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	**T**	**P**		**CIA**	**ESE**	**Total**

Theory Course(s)

23MA206	Statistics and Numerical Methods	BSC	3	1	0	4	40	60	100
23EC408	Control System	PCC	3	0	0	3	40	60	100
23EC409	Computer Architecture and Organization	PCC	3	0	0	3	40	60	100
23HS101	Universal Human Values-II	HSMC	3	0	0	3	40	60	100

Theory with Practical Course(s)

23EC410	Analog and Digital Communication	PCC	3	0	2	4	50	50	100
23EC411	Linear Integrated Circuits	PCC	3	0	2	4	50	50	100

Employability Enhancement Course(s)

23HS702	Soft Skills - II	EEC	1	0	0	1	100	-	100

Mandatory Course

23MC802	Environmental Sciences and Disaster Management	MC	2	0	0	0	100	-	100
	Total		**21**	**1**	**4**	**22**	**460**	**340**	**800**

	V SEMESTER								
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	**T**	**P**		**CIA**	**ESE**	**Total**

Theory Course(s)

23HS102	Principles of Management	HSMC	3	0	0	3	40	60	100
23EC5XX	Professional Elective – I	PEC	3	0	0	3	40	60	100

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23EC6XX	Open Elective* - I	OEC	3	0	0	3	40	60	100

Theory with Practical Course(s)

23EC412	Microprocessor and Microcontroller	PCC	3	0	2	4	50	50	100
23EC413	Communication Networks	PCC	3	0	2	4	50	50	100
23EC414	Digital Signal Processing	PCC	3	0	2	4	50	50	100

Employability Enhancement Course(s)

23HS703	Soft Skills -III	EEC	1	0	0	1	100	-	100
Total			**19**	**0**	**6**	**22**	**370**	**330**	**700**

*Open Elective - Shall be chosen from the list of open electives offered by other Programmes

VI SEMESTER									
Code No.	**Course**	**Category**	**Periods / Week**				**Maximum Marks**		
			L	**T**	**P**	**C**	**CIA**	**ESE**	**Total**

Theory Course(s)

23EC5XX	Professional Elective – II	PEC	3	0	0	3	40	60	100
23EC6XX	Open Elective-II	OEC	3	0	0	3	40	60	100
23EC6XX	Open Elective-III	OEC	3	0	0	3	40	60	100

Theory with Practical Course(s)

23EC415	Embedded Systems	PCC	3	0	2	4	50	50	100
23EC416	Wireless Communication	PCC	3	0	2	4	50	50	100
23EC417	VLSI and Chip Design	PCC	3	0	2	4	50	50	100

Employability Enhancement Course(s)

23EC705	Mini Project	EEC	0	0	4	2	100	-	100
23HS704	Soft Skills - IV	EEC	1	0	0	1	100	-	100

Mandatory Course

23MC803	Cyber Security	MC	0	0	2	0	100	-	100
Total			**19**	**0**	**12**	**24**	**570**	**330**	**900**
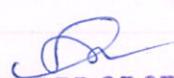
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VII SEMESTER

Code No.	Course	Category	Periods / Week				Maximum Marks		
			L	T	P	C	CIA	ESE	Total
Theory Course(s)									
23HS103	Entrepreneurship and IPR	HSMC	3	0	0	3	40	60	100
23EC5XX	Professional Elective - III	PEC	3	0	0	3	40	60	100
23EC5XX	Professional Elective – IV	PEC	3	0	0	3	40	60	100
23EC6XX	Open Elective-IV	OEC	3	0	0	3	40	60	100
Theory with Practical Course(s)									
23EC418	Optical Communication	PCC	3	0	2	4	50	50	100
Employability Enhancement Course(s)									
23EC702	Internship*	EEC	2 weeks			1	100	-	100
Mandatory Course									
23MC804	Indian Constitution	MCC	1	0	0	0	100	-	100
	Total		16	0	2	17	410	290	700

VIII SEMESTER

Code No.	Course	Category	Periods / Week				Maximum Marks		
			L	T	P	C	CIA	ESE	Total
Employability Enhancement Course(s)									
23EC703	Project Work	EEC	0	0	20	10	60	40	100
	Total		0	0	20	10	60	40	100

Total Credits: 164

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PROFESSIONAL ELECTIVES

Vertical – I Semiconductor Chip Design and Testing

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23EC511	Wide Bandgap Devices	PEC	3	0	0	3	40	60	100
23EC512	Validation and Testing Technology	PEC	3	0	0	3	40	60	100
23EC513	Low Power IC Design	PEC	3	0	0	3	40	60	100
23EC514	VLSI Testing and Design For Testability	PEC	3	0	0	3	40	60	100
23EC515	Mixed Signal IC Design Testing	PEC	3	0	0	3	40	60	100
23EC516	Analog IC Design	PEC	3	0	0	3	40	60	100

Vertical – II Bio Medical Technologies

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23EC521	Wearable Devices	PEC	3	0	0	3	40	60	100
23EC522	Human Assist Devices	PEC	3	0	0	3	40	60	100
23EC523	Therapeutic Equipment	PEC	3	0	0	3	40	60	100
23EC524	Medical Imaging Systems	PEC	3	0	0	3	40	60	100
23EC525	Brain Computer Interface and Applications	PEC	3	0	0	3	40	60	100
23EC526	Body Area Networks	PEC	3	0	0	3	40	60	100

Vertical – III Signal Processing

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23EC531	Advanced Digital Signal Processing	PEC	3	0	0	3	40	60	100
23EC532	Image Processing	PEC	3	0	0	3	40	60	100
23EC533	Speech Processing	PEC	3	0	0	3	40	60	100
23EC534	Software Defined Radio	PEC	3	0	0	3	40	60	100
23EC535	DSP Architecture and Programming	PEC	3	0	0	3	40	60	100
23EC536	Computer Vision	PEC	3	0	0	3	40	60	100

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Vertical – IV RF Technologies

23EC541	RF and Microwave	PEC	3	0	0	3	40	60	100
23EC542	Signal Integrity	PEC	3	0	0	3	40	60	100
23EC543	Antenna Design	PEC	3	0	0	3	40	60	100
23EC544	MICs and RF System Design	PEC	3	0	0	3	40	60	100
23EC546	EMI/EMC Pre Compliance Testing	PEC	3	0	0	3	40	60	100
23EC547	RFID System Design and Testing	PEC	3	0	0	3	40	60	100

Vertical – V High Speed Communications

23EC551	Optical Networks	PEC	3	0	0	3	40	60	100
23EC552	Wireless Broad Band Networks	PEC	3	0	0	3	40	60	100
23EC553	4G/5G Communication Networks	PEC	3	0	0	3	40	60	100
23EC554	Software Defined Networks	PEC	3	0	0	3	40	60	100
23EC555	Massive MIMO Networks	PEC	3	0	0	3	40	60	100
23EC556	Advanced Wireless Communication Techniques	PEC	3	0	0	3	40	60	100

Vertical – VI Sensor Technologies and IoT

23EC561	IoT Processors	PEC	3	0	0	3	40	60	100
23EC562	IoT Based System Design	PEC	3	0	0	3	40	60	100
23EC563	Wireless Sensor Network Design	PEC	3	0	0	3	40	60	100
23EC564	Industrial IoT and Industry 4.0	PEC	3	0	0	3	40	60	100
23EC565	MEMS Design	PEC	3	0	0	3	40	60	100
23EC566	Fundamentals of Nanoelectronics	PEC	3	0	0	3	40	60	100

Vertical – VII Underwater Technologies

23EC571	Underwater Instrumentation System	PEC	3	0	0	3	40	60	100
23EC572	Underwater Imaging Systems and Image Processing	PEC	3	0	0	3	40	60	100

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23EC573	Underwater Communication	PEC	3	0	0	3	40	60	100
23EC574	Ocean Observation Systems	PEC	3	0	0	3	40	60	100
23EC575	Underwater Navigation Systems	PEC	3	0	0	3	40	60	100
23EC576	Ocean Acoustics	PEC	3	0	0	3	40	60	100

Vertical – VIII Space Technologies

23EC581	Radar Technologies	PEC	3	0	0	3	40	60	100
23EC582	Avionics Systems	PEC	3	0	0	3	40	60	100
23EC583	Positioning and Navigation Systems	PEC	3	0	0	3	40	60	100
23EC584	Satellite Communication	PEC	3	0	0	3	40	60	100
23EC585	Remote Sensing	PEC	3	0	0	3	40	60	100
23EC586	Rocketry and Space Mechanics	PEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY AGRICULTURAL ENGINEERING

Course Code	Course	Category	Periods / Week				Maximum Marks		
			L	T	P	C			
23AG601	Principles of Food Preservation	OEC	3	0	0	3	40	60	100
23AG602	Organic Farming	OEC	3	0	0	3	40	60	100
23AG603	Renewable Energy Technology	OEC	3	0	0	3	40	60	100
23AG604	Urban Horticulture	OEC	3	0	0	3	40	60	100
23AG605	Roof Top Gardening Techniques	OEC	3	0	0	3	40	60	100
23AG606	Value Addition in Agricultural Products	OEC	3	0	0	3	40	60	100

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OPEN ELECTIVE COURSES OFFERED BY ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23AD601	Artificial Intelligence for Everyone	OEC	3	0	0	3	40	60	100
23AD602	Fundamentals of Machine Learning	OEC	3	0	0	3	40	60	100
23AD603	Data Science for Engineers	OEC	3	0	0	3	40	60	100
23AD604	Artificial Intelligence in Healthcare	OEC	3	0	0	3	40	60	100
23AD605	Business Intelligence and Analytics	OEC	3	0	0	3	40	60	100
23AD606	Java Programming	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY BIOMEDICAL ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23BM601	Sensors and Transducers	OEC	3	0	0	3	40	60	100
23BM602	Fundamentals of Healthcare Analytics	OEC	3	0	0	3	40	60	100
23BM603	ICU Equipment	OEC	3	0	0	3	40	60	100
23BM604	Basics of Biomedical Engineering	OEC	3	0	0	3	40	60	100
23BM605	Fundamentals of Medical Imaging Systems	OEC	3	0	0	3	40	60	100
23BM606	Medical Electronics	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY COMPUTER SCIENCE AND ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23CS601	Fundamentals of Software Project Management	OEC	3	0	0	3	40	60	100

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23CS602	Stack Technologies for Engineers	OEC	3	0	0	3	40	60	100
23CS603	Storage Area Networks	OEC	3	0	0	3	40	60	100
23CS604	Digital Marketing	OEC	3	0	0	3	40	60	100
23CS605	Fundamentals of Multimedia Animation	OEC	3	0	0	3	40	60	100
23CS606	Network Forensics	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY CYBERSECURITY

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23CB601	Fundamentals of Information Security	OEC	3	0	0	3	40	60	100
23CB602	Cryptography and Network Security	OEC	3	0	0	3	40	60	100
23CB603	Ethical Hacking	OEC	3	0	0	3	40	60	100
23CB604	Digital Marketing	OEC	3	0	0	3	40	60	100
23CB605	R Programming	OEC	3	0	0	3	40	60	100
23CB606	Linux Programming	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY MECHANICAL ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23ME601	Industrial Safety	OEC	3	0	0	3	40	60	100
23ME602	Electric Vehicle Technology	OEC	3	0	0	3	40	60	100
23ME603	Digital Manufacturing	OEC	3	0	0	3	40	60	100
23ME604	Fundamentals of Robotics	OEC	3	0	0	3	40	60	100
23ME605	Total Quality Management	OEC	3	0	0	3	40	60	100
23ME606	Engineering Economics	OEC	3	0	0	3	40	60	100

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OPEN ELECTIVE COURSES OFFERED FOR OTHER PROGRAMME

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23EC601	Fundamentals of Communication Systems	OEC	3	0	0	3	40	60	100
23EC602	Remote Sensing Concepts	OEC	3	0	0	3	40	60	100
23EC603	Wireless Networks	OEC	3	0	0	3	40	60	100
23EC604	Consumer Electronics	OEC	3	0	0	3	40	60	100
23EC605	Fundamentals of Image Processing	OEC	3	0	0	3	40	60	100
23EC606	Machine Vision System	OEC	3	0	0	3	40	60	100

COURSES FOR MINOR DEGREE - VLSI DESIGN AND TECHNOLOGY

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23EC901	Electronic Materials, Devices and Circuits	MEC	3	0	0	3	40	60	100
23EC902	Digital System Design	MEC	3	0	0	3	40	60	100
23EC903	Analog Circuits	MEC	3	0	0	3	40	60	100
23EC904	VLSI Design	MEC	3	0	0	3	40	60	100
23EC905	VLSI Verification and Testing	MEC	3	0	0	3	40	60	100
23EC906	Semiconductor Equipment Design and Technology	MEC	3	0	0	3	40	60	100

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SUMMARY

S.No	Category	Credits per Semester								SSCET	AU
		I	II	III	IV	V	VI	VII	VIII		
1	HSMC	5	1	-	3	3	-	3	-	15	12
2	BSC	12	7	4	4	-	-	-	-	27	25
3	ESC	5	13	-	-	-	-	-	-	18	21
4	PCC	-	-	19	18	12	12	4	-	65	58
5	PEC	-	-	-	-	3	3	6	-	12	18
6	OEC	-	-	-	-	3	6	3	-	12	12
7	EEC	-	2	1	1	1	3	1	10	19	16
8	MC	√				√	√	√		4 Courses	2 Courses
	Total	22	23	24	26	22	24	17	10	164	162

HSMC - Humanities and Social Sciences including Management Courses

BSC - Basic Science Courses

ESC - Engineering Science Courses

PCC - Professional Core Courses

PEC - Professional Elective Courses

OEC - Open Elective Courses

EEC - Employability Enhancement Courses

MC   - Mandatory Courses (Non-Credit Courses)

MEC – Minor Elective Courses

CIA - Continuous Internal Assessment

ESE - End Semester Examination

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Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

23EN101	**COMMUNICATIVE ENGLISH** (Common to all B.E./B.Tech Programmes)	L	T	P	C
		3	0	0	3
Category	HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC)				
Pre requisites	Nil				

Course Objectives

The course is intended to
- Enable the students to assimilate the correct patterns of the language.
- Develop students' insight into the structure of the English language.
- Enrich vocabulary bank, to communicate more effectively in English,
- Express opinions including facts & ideas & maintain conversation in everyday situations.
- Use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Outline the basics of English communication	Understand
CO 2	Contrast the ways in which written and spoken communication differ.	Understand
CO 3	Relate the descriptive and analytical words, phrases, and sentence structures.	Understand
CO 4	Identify various text kinds and understand their connotative and denotative implications.	Apply
CO 5	Utilize several text kinds using the proper formats.	Apply

Course Contents

Unit – I	**Basics of Communication**	9

Listening – Telephone conversation & Writing message, gap filling; Reading – Telephone message, bio-note; Writing – Personal profile; Grammar – Simple present tense, Present continuous tense, Asking questions (wh-questions); Vocabulary – GRE Vocabulary.

Unit – II	**Narration**	9

Listening – Travel/Fiction podcast, Watching a travel documentary; Reading – An excerpt from a travelogue, Newspaper Report; Writing – Narrative (Event, personal experience etc.); Grammar – Subject – verb agreement, Simple past, Past continuous Tenses; Vocabulary – Antonyms, Word formation (Prefix and Suffix).

Unit – III	**Description**	9

Listening – Conversation, Radio/TV advertisement/BBC Documents; Reading – A tourist brochure and planning an itinerary, descriptive article / excerpt from literature; Writing – Definitions, Descriptive writing, Checklists; Grammar – Future tense, Perfect tenses, Preposition; Vocabulary – Adjectives and Adverbs.

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Passed in Board of Studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

Unit – IV	Classification	9

Listening – Announcements and filling a table; Reading – An article, social media posts and classifying (channel conversion – text to table), IELTS & TOEFL, BEC materials; Writing – Note making, Note taking and Summarising, a classification paragraph; Grammar – Connectives, Transition words; Vocabulary – Contextual vocabulary, Words used both as noun and verb, Classification related words.

Unit – V	Expression of Views	9

Listening – Debate / Discussion; Reading – Formal letters, Letters to Editor, Opinion articles / Blogs; Writing – Letter writing/ Email writing (Enquiry / Permission, Letter to Editor), Resume Writing; Grammar – Question tags, Indirect questions, Yes / No questions; Vocabulary – Compound words, Phrasal verbs, Articles-Review of Movie/Documentary/Short-films.

Total : 45 Hours

Text Books

1. Anna University, Division of Humanities and Social Sciences. English for Engineers and Technologists. Vol. 1: A Skills Approach, Orient Longman, 2002.
2. Trimble, Louis, English for Science and Technology. Vol. 1: A Discourse Approach, Cambridge University Press. 2023.
3. Kumar, Sanjay & Lata, Pushp. Communication Skills. New Delhi: Oxford University Press, 2018.

Reference Books

1. C.Richards Jack. Interchange Fifth Edition, Cambridge University Press, 2017.
2. Wallwork Adrian, Springer. English for Academic Correspondence and Socializing. Cambridge University Press. 2011.
3. Cortrell, Stella. The Study Skills Handbook. Fourth Edition,Red Globe Press, 2013.
4. Kumar, Sanjay & Lata, Pushp. Communication Skills,Oxford University Press, 2011.

Additional / Web References

1. https://nptel.ac.in/courses/109106094
2. nptel.ac.in/courses/109/104/109104090/
3. http://www.uefap.com/grammar/gramfram.htm

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	-	-	-	-	2	-	-	-	2	3	-	3			
CO 2	-	-	-	-	2	-	-	-	2	3	-	3			
CO 3	-	-	-	-	2	-	-	-	2	3	-	3			
CO 4	-	-	-	-	2	-	-	-	2	3	-	3			
CO 5	-	-	-	-	2	-	-	-	2	3	-	3			
Average	-	-	-	-	2	-	-	-	2	3	-	3			

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

3 – High   2 – Medium   1 – low   "-" - No Correlation

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Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	60
				Total	40	60

23MA201	ENGINEERING MATHEMATICS- I (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		3	1	0	4
Category	Basic science (BS)				
Pre requisites	Nil				

Course Objectives
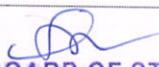
The course is intended to
- Develop the use of matrix algebra techniques that are needed by engineers for practical applications.
- Familiarize the student with differentiation rules.
- Familiarize the student with functions of several variables this is needed in many branches of engineering.
- Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.
- Acquire the knowledge of ordinary differential equation in both variable and constant coefficients.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.	Apply
CO 2	Interpret various concepts of differential calculus like limit, continuity, differentiability, Successive differentiation and study it's applicability in maxima and minima of one variable.	Understand
CO 3	Construct the application of partial differentiation and apply for evaluating maxima and minima of functions of multi variables.	Apply
CO 4	Make use of the concept of change of order of integration to evaluate multiple integrals and their usage in computing the area and volume.	Apply
CO 5	Illustrate ordinary differential equations to solve constant and variable coefficient problems.	Understand

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Passed in Board of Studies Meeting on 26.10.2023

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Course Contents

Unit – I	Matrices	9+3
Characteristic equation -Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors - Diagonalization of matrices- Reduction of a quadratic form to canonical form by orthogonal transformation- Nature of quadratic form-Cayley -Hamilton theorem.		
Unit – II	Differential Calculus	9+3
Representation of functions -Limit of a function - Continuity- Derivatives -Differentiation rules - Taylor's series - Maclaurin series- Maxima and Minima of functions of one variable.		
Unit – III	Multivariable Calculus	9+3
Partial differentiation - Homogeneous functions and Euler's theorem - Jacobians -Taylor's series for functions of two variables - Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.		
Unit – IV	Multiple Integrals	9+3
Double integrals - Area enclosed by plane curves- Double integrals in polar coordinates - Change of order of integration -Triple integrals - Volume of solids (Cartesian Co-ordinates only).		
Unit – V	Ordinary Differential Equations	9+3
Higher order linear differential equations with constant coefficients -Homogeneous Equation of Euler's and Legendre's Types of linear equations with Variable Coefficients - Method of variation of parameters.		

Total : 60 Periods

Text Books

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S. "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, " Calculus: Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015.

Reference Books

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016.
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media, New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.

Additional / Web References

1. https://nptel.ac.in/courses/122104018
2. https://nptel.ac.in/courses/111105122
3. https://nptel.ac.in/courses/111107108

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1												
CO 2	3	2							1	1		
CO 3	3	2							1	1		
CO 4	3	2							1	1		
CO 5	3	2							1	1		
Average	3	2							1	1		

"3"– High   "2" – Medium   "1" – low   "-" - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12		
CIA II	3 hours	2.5 units	100	12	24	60
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

23PH201	PHYSICS FOR ENGINEERS (Common to BME, Mech, ECE and AGRI)	L	T	P	C
		3	0	0	3
Category	Basic Sciences				
Pre requisites	Nil				

Course Objectives
The course is intended to
- Make the students effectively achieve an understanding of mechanics.
- Enable the students to gain knowledge of electromagnetic waves and its applications.
- Introduce the basics of oscillations, optics and lasers.
- Equip the students to be successfully understand the importance of quantum physics.
- Motivate the students towards the applications of quantum mechanics.

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Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Interpret the concepts of mechanics in the rotational system.	Understand
CO 2	Explain the Maxwell's equations and time varying electric field to show the nature of propagation of electromagnetic waves, radiation pressure and its energy through free space, non-conducting and conducting media.	Understand
CO 3	Interpret the foundational knowledge of physics to recognize phenomena of oscillations, optics and lasers.	Understand
CO 4	Extend the concepts of Schrodinger wave equation to calculate the matter waves energy & momentum, probability of finding the particle and wave function of quantum system.	Understand
CO 5	Make use of advanced physics concepts of quantum theory and its application in tunneling microscopes.	Apply

Course Contents

Unit – I	Mechanics	9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

Unit – II	Electromagnetic Waves	9

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

Unit – III	Oscillations , Optics and Lasers	9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

Unit – IV	Basic Quantum Mechanics	9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

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Unit – V	**Applied Quantum Mechanics**	9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

Total : 45 Hours

Text Books

1. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill,Seventh Edition, 2017.
2. E.M.Purcell and D.J.Morin, "Electricity and Magnetism", Cambridge Univ.Press, 2013.
3. Gaur R K, Gupta S L "Engineering Physics", Dhanpat Rai Publications., 2013.
4. Hugh D. Young, Roger A. Freedman, Lewis Ford .A "University Physics with Modern Physics", Pearson Education., India, 2008.

Reference Books

1. R.Wolfson "Essential University Physics". Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, "Physics – Volume 1 & 2", CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019.
4. Halliday D, Resnick R, Walker J "Fundamentals of Physics", Wiley Publications, 2013.

Additional / Web References

1. https://archive.nptel.ac.in/courses/115/106/115106119/
2. https://archive.nptel.ac.in/courses/115/101/115101005/
3. https://archive.nptel.ac.in/courses/115/102/115102124/
4. https://archive.nptel.ac.in/courses/115/101/115101107/

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1												
CO 2	3	-	-	-	-	-	-	-	2	-	-	2
CO 3	3	-	-	-	-	-	-	-	2	-	-	2
CO 4	3	-	-	-	-	-	-	-	2	-	-	2
CO 5	3	-	-	-	-	-	-	-	2	-	-	2
Average	3	-	-	-	-	-	-	-	2	-	-	2

3 – High   2 – Medium   1 – low   "-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

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Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

23CY201	CHEMISTRY FOR ENGINEERS (Common to all B.E.,/B.Tech Programmes)	L	T	P	C
		3	0	0	3
Category	Basic Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to
- Impart knowledge on the various sources of water and its impurities.
- Impart knowledge on the basic principles and preparatory methods of nanomaterials.
- Facilitate the understanding of different types of fuels, their preparation, properties and Combustion characteristics.
- Familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- Familiarize different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Recognize water quality parameters and water treatment techniques for the polluted water.	Understand
CO 2	Outline the various synthesis processes of nanomaterial and enumerate its applications in various fields.	Understand
CO 3	Illustrate the composition, calorific values, uses of natural fuels and the manufacture of synthetic and bio fuels.	Understand
CO 4	Infer the knowledge of operating ideology, working process and application of energy conversion and storage devices.	Understand

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Passed in Board of Studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

CO 5	Reveal the basic concepts, processing of polymer and its chemistry in engineering and technology.	Understand

Course Contents

Unit – I	Water treatment	9

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

Unit – II	Nanochemistry	9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

Unit – III	Fuels and combustion	9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil – cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

Unit – IV	Energy sources and storage devices	9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

Unit – V	Polymer chemistry	9

Introduction: Functionality-degree of polymerization. Classification of polymers (Source, Structure, Synthesis and Intermolecular forces). Mechanism of free radical addition polymerization. Properties of polymers: Tg, tacticity, molecular weight-number average, weight average, viscosity average and polydispersity index (Problems). Techniques of polymerization: Bulk, emulsion, solution and suspension. Engineering Plastics: Polyamides, Polycarbonates and Polyurethanes. Compounding and Fabrication Techniques: Injection, Extrusion, Blow and Calendaring.

	Total : 45 Hours

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Text Books
1. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B.,"Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi,2012.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.
Reference Books
1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
3. O.V. Roussak and H.D. Gesser, Applied Chemistry: A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
Additional / Web References
1. https://nptel.ac.in/courses/122101001

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	-	-	-	-	2	-	1	-	-	1
CO 2	3	-	-	-	-	-	-	-	-	-	-	1
CO 3	3	-	-	-	-	-	2	-	1	-	-	1
CO 4	3	-	-	-	-	-	2	-	-	-	-	1
CO 5	3	-	-	-	-	-	-	-	1	-	-	1
Average	3	-	-	-	-	-	2	-	1	-	-	1

3 – High   2 – Medium   1 – low   "-" - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

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Passed in Board of Studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

23CS301	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		3	0	0	3
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The course is intended to
- Understand the basics of algorithmic problem solving.
- Develop and solve problems using python conditionals and loops.
- Develop and use function calls to solve problems.
- Construct python data structures - lists, tuples, dictionaries to represent complex data.
- Implement input/output with file exceptions in python.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Develop logical solutions to simple and complex computational problems.	Apply
CO 2	Develop and execute python programs using conditionals and loops	Apply
CO 3	Implement python programs using functions for searching operations	Apply
CO 4	Execute the lists, tuples and dictionary created in python	Apply
CO 5	Implement a module to read & write data with exceptions.	Apply

Course Contents

Unit – I	Basic Programming Representations	9

Fundamentals of Computer, Identification of Computational Problems, Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

Unit – II	Different Data Types	9

Introduction to python, Python interactive and script mode, data types: numeric, boolean, string, list, tuple, dictionary and set; identifier, variables, keywords, expressions, statements, assignment, precedence of operators, comments, indentation; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

Unit – III	Functional Flow	9

Conditionals: Boolean values and Operators, if statement, alternative statement, nested statements, chained conditional; Iteration: state, while, for, break, continue, pass; Input and Output; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string methods, string module; Lists as arrays, creation of arrays and operations on arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

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Unit – IV	Types of Data Structures	9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, advanced list processing - list comprehension (Map, Filter, Lambda and Reduce); Tuples: tuple introduction, tuple assignment, tuple as return value; Dictionaries: operations and methods; Sets: set introduction, set operations; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

Unit – V	Files, Modules, Packages	9

Files: text files, reading and writing files, file positions, format operator, directory methods, command line arguments, Exceptions: errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

Total : 45 Periods

Text Books

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

Reference Books

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 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.

Additional / Web References

1. https://learnengineering.in/ge3151-problem-solving-and-python-programming/
2. https://www.scribd.com/document/546667558/GE3151-PROBLEM-SOLVING-AND-PYTHON-PROGRAMMING
3. https://padeepz.net/ge3151-notes-problem-solving-and-python-programming-regulation-2021-anna-university/
4. https://onlinecourses.nptel.ac.in/noc21_cs32/

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	2
CO 4	2	2	-	2	2	-	-	-	-	-	2	2
CO 5	3	2	-	-	2	-	-	-	-	-	2	2
Average	2	3	3	3	2	-	-	-	-	-	2	2

3 – High   2 – Medium   '-' - No Correlation

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Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
			Total		40	60

CHAIRMAN-BOARD OF STUDIES

தமிழர் மரபு

LTPC
1001

அலகு 1 மொழி மற்றும் இலக்கியம்:

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற 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 2   மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை:

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

அலகு 3   நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:

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

அலகு 4   தமிழர்களின் திணைக் கோட்பாடுகள்:

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

அலகு 5   இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:

இந்திய விவடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு — கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TEXT-CUM-REFERENCE BOOKS

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

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

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

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).

5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

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

7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)

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

9. Keeladi – 'Sangam City Civilization on thebanks of river Vaigai; (Jointly published by: Department of Archaelogy & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilandu).

12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.

CHAIRMAN-BOARD OF STUDIES

HERITAGE OF TAMILS

23TA101

UNIT I LANGUAGE AND LITERATURE

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

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE

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

UNIT III FOLK AND MARTIAL ARTS

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

UNIT IV THINAI CONCEPT OF TAMILS

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TEXT-CUM-REFERENCE BOOKS

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

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

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

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).

5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

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

7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)

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

9. Keeladi – 'Sangam City Civilization on thebanks of river Vaigai; (Jointly published by: Department of Archaelogy & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilandu).

12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.

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23PC201	PHYSICS AND CHEMISTRY LABORATORY (Common to all B.E./B.Tech Programmes)	L	T	P	C
		0	0	4	2
Category	Basic sciences				
Pre requisites	Physics and chemistry				

Course Objectives

The course is intended to
- Measure various physical parameter of solid and matter waves.
- Identify the velocity of ultrasonic waves in different liquid medium.
- Measure acceptance angle, groove width and wave length of laser.
- Demonstrate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO and chloride.
- Familiarize with electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Develop the experimental skills on physical properties of materials and matter waves.	Apply
CO 2	Make use of concepts of sound to measure physical properties of given liquids.	Apply
CO 3	Identify various physical parameters of object with concepts of optics.	Apply
CO 4	Analyze the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	Apply
CO 5	Determine the amount of metal ion through volumetric techniques.	Apply

List of Experiments in physics (Any Seven Experiments)

S.No	List of Exercises	CO	Blooms Taxonomy
1.	Simple harmonic oscillations of cantilever.	CO 1	Apply
2.	Non-uniform bending - Determination of Young's modulus.	CO 1	Apply
3.	Melde's string experiment.	CO 1	Apply
4.	Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.	CO 2	Apply
5.	Photoelectric effect.	CO 3	Apply
6.	Air wedge - Determination of thickness of a thin sheet/wire.	CO 3	Apply
7.	a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser.	CO 3	Apply

CHAIRMAN-BOARD OF STUDIES

8.	Laser- Determination of the wave length of the laser using grating.	CO 3	Apply

Total : 30 Periods

List of Experiments in Chemistry (Any Seven Experiments)

S.No	List of Exercises	CO	Blooms Taxonomy
1.	Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.	CO 4	Apply
2.	Determination of types and amount of alkalinity in a water sample - Split the first experiment into two.	CO 4	Apply
3.	Determination of total, temporary & permanent hardness of water by EDTA method.	CO 4	Apply
4.	Determination of DO content of water sample by Winkler's method.	CO 4	Apply
5.	Determination of chloride content of water sample by Argentometric method.	CO 4	Apply
6.	Determination of strength of given hydrochloric acid using pH meter.	CO 5	Apply
7.	Determination of strength of acids in a mixture of acids using conductivity meter.	CO 5	Apply
8.	Estimation of iron content of the given solution using potentiometer.	CO 5	Apply

Total : 30 Periods

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

CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	2	2	-	-	-	-	-	-	2	-	-	-
CO 2	2	2	-	-	-	-	-	-	2	-	-	-
CO 3	2	2	-	-	-	-	-	-	2	-	-	-
CO 4	2	2	-	-	-	-	-	-	2	-	-	-
CO 5	2	2	-	-	-	-	-	-	2	-	-	-
Average	2	2	-	-	-	-	-	-	2	-	-	-

CHAIRMAN-BOARD OF STUDIES

Passed in Board of Studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
			Total	**60**	**40**

23CS302	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		0	0	3	1.5
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The course is intended to
- Develop the problem-solving skills to complex problems
- Develop the basic programming constructs in Python.
- Implement various gaming strategies in python to solve real world problems.
- Model a data structure using lists, tuples, dictionaries in python.
- Make use of input / output operations with files in Python.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO No.	Course Outcome	Bloom's Level
CO 1	Develop algorithmic solutions to simple computational problems	Apply
CO 2	Implement programs in Python using conditionals and loops for solving problems.	Apply
CO 3	Implement programs in Python for real time applications using functions	Apply
CO 4	Implement programs in Python for real time applications using exception handling.	Apply
CO 5	Develop gaming applications using Python	Apply

S.No	List of Exercises	CO	Bloom's Taxonomy
1.	Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)	CO 1	Apply
2.	Python programming using simple statements and expressions (exchange the values of two variables,	CO 2	Apply

CHAIRMAN-BOARD OF STUDIES

		circulate the values of n variables, distance between two points).		
3.		Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)	CO 2	Apply
4.		Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building – operations of list & tuples)	CO 3	Apply
5.		Implementing programs using Functions. (Factorial, largest number in a list, area of shape)	CO 3	Apply
6.		Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)	CO 4	Apply
7.		Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)	CO 4	Apply
8.		Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)	CO 4	Apply
9.		Exploring Pygame tool.	CO 4	Apply
10.		Developing a game activity using Pygame like bouncing ball, car race etc.	CO 5	Apply

Total : 45 Periods

Reference Books
1. Manual-prepared by SSCET

Additional / Web References
1. http://nptel.ac.in/courses/112104113/
2. http://nptel.ac.in/courses/112108148/

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

CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	-
CO 4	2	2	-	2	2	-	-	-	-	-	2	-
CO 5	2	2	-	-	2	-	-	-	-	-	2	-
CO 6	2	2	-	-	2	-	-	-	-	-	2	-
Average	2	3	3	3	2	-	-	-	-	-	2	2

3– High   2 – Medium   1 – low   '-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

Passed in Board of Studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
			Total	60	40

23EN102	Communication Laboratory (Common to All B.E/B.Tech Programs)	L	T	P	C
		0	0	2	1
Category	HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC)				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Improve the communicative competence of learners
- Help learners use language effectively in academic /work contexts
- Develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- Build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- Use language efficiently in expressing their opinions via various media.

Course Contents		
Unit – I	Introduction to Fundamental of Communication	6

Listening - Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form; BBC Radio/Research find YouTube channel.
Speaking - making telephone calls-Self Introduction; Introducing a friend; - 42 politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions (filling out a bank application for example), PPT Presentation.

Unit – II	Narration	6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities, Oral writing (Extract videos), and Document national statement. Listening to TED Talks.
Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings engaging in small talk- describing requirements and abilities, making predictions- talking about a given topic-giving opinions, understanding a website-describing processes.

CHAIRMAN-BOARD OF STUDIES

Unit – IIII	Reading	6

Reading – Reading Novel/ Auto-biography/ Award winning novels/ Self motivation books/ Basic economics books.

Unit – IV	Reading	6

Reading- longer texts- close reading, Reading exercise: IELTS & TOEFL, BEC, Journals, Newspapers, Reading edition, Comprehension-reading longer texts- reading different types of texts- magazines.

Unit – V	Writing	6

Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing. Fill in the blanks: Proposal, Resume writing, PPT, AI tools, Letter writing, informal or personal letters-e-mails-conventions of personal email. Using Chat GPT & Language tools, screening of English movies.

Total : 30 Hours

Text Books

1. Anna University, Division of Humanities and Social Sciences, *English for Engineers and Technologists. Vol. 1: A Skills Approach,* Orient Longman, 2002.
2. Trimble Louis, *English for Science and Technology, Vol. 1: A Discourse Approach.* England: Cambridge University Press, 2023.
3. Kumar, Sanjay & Lata, Pushp. *Communication Skills,* Oxford University Press, 2011.

Reference Books

1. C.Richards Jack. *Interchange Fifth Edition*, Cambridge University Press, 2017.
2. Wallwork Adrian, Springer. *English for Academic Correspondence and Socializing,* Cambridge University Press. 2011.

Additional / Web References

1. https://nptel.ac.in/courses/109106094
2. nptel.ac.in/courses/109/104/109104090/
3. http://www.uefap.com/grammar/gramfram.html

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

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	-	-	-	-	2	-	-	-	2	3	-	3			
CO 2	-	-	-	-	2	-	-	-	2	3	-	3			
CO 3	-	-	-	-	2	-	-	-	2	3	-	3			
CO 4	-	-	-	-	2	-	-	-	2	3	-	3			
CO 5	-	-	-	-	2	-	-	-	2	3	-	3			
Average	-	-	-	-	2	-	-	-	2	3	-	3			

"3"– High   "2" – Medium   "1" – low   "-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

Passed in Board of Studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
	Total			60	40

23MC801   INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over. The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

CHAIRMAN-BOARD OF STUDIES

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering

/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

CHAIRMAN-BOARD OF STUDIES

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Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build vself using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

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23MA202	ENGINEERING MATHEMATICS-II (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		3	1	0	4
Category	Basic Sciences (BS)				
Pre requisites	23MA201				

Course Objectives

The course is intended to

- Demonstrate the basic concepts of PDE for solving standard partial differential equations.
- Interpreting techniques of vector calculus to solve problems in integration over a curve.
- Familiarize the concepts of complex integration to solve contour problems.
- Introduce Fourier series analysis which is central to many applications in Engineering apart from its use in solving boundary value problems.
- Acquaint the student with Fourier transform techniques used in wide variety of situations.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Demonstrate the formation of PDE to solve homogeneous and non-homogeneous problems.	Understand
CO 2	Acquire knowledge vector calculus to evaluate integration over a curve.	Apply
CO 3	Construct Cauchy integral theorem and residue theorem to evaluate contour integration.	Apply
CO 4	Utilize the fourier series of periodic functions and solve differential equations using fourier analysis.	Apply
CO 5	Contrast mathematical principles on transforms of periodic and non-periodic functions.	Understand

Course Contents

Unit – I	Partial Differential Equations	9+3

Formation of partial differential equations - Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Homogenous Linear partial differential equations of second and higher order with constant coefficients.

Unit – II	Vector calculus	9+3

Gradient and directional derivative - Divergence and curl - Irrotational and solenoidal vector fields -Line integral over a plane curve - Surface integral and volume integral - Green's, Gauss divergence and Stokes' theorems (proofs excluded).

Unit – III	Complex Integration	9+3

Line integral - Cauchy's theorem and integral formula -Taylor's and Laurent's series - Singularities - Residues - Residue theorem-Application of residue theorem for evaluation of real integrals - Use of circular contour and semi-circular contour with no pole on real axis.

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Unit – IV	**Fourier series**	9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range Sine and Cosine series - Parseval's identity – Harmonic Analysis – Complex form of Fourier series.

Unit – V	**Fourier Transform**	9+3

Fourier integral theorem - Fourier transform pair - Sine and Cosine transforms - Properties - Transform of elementary functions - Convolution theorem - Parseval's identity.

Total : 60 Periods

Text Books

1. Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

2. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, New Delhi, 2011.

3. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., 2011.

Reference Books

1. Kolman. B. Hill. D.R., "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint, 2009.

2. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011.

3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.

Additional / Web References

1.https://nptel.ac.in/courses/111106094
2.https://archive.nptel.ac.in/courses/111/103/111103070/
3.https://nptel.ac.in/courses/111106111

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1												
CO 2	3	2							1	1		
CO 3	3	2							1	1		
CO 4	3	2							1	1		
CO 5	3	2							1	1		
Average	3	2							1	1		

"3"– High   "2" – Medium   "1" – low   "-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

23PH203	SEMICONDUCTOR PHYSICS (for B.E-ECE)	L	T	P	C
		3	0	0	3
Category	Basic Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Understand the electrical properties of materials including free electron theory, applications of quantum mechanics.
- Introduce knowledge on physics of semiconductors, determination of charge carriers and device applications.
- Give a comprehensive exposure to all types of devices and circuits constructed with discrete components.
- Analyze the frequency response of small signal amplifiers.
- Establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications.

Course Outcomes (COs)

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Reveal the concepts of carrier transport in conducting materials.	Understand
CO 2	Reveal the concepts of carrier transport in conducting and Semiconducting materials.	Understand
CO 3	Make use of concepts of semiconducting materials to explain the operation of various semiconducting devices.	Apply
CO 4	Analyze various amplifiers in different configuration.	Apply
CO 5	Make use of concepts of band theory to explain absorption and emission of optical waves in semiconducting materials.	Understand

Course Contents

Unit – I	Electrical Properties of Materials	9

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Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids.

Unit – II	Semiconductor and Transport Physics	9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

Unit – III	Semiconductor Devices	9

PN junction diode, Zener diode -forward and reverse biasing-characteristics, BJT, MOSFET, UJT –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier, Zener as regulator.

Unit – IV	Amplifiers	9

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

Unit – V	Optical Properties of Materials	9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

Total : 45 Hours

Text Books

1. Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007
2. S.O. Pillai, "Solid State Physics", New Age International(P) Ltd., publishers, 2009.
3. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", Mc-Graw Hill India, 2019.
4. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press, 5 th Edition, 2010.
5. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2008.

Reference Books

1. R.Balasubramaniam, Callister's "Materials Science and Engineering". Wiley (Indian Edition), 2014.
2. Donald.A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 3 rd Edition, 2010.
3. D.Schilling and C.Belove, "Electronic Circuits", McGraw Hill, 3 rd Edition, 1989
4. Gaur R K, Gupta S L "Engineering Physics", Dhanpat Rai Publications., 2013.

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Passed in Board of studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

Additional / Web References

1. https://archive.nptel.ac.in/courses/115/107/115107131/
2. https://archive.nptel.ac.in/courses/115/106/115106127/
3. https://archive.nptel.ac.in/courses/115/102/115102103/

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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	-	-	-	-	-	-	-	2	-	-	2
CO 2	3	-	-	-	-	-	-	-	2	-	-	2
CO 3	3	2	-	-	-	-	-	-	2	-	-	2
CO 4	3	2	-	-	-	-	-	-	2	-	-	2
CO 5	3	-	-	-	-	-	-	-	2	-	-	2
Average	3	2	-	-	-	-	-	-	2	-	-	2

3 – High   2 – Medium   1 – low   "-" - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	60
				Total	40	60

23EC301	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to all B.E/ B.Tech. Programmes)	L	T	P	C
		3	0	0	3
Category	Engineering Sciences				
Pre requisites	Nil				

Course Objectives

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The course is intended to
- Solve electric circuits using basic laws.
- Impart knowledge of types, construction and working principles of transformer and concepts of protective devices.
- Familiarize the types, construction and working principles of electrical machines.
- Introduce the characteristics and applications of analog devices and logic gates.
- Acquaint the functional elements and working of measuring instruments.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Compute the electric circuit parameters using basic laws.	Apply
CO 2	Explain the construction and working of transformers and the concepts of protective devices.	Understand
CO 3	Explain the construction and working principles of Electrical Machines.	Understand
CO 4	Interpret the characteristics of analog electronic devices and logic gates	Apply
CO 5	Select appropriate measuring instruments for the given application.	Apply

Course Contents

Unit – I	ELECTRICAL CIRCUITS	9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor, Steady state analysis of RLC circuits

Unit – II	TRANSFORMERS AND ELECTRICAL INSTALLATIONS	9

Transformer: Single Phase Transformer: Construction, principle of operation, EMF Equation, types of transformer, Regulation, Efficiency and applications of Transformer, Three phase transformer.

Types of wires and cables, earthing, protective devices - switch fuse unit - Miniature circuit breaker - moulded case circuit breaker - earth leakage circuit breaker, safety precautions and First Aid.

Unit – III	ELECTRICAL MACHINES	9

Construction of electrical machine, Working principle of Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction and working principle of alternator, Single phase Induction Motor, three phase induction motor.

CHAIRMAN-BOARD OF STUDIES

Unit – IV	ANALOG AND DIGITAL ELECTRONICS	9

Analog electronics: Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon, Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications, Transistors: IV characteristics of BJT, FET, IGBT, UJT, Applications
Digital electronics: Number Systems - Code Converters: BCD, Gray Code, Excess 3 – 1's complement, 2's complement - Logic Gates.

Unit – V	MEASUREMENTS AND INSTRUMENTATION	9

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

Total : 45 Hours

Text Books
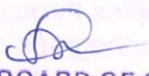
1. S. K, Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2011.
2. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", McGraw Hill Education, Second Edition, 2020
3. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, 2014.
4. James A Svoboda, Richard C. Dorf, Introduction to Electric Circuits, Wiley,2018

Reference Books

1. Muthusubramanian, R. Basic Electrical & Electronics Engineering, Tata McGraw Hill Education Private Limited, 2009.
2. Thomas L. Floyd, 'Electronic Devices', Pearson Education, Tenth Edition, 2017.
3. Thomas L. Floyd, 'Digital Fundamentals', Pearson Education, Eleventh Edition, 2018.
4. H.S. Kalsi, 'Electronic Instrumentation', McGraw-Hill education, New Delhi, 2018

Additional / Web References

1. https://archive.nptel.ac.in/courses/117/106/117106108/
2. https:// nptel.ac.in/courses/108/105/108105132/
3. https://nptel.ac.in/courses/108105153

CHAIRMAN-BOARD OF STUDIES

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

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	-	-	-	-	-	-	-	2	2	2	2	2
CO 2	3	2	2	-	-	-	-	-	-	-	1	2	2	2	2
CO 3	3	2	2	-	-	-	-	-	-	-	2	2	2	2	2
CO 4	3	2	2	-	-	-	-	-	-	-	2	2	3	2	2
CO 5	3	1	1	-	-	-	-	-	-	-	2	2	2	2	2
Average	3	1.8	1.8	-	-	-	-	-	-	-	1.8	2	2	2	2

3 – High   2 – Medium   1– Low   '-" - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12		
CIA II	3 hours	2.5 units	100	12	24	60
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

23ME301	ENGINEERING GRAPHICS	L	T	P	C
		3	1	0	4
Category	Engineering Sciences				
Pre requisites	NIL				

Course Objectives

The course is intended to
- Develop graphical skills for the construction of curves
- Expose the orthographic principles through lines and planes.
- Demonstrate the concepts of orthographic projections of solids
- Impart the knowledge on sectioning solids and development of lateral surfaces of solids

CHAIRMAN-BOARD OF STUDIES

- Exposure to the significance of isometric projections

Course Outcomes

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Sketch the engineering curves as per engineering drawing standards	Understand
CO 2	Illustrate the orthographic projections to construct lines and planar surface	Understand
CO 3	Construct the orthographic views of solids	Apply
CO 4	Develop the lateral surfaces of solids using drawing standards	Apply
CO 5	Sketch the isometric projection and perspective projection of simple solids	Apply

Course Contents

Unit – I	Plane Curves	12

Importance of graphics in engineering applications – Use of drafting instruments – Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

Unit – II	Projection of Lines and Plane Surface	12

Orthographic projection-Principal planes-First angle projection-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. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Unit – III	Projection of Solids	12

Projection of solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Unit – IV	Projection of Sectioned Solids and Development of Surfaces	12

Sectioning of prisms, pyramids, cylinder, and cone 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 Projection	12

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)

Total : 60 Hours

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Text Books

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natarajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Reference Books

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2 nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015
4. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.

Additional / Web References

1. https://nptel.ac.in/courses/112103019
2. https://en.wikipedia.org/wiki/Engineering_drawing

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

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 2	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 3	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 4	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 5	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
Average	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-

3 – High   2 – Medium   1 – low   '-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12		
CIA II	3 hours	2.5 units	100	12	24	60
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
			Total		40	60

CHAIRMAN-BOARD OF STUDIES

தமிழரும் தொழில்நுட்பமும்

LTPC
1001

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம்:

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

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

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

அலகு 3 உற்பத்தித் தொழில்நுட்பம்:

கப்பல் கட்டும் கலை – உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எ.·கு – 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 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்:

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

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

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

TEXT-CUM-REFERENCE BOOKS

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

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

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

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).

5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

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

7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)

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

9. Keeladi – 'Sangam City Civilization on thebanks of river Vaigai; (Jointly published by: Department of Archaelogy & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilandu).

12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.

CHAIRMAN-BOARD OF STUDIES

TAMILS AND TECHNOLOGY

23TA102

LTPC1001

UNIT I WEAVING AND CERAMIC TECHNOLOGY

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

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

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

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

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.

TEXT-CUM-REFERENCE BOOKS

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

CHAIRMAN-BOARD OF STUDIES

23CS303	C PROGRAMMING AND DATA STRUCTURES	L	T	P	C
	(Common to ECE and BME)	3	0	2	4
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Introduce the basics of the C programming language.
- Learn the concepts of advanced features of C.
- Understand the concepts of ADTs and linear data structures.
- Know the concepts of non-linear data structure and hashing.
- Familiarize the concepts of sorting and searching techniques.

Course Outcomes

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
Theory		
CO 1	Develop C programs for any real world/technical application.	Apply
CO 2	Apply advanced features of C in solving problems	Apply
CO 3	Write functions to implement linear and non–linear data structure operations	Apply
CO 4	Suggest and use appropriate linear/non–linear data structure operations for solving a given problem	Apply
CO 5	Appropriately use sort and search algorithms for a given application.	Apply
Laboratory		
CO 6	Use different constructs of C and develop applications	Apply
CO 7	Develop C programs using functions and arrays	Apply
CO 8	Develop C programs using pointers and strings	Apply
CO 9	Implement the linear ADT using static memory allocations	Apply
CO 10	Implement Sorting and searching algorithms for a given application	Apply

Course Contents

Unit – I	C PROGRAMMING FUNDAMENTALS	9

Data Types – Variables – Operations – Expressions and Statements – Conditional Statements – Functions – Recursive Functions – Arrays – Single and Multi-Dimensional Arrays.

Unit – II	C PROGRAMMING - ADVANCED FEATURES	9

Structures – Union – Enumerated Data Types – Pointers: Pointers to Variables, Arrays and Functions – File Handling – Preprocessor Directives.

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

Unit – III	LINEAR DATA STRUCTURES - LISTS	9
Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List – Doubly Linked Lists – Circular Linked List		
Unit – IV	LINEAR DATA STRUCTURES – STACK AND QUEUE	9
Stack ADT – Implementation of Stack – Applications – Queue ADT – Priority Queues – Queue Implementation		
Unit – V	SORTING AND SEARCHING TECHNIQUES	9
Insertion Sort – Quick Sort – Heap Sort – Merge Sort –Linear Search – Binary Search		
	Total: 45 + 30 Periods	

List of Experiments

S.No.	Name of the Experiment	CO	Bloom's Level
1	Practice of C programming using statements, expressions, decision making and iterative statements	CO6	Apply
2	Implement C programming using Functions, Arrays	CO7	Apply
3	Implement C programming using Pointers and Structures	CO8	Apply
4	Implement C programs using Files	CO8	Apply
5	Development of real time C applications	CO8	Apply
6	Array implementation of List ADT	CO9	Apply
7	Array implementation of Stack ADT	CO9	Apply
8	Array implementation of Queue ADT	CO9	Apply
9	Applications of List, Stack and Queue ADTs	CO9	Apply
10	Implementation of searching techniques	CO10	Apply
11.	Implementation of Sorting algorithms: Insertion Sort, Quick Sort, Merge Sort	CO10	Apply

Text Books

1. P. K. Nag, Engineering Thermodynamics, Tata-McGraw Hill Pub, 6th Edition, 2017.
2. Thermodynamics: An Engineering Approach, Yunus A. Cengel and Michael A. Boles, 8th Edition, Tata-McGraw Hill Pub, 2016.
3. Fundamentals of Engineering Thermodynamics, Rathakrishnan, 2nd Edition, Phi Learning, 2005

Reference Books

CHAIRMAN-BOARD OF STUDIES

1. Engineering Thermodynamics, Rajput, 4th Edition, Laxmi Publications, 2010
2. Fundamentals of Thermodynamics, Gordon J. Van Wylan & Richard E. Sonntagg, 7th Edition, Wiley Eastern Ltd, 2009.
3. Dr.R.Yadav, Fundamentals of Engineering Thermodynamics, Central publishing House, 7th Edition, 2004.
4. Manual-prepared by SSCET staff

Additional / Web References

1. http://nptel.ac.in/courses/112104113/
2. http://nptel.ac.in/courses/112108148/
3. http://nptel.ac.in/courses/112105123/

COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO 1	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 2	3	3	2	2	2	-	-	-	-	2	2	3	3	3
CO 3	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 4	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 5	3	3	2	3	2	2	-	-	-	2	2	3	3	3
CO 6	3	3	2	2	2	-	-	-	-	2	2	3	3	3
CO 7	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 8	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 9	3	3	2	2	2	2	-	-	-	2	2	3	3	3
CO 10	3	3	2	2	2	2	-	-	-	2	2	3	3	3
Average	3	3	2	2	2	2	-	-	-	2	2	3	3	3

Assessment	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks		Continuous Internal Assessment Marks	End Semester Examination Marks
CIA I	3 hours	2.5 units	100	10		20	50
CIA II	3 hours	2.5 units	100	10			
Observation & Analysis of Experimental		All Experiments	75	22.5		30	-

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*

results, Viva Voce, Quiz based on rubrics.							
Model Exam	3 hours			25	7.5		
Total						50	50

23ME302	**ENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
		0	0	4	2
Category	**Engineering Sciences**				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Understand the basic carpentry, plumbing, sheet metal and welding operations.
- Understand various wiring circuits and soldering & checking of continuity.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work	Understand
CO 2	Make joints in wood materials used in common household wood work	Apply
CO 3	Weld various joints in steel plates using arc welding work and use sheet metal practices in fabrication	Apply
CO 4	Wire various electrical joints in common household electrical wiring	Apply
CO 5	Solder and test simple electronic circuits; Assemble and dismantle computer	Apply

CHAIRMAN-BOARD OF STUDIES

S.No	List of Exercises	CO	Blooms Taxonomy
GROUP-A (CIVIL & MECHANICAL)			
1.	Assemble the pipeline connections using tools for the given layout	CO 1	Apply
2.	Making wooden T- Joint, and lap joint using carpentry tools	CO 1	Apply
3.	Basic machining work- simple turning and facing	CO 2	Apply
4.	Welding a butt and lap joint using welding process	CO 3	Apply
5.	Make a tray in sheet metal for the given dimensions	CO 3	Apply
GROUP-B (ELECTRICAL & ELECTRONICS)			
6.	Stair case wiring	CO 4	Apply
7.	Fluorescent lamp wiring	CO4	Apply
8.	Energy meter wiring	CO4	Apply
9.	Soldering simple electronic circuits and check the continuity	CO 5	Apply
10.	Assembly and dismantle of computer/ laptop/Mobile phones	CO 5	Apply
			Total : 60 Periods

Reference Books

1. Manual-prepared by SSCET

Web References

1. https://be-iitkgp.vlabs.ac.in/exp/familiarisation-resistor/
2. https://fab-coep.vlabs.ac.in/exp/computer-controlled-cutting/

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

CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 2	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 3	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 4	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 5	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
Average	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-

3 – High   2 – Medium   1 – low   '-" - No Correlation

CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023   Approved in Academic Council Meeting on 07.11.2023

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
		Total		60	40

23ME701	DESIGN THINKING	L	T	P	C
		2	0	0	2
Category	Employment Enhancement Course				
Pre requisites	Nil				

Course Objectives

The objectives of this course are to

- Acquire knowledge in Design thinking concepts and process.
- To inculcate attitude to solve societal problems using design thinking tools
- Develop skills in solving problems using ideation tools.
- Conceive, conceptualize, design and demonstrate innovative ideas using prototypes
- Apply concepts for testing of prototypes

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Apply Design thinking concepts and principles to perform human centered design process for creative problem solving.	Apply
CO 2	Derive empathy maps to visualize user attitudes and behavior for gaining insights of customers.	Apply
CO 3	Develop innovative products or services for a customer base using ideation techniques.	Apply
CO 4	Use design thinking tools to build prototypes for complex problems using gathered user requirements.	Apply
CO 5	Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.	Apply

CHAIRMAN-BOARD OF STUDIES

Course Contents

Unit – I	**Design Thinking Process**	**6**

Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

Unit – II	**Empathize**	**6**

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

Unit – III	**Ideation**	**6**

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

Unit – IV	**Prototype**	**6**

Prototype - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

Unit – V	**Testing of Prototypes**	**6**

Prototyping for physical products: uniqueness for physical products, Prototyping for digital products: What's unique for digital products, Preparation; Preparation; Testing prototypes with users.

Total : 30 Hours

Text Books

1. Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017,
2. Michael G. Luchs, Scott Swan , Abbie Griffin, "Design Thinking – New Product Essentials from PDMA", Wiley, 2015.

Reference Books

1. Ulrich &Eppinger, "Product Design and Development", 3rd Edition, McGraw Hill, 2004
2. Idris Mootee, "Design Thinking for Strategic Innovation", 2013, John Wiley & Sons Inc
3. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly, 2017.
4. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking", Tata Mc Graw Hill, First Edition,2019.

Additional / Web References

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://nptel.ac.in/courses/110106124/
3. https://hbr.org/2018/09/why-design-thinking-works

CHAIRMAN-BOARD OF STUDIES

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

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	-	-	-	3	-	-	-	-	-	-	2	3	3	3
CO 2	2	3	-	-	3	-	-	-	-	-	-	2	3	3	3
CO 3	2	-	3	-	3	-	-	-	-	-	-	2	3	3	3
CO 4	2	-	3	-	3	-	-	-	-	-	-	2	3	3	3
CO 5	2	-	-	3	3	-	-	-	-	-	-	2	3	3	3
Average	2.5	3	3	3	3	-	-	-	-	-	-	2	3	3	3

4 – High   2 – Medium   1 – low   '-" - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
				Total	40	60

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

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	-	-	-	3	-	-	-	-	-	-	2	3	3	3
CO 2	2	3	-	-	3	-	-	-	-	-	-	2	3	3	3
CO 3	2	-	3	-	3	-	-	-	-	-	-	2	3	3	3
CO 4	2	-	3	-	3	-	-	-	-	-	-	2	3	3	3
CO 5	2	-	-	3	3	-	-	-	-	-	-	2	3	3	3
Average	2.5	3	3	3	3	-	-	-	-	-	-	2	3	3	3

4 – High   2 – Medium   1 – low   '-' - No Correlation

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Passed in Board of studies Meeting on 26.10.2023   *Approved in Academic Council Meeting on 07.11.2023*