KSR College of Engineering

AN AUTONOMOUS INSTITUTION

NAAC ACCREDITED A++ | NBA ACCREDITED PROGRAMMES

25 Years KSRCE 2001 – 2026 Celebrating Academic Excellence

B.E. - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2024

(Academic Year 2024-25 Onwards)

Curriculum & Syllabus
Semester I to IV

K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.E. – Electronics and Communication Engineering

(REGULATIONS 2024)

Vision of the Institution

IV	To become a globally renowned institution in Engineering and Management, committed to providing holistic education that fosters research, innovation and sustainable development.

Mission of the Institution

IM 1	Deliver value-based quality education through modern pedagogy and experiential learning.
IM 2	Enrich Engineering and Managerial Skills through cutting-edge laboratories to meet evolving global demands.
IM 3	Empower research and innovation by integrating collaboration, social responsibility and commitment to sustainable development.

Vision of the Department / Programme: (Electronics and Communication Engineering)

DV	To be a globally recognized department in Electronics and Communication Engineering, fostering innovation, research and sustainable technological solutions through holistic education.

Mission of the Department / Programme: (Electronics and Communication Engineering)

DM 1	Impart value-based quality education through experiential learning and modern pedagogy.
DM 2	Enrich professional skills and technical competence by equipping students with state-of-the-art laboratories to meet industry readiness.
DM 3	Nurture Innovation and Research towards sustainable solutions and societal well-being.

Programme Educational Objectives (PEOs): (Electronics and Communication Engineering)

The graduates of the programme will be able to	
PEO 1	**Employability and Higher Education:** Excel in Professional career and higher education by acquiring knowledge in mathematical, social, scientific & engineering principles.
PEO 2	**Core Competence:** Analyze, design and develop/implement core-engineering problems in communication systems that are technically sound, economically feasible and socially acceptable.
PEO 3	**Interpersonal Skills and Team Work:** Exhibit professionalism, ethical communicating skills and team work by engaging in lifelong learning for sustainable development of the society.

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Chairman (BoS)

K.S.R. College of Engineering, Tiruchengode-637215 Academic Courses

Programme Outcomes (POs) of B.E. - Electronics and Communication Engineering

Program Outcomes (POs)	
PO1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
Program Specific Outcomes (PSOs)	
PSO1	**Professional Expertise:** Apply mathematics, engineering principles and modern techniques to analyse, design and prototype integrated hardware-software electronic systems.
PSO2	**Core Competence:** Apply the core concepts of Communication, VLSI, Embedded Systems and Signal & Image Processing to design innovative, industry-ready and socially relevant solutions.

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K.S.R. COLLEGE OF ENGINEERING (Autonomous)
(Approved by AICTE & Affiliated to Anna University)
K.S.R. Kalvi Nagar, Tiruchengode - 637 215

CURRICULUM
UG
R - 2024

Department	Department of Electronics and Communication Engineering
Programme	B.E. Electronics and Communication Engineering

SEMESTER I

S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
Induction Programme			MC	-	-	-		-	-	-	-	-
THEORY COURSES												
1	24ENT19	Professional Communication	HSMC	45	0	0	45	90	3	40	60	100
2	24EET07	Basics of Electrical and Instrumentation	ESC	45	0	0	45	90	3	40	60	100
3	24ITT16	Programming for Problem Solving	ESC	45	0	0	45	90	3	40	60	100
4	24GET19	தமிழர்மரபு/ Heritage of Tamils	HSMC	15	0	0	15	30	1	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
5	24MAI19	Matrices and Calculus	BSC	30	15	30	45	120	4	50	50	100
6	24PHI07	Engineering Physics	BSC	45	0	30	45	120	4	50	50	100
LABORATORY COURSES												
7	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	30	0	30	1	60	40	100
8	24MEP16	Engineering Graphics Laboratory	ESC	15	0	30	15	60	2	60	40	100
9	24GEP16	Engineering Experience Laboratory	ESC	0	0	30	0	30	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
10	24SSP19	Aptitude and Coding skills -1	EEC	0	0	30	0	30	1	60	40	100
MANDATORY COURSE												
11	24MCP09	Mandatory Course - I	MC	0	0	30	0	30	0	-	-	-
			TOTAL	**240**	**15**	**210**	**255**	**720**	**23**	**1000**		

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SEMESTER II												
S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24CST29	Python Programming	ESC	45	0	0	45	90	3	40	60	100
2	24ECT21	Design Thinking	PCC	30	0	0	30	60	2	40	60	100
3	24GET29	தமிழரும் தொழில் நுட்பமும்/Tamils and Technology	HSMC	15	0	0	15	30	1	40	60	100
4	24ECT22	Circuit Theory	PCC	45	15	0	60	120	4	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
5	24MAI29	Probability and Statistics	BSC	30	15	30	45	120	4	50	50	100
6	24CHI06	Chemistry for Engineers	BSC	45	0	30	45	120	4	50	50	100
LABORATORY COURSES												
7	24ENP29	Professional Communication Laboratory	HSMC	0	0	30	0	30	1	60	40	100
8	24CSP29	Python Programming Laboratory	ESC	0	0	30	0	30	1	60	40	100
9	24ECP21	Circuit Theory Laboratory	PCC	0	0	30	0	30	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
10	24SSP29	Aptitude and Coding skills-II	EEC	0	0	30	0	30	1	60	40	100
			TOTAL	210	30	180	240	660	22		1000	

SEMESTER III												
S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24MAT31	Random Processes and Numerical Analysis	BSC	45	15	0	60	120	4	40	60	100
2	24ECT31	Electron Devices	PCC	45	0	0	45	90	3	40	60	100
3	24ECT32	Electromagnetic Waves	PCC	45	0	0	45	90	3	40	60	100
4	24ECT33	Microprocessors and Microcontrollers	PCC	45	0	0	45	90	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
5	24ECI31	Digital Electronics	PCC	45	0	30	45	120	4	50	50	100
LABORATORY COURSES												
6	24ECP31	Electron Devices Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
7	24ECP32	Microprocessors and Microcontrollers Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8	24ECP36	Design Studio - I	ESC	0	0	30	0	30	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
9	24SDP39	Soft Skills Development - III	EEC	0	0	30	0	30	1	60	40	100
			TOTAL	225	15	180	240	660	22		900	

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SEMESTER IV

S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24ECT41	Electronic Circuits	PCC	45	0	0	45	90	3	40	60	100
2	24ECT42	Verilog HDL	PCC	45	0	0	45	90	3	40	60	100
3	24ECT43	Linear Integrated Circuits	PCC	45	0	0	45	90	3	40	60	100
4	24GET09	Universal Human Values and Ethics	HSMC	45	0	0	45	90	3	40	60	100
5		Open Elective - I	OEC	45	0	0	45	90	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
6	24ECI41	Signals and Systems	PCC	30	15	30	45	120	4	50	50	100
LABORATORY COURSES												
7	24ECP41	Analog Electronics Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8	24ECP46	Design Studio - II	ESC	0	0	30	0	30	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
9	24SDP49	Soft Skills Development - IV	EEC	0	0	30	0	30	1	60	40	100
			TOTAL	**255**	**15**	**135**	**270**	**675**	**22.5**		**900**	

SEMESTER V

S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24ECT51	Analog Communication Systems	PCC	45	0	0	45	90	3	40	60	100
2	24ECT52	System Verilog	PCC	45	0	0	45	90	3	40	60	100
3		Professional Elective – I	PEC	45	0	0	45	90	3	40	60	100
4		Open Elective - II	OEC	45	0	0	45	90	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
5	24ECI51	Computer Networks	PCC	45	0	30	45	120	4	50	50	100
6	24ECI52	Digital Signal Processing	PCC	45	0	30	45	120	4	50	50	100
LABORATORY COURSES												
7	24ECP51	VLSI and Chip Design Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
8	24ECP52	Internship – I*	EEC	0	0	0	0	0	1	100	-	100
9	24ECP53	Industry oriented Course - I	EEC	0	0	30	0	30	1	100	-	100
10	24ECP54	Seminar Presentation	EEC	0	0	30	0	30	1	100	-	100
MANDATORY COURSE												
11		Mandatory Course - II	MC	30	0	0	0	30	0	100	-	100
			TOTAL	**300**	**0**	**135**	**275**	**705**	**24.5**		**1100**	

- **The Students should undergo internship during the IV semester summer vacation.**

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SEMESTER VI													
S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24GET69	Entrepreneurship Development	HSMC	45	0	0	45	90	3	40	60	100
2	24ECT61	Digital Communication Systems	PCC	45	15	0	60	120	4	40	60	100
3	24ECT62	Embedded Systems	PCC	45	0	0	45	90	3	40	60	100
4		Open Elective - III	OEC	45	0	0	45	90	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
5		Professional Elective – II/ VLSI Design	PEC	45	0	30	45	120	4	50	50	100
LABORATORY COOURSES												
6	24ECP61	Communication Systems Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
7	24ECP62	Embedded Systems Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE												
8	24ECP63	Mini Project	EEC	0	0	60	0	60	2	60	40	100
9	24ECP64	Industry oriented Course - II	EEC	0	0	30	0	30	1	60	40	100
10	24ECP65	Technical Comprehension	EEC	0	0	30	0	30	1	60	40	100
MANDATORY COURSE												
11		Mandatory Course - III	MC	30	0	0	0	30	0	100	-	100
			TOTAL	255	15	210	240	705	24	1100		

SEMESTER VII												
S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
THEORY COURSES												
1	24GET79	Project Management	EEC	45	0	0	45	90	3	40	60	100
2	24ECT71	Standard in Electronics and Communication Engineering	PCC	15	0	0	15	30	1	100	-	100
3		Professional Elective – III	PEC	45	0	0	45	90	3	40	60	100
4		Professional Elective – IV	PEC	45	0	0	45	90	3	40	60	100
5		Professional Elective – V	PEC	45	0	0	45	90	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT												
6	24ECI71	RF and Microwave Engineering	PCC	30	15	30	45	120	4	50	50	100

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EMPLOYABILITY ENHANCEMENT COURSES												
7	24ECP71	Project Work Phase - I	EEC	0	0	60	0	60	2	60	40	100
			TOTAL	**225**	**15**	**90**	**240**	**570**	**19**	**700**		

SEMESTER VIII

S.No	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
EMPLOYABILITY ENHANCEMENT COURSE												
1	24ECP81	Project Work Phase – II	EEC	0	0	240	0	240	8	60	40	100
			TOTAL	**0**	**0**	**240**	**0**	**240**	**8**	**100**		

Total Number of Credits to be Earned for the Award of the Degree = 165

Note: HSMC – Humanities and Social Sciences including Management Courses, BSC – Basic Science Courses, ESC – Engineering Sciences Courses, PCC – Professional Core Courses, PEC – Professional Elective Courses, OEC – Open Elective Courses, EEC – Employability Enhancement Courses & MC – Mandatory Courses, SL – Self Learning.

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	K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215	CURRICULUM UG R - 2024

Department	Department of Electronics and Communication Engineering
Programme	B.E. Electronics and Communication Engineering

HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)

S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.	C = T/30	CA	ES	Tot.
1	24ENT19	Professional Communication	HSMC	45	0	0	45	90	3	40	60	100
2	24GET19	தமிழர் மரபு/ Heritage of Tamils	HSMC	15	0	0	15	30	1	40	60	100
3	24GET29	தமிழரும் தொழில் நுட்பமும்/ Tamils and Technology	HSMC	15	0	0	15	30	1	40	60	100
4	24ENP29	Professional Communication Laboratory	HSMC	0	0	30	0	30	1	60	40	100
5	24GET09	Universal Human Values and Ethics	HSMC	45	0	0	45	90	3	40	60	100
6	24GET69	Entrepreneurship Development	HSMC	45	0	0	45	90	3	40	60	100
			TOTAL	**165**	**0**	**30**	**165**	**360**	**12**	-		

BASIC SCIENCE COURSES (BSC)

S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.	C = T/30	CA	ES	Tot.
1	24MAI19	Matrices and Calculus	BSC	30	15	30	45	120	4	50	50	100
2	24PHI07	Engineering Physics	BSC	45	0	30	45	120	4	50	50	100
3	24MAI29	Probability and Statistics	BSC	30	15	30	45	120	4	50	50	100
4	24CHI06	Chemistry for Engineers	BSC	45	0	30	45	120	4	50	50	100
5	24MAT31	Random Processes and Numerical Analysis	BSC	45	15	0	60	120	4	40	60	100
			TOTAL	**195**	**45**	**120**	**240**	**600**	**20**	-		

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ENGINEERING SCIENCES COURSES (ESC)													
S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot.
1	24EET07	Basics of Electrical and Instrumentation	ESC	45	0	0	45	90	3	40	60	100
2	24ITT16	Programming for Problem Solving	ESC	45	0	0	45	90	3	40	60	100
3	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	30	0	30	1	60	40	100
4	24MEP16	Engineering Graphics Laboratory	ESC	15	0	30	15	60	2	60	40	100
5	24GEP16	Engineering Experience Laboratory	ESC	0	0	30	0	30	1	60	40	100
6	24CST29	Python Programming	ESC	45	0	0	45	90	3	40	60	100
7	24CSP29	Python Programming Laboratory	ESC	0	0	30	0	30	1	60	40	100
8	24ECP36	Design Studio - I	ESC	0	0	30	0	30	1	60	40	100
9	24ECP46	Design Studio – II	ESC	0	0	30	0	30	1	60	40	100
			TOTAL	150	0	180	150	480	16	-		

EMPLOYABILITY ENHANCEMENT COURSES (EEC)													
S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot.
1	24SSP19	Aptitude and Coding skills -1	EEC	0	0	30	0	30	1	60	40	100
2	24SSP29	Aptitude and Coding skills-II	EEC	0	0	30	0	30	1	60	40	100
3	24SDP39	Soft Skills Development - III	EEC	0	0	30	0	30	1	60	40	100
4	24SDP49	Soft Skills Development - IV	EEC	0	0	30	0	30	1	60	40	100
5	24ECP42	Seminar Presentation	EEC	0	0	30	0	30	1	100	-	100
6	24ECP52	Internship – I*	EEC	0	0	0	0	0	1	100	-	100
7	24ECP53	Industry oriented Course - I	EEC	0	0	30	0	30	1	100	-	100
8	24ECP63	Mini Project	EEC	0	0	60	0	60	2	60	40	100
9	24ECP64	Industry oriented Course - II	EEC	0	0	30	0	30	1	60	40	100
10	24ECP65	Technical Comprehension	EEC	0	0	30	0	30	1	60	40	100
11	24GET79	Project Management	EEC	45	0	0	45	90	3	40	60	100
12	24ECP71	Project Work Phase - I	EEC	0	0	60	0	60	2	60	40	100
13	24ECP81	Project Work Phase – II	EEC	0	0	240	0	240	8	60	40	100
			TOTAL	45	0	600	45	690	24	-		

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PROFESSIONAL CORE COURSES (PCC)													
S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot
1.	24ECT21	Design Thinking	PCC	30	0	0	30	60	2	40	60	100
2.	24ECT22	Circuit Theory	PCC	45	15	0	60	120	4	40	60	100
3.	24ECP21	Circuit Theory Laboratory	PCC	0	0	30	0	30	1	60	40	100
4.	24ECT31	Electron Devices	PCC	45	0	0	45	90	3	40	60	100
5.	24ECT32	Electromagnetic Waves	PCC	45	0	0	45	90	3	40	60	100
6.	24ECT33	Microprocessors and Microcontrollers	PCC	45	0	0	45	90	3	40	60	100
7.	24ECI31	Digital Electronics	PCC	45	0	30	45	120	4	40	60	100
8.	24ECP31	Electron Devices Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
9.	24ECP32	Microprocessors and Microcontrollers Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
10.	24ECT41	Electronic Circuits	PCC	45	0	0	45	90	3	40	60	100
11.	24ECT42	Verilog HDL	PCC	45	0	0	45	90	3	40	60	100
12.	24ECT43	Linear Integrated Circuits	PCC	45	0	0	45	90	3	40	60	100
13.	24ECI41	Signals and Systems	PCC	30	15	30	45	120	4	50	50	100
14.	24ECP41	Analog Electronics Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
15.												
16.	24ECT51	Analog Communication Systems	PCC	45	0	0	45	90	3	40	60	100
17.	24ECT52	VLSI and Chip Design	PCC	45	0	0	45	90	3	40	60	100
18.	24ECI51	Computer Networks	PCC	45	0	30	45	120	4	50	50	100
19.	24ECI52	Digital Signal Processing	PCC	45	0	30	45	120	4	50	50	100
20.	24ECP51	VLSI and Chip Design Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
21.	24ECT61	Digital Communication Systems	PCC	45	15	0	60	120	4	40	60	100
22.	24ECT62	Embedded Systems	PCC	45	0	0	45	90	3	40	60	100
23.	24ECP61	Communication Systems Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
24.	24ECP62	Embedded Systems Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
25.	24ECT71	Standard in Electronics and Communication Engineering	PCC	15	0	0	15	30	1	100	-	100
26.	24ECI71	RF and Microwave Engineering	PCC	30	15	30	45	120	4	50	50	100
			TOTAL	735	45	480	780	2040	68	-		

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PROFESSIONAL ELECTIVE COURSES (PEC): VERTICALS					
Vertical- I	**Vertical - II**	**Vertical - III**	**Vertical- IV**	**Vertical - V**	**Vertical – VI**
Semiconductor Chip Design and Testing	**Signal Processing**	**Sensor Technologies and IoT**	**High Speed Communications**	**Biomedical Technologies**	**Advanced Communication Techniques**
Low Power IC Design	DSP Architecture and Programming	Real Time Operating Systems	Optical Communication & Networks	Medical Electronics	Digital Communication Systems - II
Mixed Signal IC Design Testing	Advanced Digital Signal Processing	Embedded System Networking	Wireless Cellular Communication	Therapeutic Equipment	Information Theory and Coding
ASIC Design	Digital Image processing	Internet of Things	5G/6G Communication Networks	Tele Health Technologies	Ultra-Wideband Communications
RISC V & ARM	Pattern Recognition	Industrial IoT and Industry 4.0	Wireless Networks	Introduction to Wearable Devices	Software Defined Radio
System Verilog	Fundamentals of AI and ML	ARM System Architecture	ADHOC Networks	Body Area Networks	Cognitive Radio Network
DFT & UVM	Soft Computing	Wireless Sensor Network Design	Satellite Communication	Internet of Medical Things	Antenna and wave propagation

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S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot.
VERTICAL 1: SEMICONDUCTOR CHIP DESIGN AND TESTING												
1	24ECE01	Low Power IC Design	PEC	45	0	0	45	90	3	40	60	100
2	24ECE02	Mixed Signal IC Design Testing	PEC	45	0	0	45	90	3	40	60	100
3	24ECE03	ASIC Design	PEC	45	0	0	45	90	3	40	60	100
4	24ECE04	RISC V & ARM	PEC	45	0	0	45	90	3	40	60	100
5	24ECE05	System Verilog	PEC	45	0	0	45	90	3	40	60	100
6	24ECE06	DFT & UVM	PEC	45	0	0	45	90	3	40	60	100
VERTICAL 2:SIGNAL PROCESSING												
1	24ECE07	DSP Architecture and Programming	PEC	45	0	0	45	90	3	40	60	100
2	24ECE08	Advanced Digital Signal Processing	PEC	45	0	0	45	90	3	40	60	100
3	24ECE09	Digital Image processing	PEC	45	0	0	45	90	3	40	60	100
4	24ECE10	Pattern Recognition	PEC	45	0	0	45	90	3	40	60	100
5	24ECE11	Fundamentals of AI and ML	PEC	45	0	0	45	90	3	40	60	100
6	24ECE12	Soft Computing	PEC	45	0	0	45	90	3	40	60	100
VERTICAL 3: SENSOR TECHNOLOGIES AND IOT												
1	24ECE13	Real Time Operating Systems	PEC	45	0	0	45	90	3	40	60	100
2	24ECE14	Embedded System Networking	PEC	45	0	0	45	90	3	40	60	100
3	24ECE15	Internet of Things	PEC	45	0	0	45	90	3	40	60	100
4	24ECE16	Industrial IoT and Industry 4.0	PEC	45	0	0	45	90	3	40	60	100
5	24ECE17	ARM System Architecture	PEC	45	0	0	45	90	3	40	60	100
6	24ECE18	Wireless Sensor Network Design	PEC	45	0	0	45	90	3	40	60	100
VERTICAL 4: HIGH SPEED COMMUNICATIONS												
1	24ECE19	Optical Communication & Networks	PEC	45	0	0	45	90	3	40	60	100
2	24ECE20	Wireless Cellular Communication	PEC	45	0	0	45	90	3	40	60	100
3	24ECE21	5G/6G Communication Networks	PEC	45	0	0	45	90	3	40	60	100
4	24ECE22	Wireless Networks	PEC	45	0	0	45	90	3	40	60	100

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S.No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Tot.
5	24ECE23	ADHOC Networks	PEC	45	0	0	45	90	3	40	60	100
6	24ECE24	Satellite Communication	PEC	45	0	0	45	90	3	40	60	100
VERTICAL 5: BIOMEDICAL TECHNOLOGIES												
1		Medical Electronics	PEC	45	0	0	45	90	3	40	60	100
2		Therapeutic Equipment	PEC	45	0	0	45	90	3	40	60	100
3		Tele Health Technologies	PEC	45	0	0	45	90	3	40	60	100
4		Introduction to Wearable Devices	PEC	45	0	0	45	90	3	40	60	100
5		Body Area Networks	PEC	45	0	0	45	90	3	40	60	100
6		Internet of Medical Things	PEC	45	0	0	45	90	3	40	60	100
VERTICAL 6: ADVANCED COMMUNICATION TECHNIQUES												
1	24ECE25	Digital Communication Systems - II	PEC	45	0	0	45	90	3	40	60	100
2	24ECE26	Information Theory and Coding	PEC	45	0	0	45	90	3	40	60	100
3	24ECE27	Ultra-Wideband Communications	PEC	45	0	0	45	90	3	40	60	100
4	24ECE28	Software Defined Radio	PEC	45	0	0	45	90	3	40	60	100
5	24ECE29	Cognitive Radio Network	PEC	45	0	0	45	90	3	40	60	100
6	24ECE30	Antenna and wave propagation	PEC	45	0	0	45	90	3	40	60	100
MANDATORY COURSE – I,II,III												
1	24MCP09	Yoga for Stress Management	MC	0	0	30	0	30	0	-	-	-
2	24MCT01	Constitution of India	MC	30	0	0	0	30	0	100	-	100
3	24MCT02	Environmental Science and Sustainability	MC	30	0	0	0	30	0	100	-	100
4	24MCT03	Introduction to Gender Studies	MC	30	0	0	0	30	0	100	-	100
5	24MCT04	Life Science for Engineers	MC	30	0	0	0	30	0	100	-	100
6	24MCT05	Industrial Safety	MC	30	0	0	0	30	0	100	-	100
7	24MCT06	Essence of Indian Knowledge System	MC	30	0	0	0	30	0	100	-	100
8	24MCT07	Elements of Literature	MC	30	0	0	0	30	0	100	-	100
9	24MCT08	Disaster Management	MC	30	0	0	0	30	0	100	-	100

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Open Elective Details

S. No.	Dept.	Course Code	Course Name	L	T	P	SL	Credit
1.	AUTO	24AUO01	Basics of Automobile Engineering	45	0	0	45	3
2.		24AUO02	Hybrid Vehicles	45	0	0	45	3
3.	BME	24BMO01	Basics of Biomedical Instrumentation	45	0	0	45	3
4.		24BMO02	Biometric systems	45	0	0	45	3
5.	CIVIL	24CEO01	Smart Buildings	45	0	0	45	3
6.		24CEO02	Climate Change	45	0	0	45	3
7.	CSE	24CSO01	Data structures using C	45	0	30	45	4
8.		24CSO02	Fundamentals of Java Programming	15	0	90	15	4
9.		24CSO03	Full Stack Development	45	0	0	45	3
10.		24CBO03	Applied Java Programming	15	0	90	15	4
11.		24CSO04	Digital Marketing	45	0	0	45	3
12.	CSE (Cyber Security)	24CB001	Ethical Hacking	45	0	0	45	3
13.		24CB002	Digital and Mobile Forensics	45	0	0	45	3
14.	AIDS	24CSO06	Data Science Fundamentals	45	0	0	45	3
15.		24CSO07	Artificial Intelligence and Machine learning	45	0	0	45	3
16.		24CSO08	Data Exploration and Visualization	45	0	0	45	3
17.	IOT	24IOO01	Industrial Internet of things	45	0	0	45	3
18.		24IOO02	Introduction to Sensors and IoT	45	0	0	45	3
19.	ECE	24ECO01	Drone Technology	45	0	0	45	3
20.		24ECO02	Wearable Devices	45	0	0	45	3
21.		24ECO03	5G /6G Communication	45	0	0	45	3
22.		24ECO04	Embedded IoT	45	0	0	45	3
23.	EEE	24EEO01	Solar and Wind Energy System	45	0	0	45	3
24.		24EEO02	Hydrogen and Hybrid Energy System	45	0	0	45	3
25.		24EEO03	Electric Vehicle Technology	45	0	0	45	3
26.		24EEO04	Energy Conservation and Management	45	0	0	45	3
27.	IT	24ITO01	Introduction to Mobile App and Development	45	0	0	45	3
28.		24ITO02	Introduction to Big Data and Analytics	45	0	0	45	3
29.		24ITO03	Augmented Reality / Virtual Reality	45	0	0	45	3
30.	Mech	24MEO01	3D Printing	45	0	0	45	3
31.		24MEO02	Robotics and Automation	45	0	0	45	3
32.		24MEO03	Lean Manufacturing	45	0	0	45	3
33.	SFE	24SFO01	Occupational health and safety	45	0	0	45	3
34.		24SFO02	Electrical safety	45	0	0	45	3
35.		24SFO02	Electrical safety	45	0	0	45	3

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36.		24SFO03	Building Fire Safety	45	0	0	45	3

Industry Offered Courses

S.No	Course Name
1.	Embedded Systems Using ARM Cortex-M0
2.	Embedded System and SOC Protocol
3.	Advanced Embedded Systems Applications & IoT Programming
4.	IoT and Edge AI implementation
5.	Digital Design Fundamentals Using Verilog HDL
6.	Functional Verification Using System Verilog

CREDIT SUMMARY										
Name of the Programmed: B.E Electronics and Communication Engineering										
CATEGORY	I	II	III	IV	V	VI	VII	VIII	TOTAL CREDITS	%
HSMC	4	2	-	3	-	3	-	-	12	7.27
BSC	8	8	4	-	-	-	-	-	20	12.12
ESC	10	4	1	1	-	-	-	-	16	9.69
PCC	-	7	16	14.5	15.5	10	5	-	68	41.21
PEC	-	-	-	-	3	4	9	-	16	9.69
OEC	-	-	-	3	3	3	-	-	9	5.45
EEC	1	1	1	1	3	4	5	8	24	14.54
MC	√	-	-	-	√	√	-	-	-	-
Total	23	22	22	22.5	24.5	24	19	8	165	-

Total No. of Credits = 165
Total No. of Credits for Lateral Entry Students = 120

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24ENT19	PROFESSIONAL COMMUNICATION	Category	L	T	P	SL	C
		HSMC	45	0	0	45	3

(Common to All Branches)

PRE-REQUISITE:

A comprehensive understanding of basic English grammar, vocabulary, and sentence structure with familiarity in Communication and Technical Writing are considered as pre-requisite for the course.

OBJECTIVE:

To equip learners with essential verbal and written communication skills, including technical writing, necessary for academic, professional, and workplace success.

UNIT - I	UNDERSTANDING COMPARISONS AND CONTRASTS	(9)

Reading: Technical brochures, telephone messages, social media messages.

Writing: Emails/letters introducing oneself, Compare and Contrast Essay.

Grammar: Present Tenses, Framing WH and Yes-No questions.

Vocabulary: Portmanteau words, One–word substitutions.

UNIT - II	WRITING REPORTS AND PARAGRAPHS	(9)

Reading: Technical texts, biographies, travelogues, travel & technical blogs.

Writing: Paragraph writing, Short Report on an event/industrial visit.

Grammar: Past Tenses, Active & Passive Voice transformations, Prepositions.

Vocabulary: Word formations using Prefixes & Suffixes.

UNIT - III	DESCRIBING THE PROCESS/PRODUCT	(9)

Reading: Advertisements, gadget reviews, user manuals, news reports.

Writing: Definitions, Instructions, Product/Process description, Checklists.

Grammar: Future Tenses, If clauses, Concord.

Vocabulary: Nominal Compounds, Discourse Markers (connectives & sequence words).

UNIT - IV	TRANSCODING AND RECOMMENDATIONS	(9)

Reading: Newspaper articles, Journal reports.

Writing: Recommendations, Transcoding.(Conversion of non-verbal to verbal information)

Grammar: Articles, Relative pronouns, Modals.

Vocabulary: Collocations, Homonyms.

UNIT - V	SUMMATION AND DESCRIPTION	(9)

Reading: Editorials and Opinion blogs, Company profiles.

Writing: Descriptive/Narrative Essays, Job/Internship Application with Resume.

Grammar: Numerical adjectives, Relative Clauses.

Vocabulary: Cause & Effect Expressions, Homophones.

TOTAL (T:45 , SL:45) = 90 PERIODS

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K.S.R. College of Engineering, Tiruchengode-637215, Centre for Academic Courses

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Recognize the structure of comparison texts using correct tenses and appropriate vocabulary.	Understand
CO2	Construct short paragraphs and reports using past tense and clear expressions.	Understand
CO3	Comprehend processes and products using future forms and appropriate vocabulary.	Understand
CO4	Interpret visuals like charts or graphs to produce well-structured written content.	Understand
CO5	Draft essays and job applications clearly, using proper grammar and structure.	Understand

TEXT BOOKS:

1. English for Engineers & Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2023.
2. Nitin Bhatnagar, Communicative English for Engineers and Professionals, Pearson, 2024.

REFERENCES:

1. Dr. K.N. Shoba, and Dr. Lourdes Joevani, English for Science & Technology-II Cambridge University Press. Francis, Department of English, Anna University, 2023.
2. Lakshminarayanan, A Course Book on Technical English, Scitech Publications (India) Pvt. Ltd.2022.
3. Kulbhusan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2023.

Mapping of COs with POs and PSOs

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

1-Low, 2-Medium, 3-High

Chairman (BoS)

K.S.R. College of Engineering, Tiruchengode-637 215. Centre for Academic Courses

24EET07	BASICS OF ELECTRICAL AND INSTRUMENTATION	Category	L	T	P	SL	C
		ESC	45	0	0	45	3

PREREQUISITE:

Students should be familiar with fundamental concepts of electric circuits and mathematical principles operation.

OBJECTIVE:

This course aims to build a strong foundation in electrical principles, laws, and the accurate use of key measurement instruments for analyzing electrical circuits. It emphasizes understanding error analysis, calibration, and the operational principles of various measuring instruments.

UNIT - I	BASIC ELECTRICAL CONCEPTS AND MEASURING INSTRUMENTS	(9)

Basic components and electric networks; charge, current, voltage and power, voltage and current sources, Faradays law and Lenz law, Ohms law, Kirchhoff's laws – Functional elements of a measurement system – Electronic Voltmeter and their advantages – True RMS voltmeter – Ohmmeter – Electronic multimeter – Current, Voltage and Power measurement.

UNIT - II	FUNDAMENTALS OF MEASUREMENT AND INSTRUMENTATION	(9)

Measurement standards – Errors – Types of Errors – Need for calibration – Classification of instruments, secondary instruments – indicating, integrating and recording operating forces – essentials of indicating instruments; deflecting, damping, controlling torques – moving coil, moving iron instruments; Ammeters and voltmeters, constructional details and operation.

UNIT - III	TRANSFORMERS	(9)

Constructional details – Principle of operation – EMF equation – Transformation ratio – Transformer on no load and load – Equivalent circuit – Load test – Voltage regulation – Auto transformer.

UNIT - IV	D.C. MACHINES	(9)

Laws of Electromagnetism – Construction of DC machines – DC generator: EMF equation – Shunt and series generators – Characteristics – DC Motor: Principle of operation, Shunt and series motors – Torque equation – Characteristics – Starting and speed control of D.C series and shunt motors.

UNIT - V	A.C MOTORS AND SPECIAL MACHINES	(9)

Three-phase induction motors: Construction, Principle of operation, Types – Starters – Applications – Single-phase induction motors: construction and operation – Split phase induction motor and capacitor start induction motor – Applications – Construction and operation of stepper motor.

LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS

Chairman (BoS)

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Explain the fundamental electrical concepts and instruments to accurately measure charge, current, voltage, and power in electrical circuits.	Understand
CO2	Discuss the measurement standards, error and proficiently operate a range of electrical measuring instruments, ensuring accurate calibration and effective functionality.	Understand
CO3	Apply transformer concepts including constructional details, principles of operation to estimate EMF equation, transformation ratios, performance under no-load and load conditions.	Apply
CO4	Determine the speed, torque produced by DC machines and understand how it varies with different operating conditions.	Apply
CO5	Describe the construction, operation and applications of AC motors and special machines.	Understand

TEXT BOOKS:

1. Sawhney A.K., A Course in Electrical and Electronic Measurements and Instrumentation, Eighteenth Edition, Dhanpat Rai Publications, New Delhi, 2001.
2. Bhattacharya S.K., Electrical Machines, Tata McGraw Hill Publishing company ltd, Second Edition, New Delhi, 1998.

REFERENCES:

1. Nagrath, I.J., Kothari, D. P., Electric Machines, Tata McGraw Hill Publishing Company Ltd, Fifth Reprint, New Delhi, 2012.
2. Fitzgerald, A.E., Charles KingselyJr and Stephen D. Umans, Electric Machinery, McGraw Hill Books Company, Seventh Edition, New Delhi, 2020.
3. David A Bell, Electronic Instrumentation and Measurements, Second Edition, PHI, New Delhi, 2003.
4. Smarajit Ghosh., Fundamentals of Electrical and Electronics Engineering, PHI Learning, Second Edition, New Delhi, 2010.

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

Chairman (BoS)

K.S.R. College of Engineering, Centre for Academic Courses, Tiruchengode-637215

24ITT16	PROGRAMMING FOR PROBLEM SOLVING	Category	L	T	P	SL	C
		ESC	45	0	0	45	3

(Common to AUTO, BME, CSE, CSE(CS), CSD, CSE (IoT), IT, ECE, EEE, MECH & SFE)

PREREQUISITE:

Students must have basic computer literacy, including familiarity with operating systems, file management, and software usage. A Basic understanding of algorithms and flowcharts are required to design and visualize problem solving strategies. Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.

OBJECTIVE:

The course introduces fundamental programming concepts using the C language, covering computer organization, algorithm representation, and basic syntax. Students will learn control structures, functions, arrays, pointers, and string handling. The course also covers complex data types like structures and unions, storage classes, and file operations. By the end, students will be able to analyze problems, design algorithms, and implement solutions using C programming.

UNIT - I	INTRODUCTION TO COMPUTING AND C	(9)

Introduction to Computing: Organization of computer – Hardware and Software – Number system and Conversions – Representation of an algorithm: pseudo code, flowchart with examples. Introduction to C –features of C – Structure of C program – Character set – C tokens – Keywords – Identifiers – Constants – Variables – Data types – Operators – Precedence and Associatively.

UNIT - II	CONTROL STRUCTURES	(9)

Decision Making and Branching: Introduction – decision making with if statement – simple if statement – if-else statement – nested if-else statements – if-else-if ladder statement – switch statement – goto statement – conditional operator – Decision making and looping: Introduction – while statement – do-while statement – for statement.

UNIT - III	FUNCTIONS AND ARRAY	(9)

Functions: Declaration and definition – Function prototype – parameter and arguments – Return type – passing argument by value and by reference – Function scope and lifetime – Function pointer – Arrays: array declaration and initialization – One dimensional array and Two dimensional array with example.

UNIT - IV	POINTERS AND STRINGS	(9)

Pointers: Definition – Initialization – Pointer's arithmetic – Pointers to pointers – Pointers and arrays. String: Declaring and initializing string variables – String handling functions and operations.

UNIT - V	STRUCTURE, UNION AND FILE	(9)

Structures: Declaration – Definition – Structure within a structure – Union – Storage classes – Preprocessor directives – Files: Defining and opening a file – Closing a file – input/output operations on files – Command line arguments.

L= 45, T=0, P=0, SL=45, TOTAL: 90 PERIODS

Chairman (BoS)

COURSE OUTCOMES:
At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Discuss about number systems and perform conversions between different number systems and depict about basic structure of C program.	Understand
CO2	Apply the concept of Looping and conditional statements to solve real-world programming problems efficiently. .	Apply
CO3	Develop modular programs using functions and implement single and two-dimensional arrays for efficient data storage and manipulation.	Apply
CO4	Apply pointer concepts with arrays and functions, and develop efficient C programs using string operations for effective memory management and text processing.	Apply
CO5	Implement user-defined data types using structures and unions, manage memory with storage classes and perform file operations and command-line processing in C programs.	Apply

TEXT BOOKS:

1. Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2017.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, 2011.

REFERENCES:

1. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publication, Nineteenth Edition, 2022.
2. Robert C. Seacord, "Effective C", No Starch Press, 2020.
3. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.
4. Ashok N. Kamathane, 'Computer Programming, Pearson Education, India, Third Edition, 2015.
5. https://archive.nptel.ac.in/courses/106/105/106105171/

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

Chairman (BoS)

24GET19	தமிழர்மரபு	CATEGORY	L	T	P	Sl.	C
		HSMC	15	0	0	15	1

(அனைத்து துறைகளுக்கும் பொதுவானது)

முன்கூட்டிய துறைசார் அறிவு : தேவை இல்லை

அலகு – I	மொழி மற்றும் இலக்கியம்	[03]

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலயக்கிகியங்கள் – சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலகியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு – II	மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை	[03]

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனியில் திருவள்ளுவர் சிலை – இசை கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூகபொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு – III	நாட்டுப் புறக் கலைகள் மற்றும் வீர விளையாட்டுக்கள்	[03]

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

அலகு – IV	தமிழர்களின் திணைக் கோட்பாடுகள்	[03]

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

அலகு – V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	[03]

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்கள்களின் அச்சு வரலாறு.

Total (L= 15, SL=15) =30 Periods

Chairman (BoS)

K.S.R. College of Engineering, Centre for Academic Courses, Tiruchengode-637215

பாடம் கற்றத்தின் விளைவுகள்: பாடத்தை வெற்றிகரகமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்		அறிவாற்றல் நிலை
CO1:	தமிழ்மொழியின் செந்ததன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்	புரிதல்
CO2:	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக் கருவிகள் குறித்த தெளிவு	புரிதல்
CO3:	தமிழர்களின் நாட்டுப் புரைக் கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு	புரிதல்
CO4:	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககாலவணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5:	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல்.	புரிதல்

Text Books:

1	தமிழகவரலாறு-மக்களும்பண்பாடும்-கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்) ,உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2002
2	கணினித்தமிழ்முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016

Reference Books :

1	கீழடி-வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல்துறைவெளியீடு)
2	பொருநை –ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
3	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
4	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

Mapping of COs with POs and PSOs

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

1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)

Chairman (BoS)

24GET19	HERITAGE OF TAMILS	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1

(Common to all branches)

Prerequisite(s): *No prerequisites are needed for enrolling into the course*

UNIT - I	LANGUAGE AND LITERATURE	[03]

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	[03]

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	[03]

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT - IV	THINAI CONCEPT OF TAMILS	[03]

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	[03]

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

Total (L= 15, SL=15) =30 Periods

Course Outcomes: **At the end of the course, the student will be able to**		**Cognitive Level**
CO1:	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2:	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3:	Review on folk and martial arts of Tamil people.	Understand
CO4:	Insight thinai concepts, trade and victory of Chozha dynasty.	Understand
CO5:	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

Chairman (BoS)

Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
Reference Books:	
1	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
2	The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplished by International Institute of Tamil Studies).
3	Keeladi – 'Sangam City Civilzation on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
4	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)

Mapping of COs with POs and PSOs

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Chairman (BoS)

24MAI19	MATRICES AND CALCULUS	Category	L	T	P	SL	C
		BSC	30	15	30	45	4

SEMESTER I - B.E / B.TECH (Common to All Branches)

PREREQUISITE

The Students should have a basic understanding of calculus, matrices, and differential equations to effectively follow the concepts in this course.

OBJECTIVES:

Build a strong foundation in eigen values, eigen vectors, quadratic forms, and higher-order linear differential equations. Develop skills in differential and vector calculus to analyze curves, optimize multivariable functions, and interpret vector fields.

UNIT - I	LINEAR ALGEBRA	(9)

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (Excluding proof) – Cayley Hamilton theorem (excluding proof) – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT - II	ORDINARY DIFFERENTIAL EQUATIONS	(9)

Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy's and Legendre's linear equations – Method of variation of parameters.

UNIT - III	DIFFERENTIAL CALCULUS	(9)

Curvature - Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involutes and Evolutes (Parabola, Ellipse, Hyperbola and Rectangular hyperbola).

UNIT - IV	FUNCTIONS OF SEVERAL VARIABLES	(9)

Partial derivatives – Euler's theorem for homogenous functions – Taylor's series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.

UNIT - V	VECTOR CALCULUS	(9)

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green's theorem in plane, Gauss divergence theorem and Stoke's theorem (Cube, Cuboid and Rectangular Paralleopiped only).

List of Exercise/Experiments(MAT LAB):

1. Calculate the characteristic equation and eigenvalues
2. Find the eigenvector and diagonalization of a given matrix.
3. SolvingODE with constant coefficients
4. Detect the solution of ODE with variable coefficients
5. Identifythe radius of curvature
6. Establish theEvolute of curve.
7. Reckon the Taylor's series for functions of two variables.
8. Computethe maxima and minima.
9. Estimatethe directionalderivative, divergence and curl.
10. Determine line integral, surface integral and volume integral.

L = 30 , T = 15 & P = 30 & SL = 45, TOTAL: 120 PERIODS

Chairman (BoS)

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

COs	Course Outcome	Cognitive Level
CO1	Apply eigen values, eigen vectors, and the Cayley-Hamilton theorem to solve matrix problems and diagonalize quadratic forms into canonical form.	Apply
CO2	Apply methods to solve second and higher-order linear differential equations with constant and variable coefficients.	Apply
CO3	Apply concepts of differential calculus to find curvature, center of curvature, and evolutes of standard Cartesian conic sections.	Apply
CO4	Apply partial derivatives, Jacobians, and lagrangian multipliers to determine local extremum of multivariable functions.	Apply
CO5	Apply vector differential operators to the vector fields and verify Green's, Gauss divergence, and Stokes' theorems for geometries.	Apply

TEXT BOOKS:

1.Ravish R Singh and Mukul Bhatt, "Engineering Mathematics – I", Mc-Graw Hill Publications, New Delhi, 2nd Edition, 2020.
2.B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2020.

REFERENCES:

1. Bali N. P and Manish Goyal, "Engineering Mathematics", Laxmi Publications Pvt Ltd., 7th Edition, 2020.
2.Dass H.K, "Advance Engineering Mathematics", S. Chand and company, 11th Edition, 2014.
3. Jain R.K. and Iyengar S.R.K," Advanced Engineering Mathematics", Narosa Publications, 8th Edition, 2012.
4.Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 10th Edition 2016.
5.https://archive.nptel.ac.in/courses/111/108/111108157/
6.https://archive.nptel.ac.in/courses/111/105/111105122/

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	**3**	**3**	**3**	**3**	**2**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**

1-low, 2-medium, 3-high

Chairman (BoS)

24PHI07	ENGINEERING PHYSICS	Category	L	T	P	SL	C
		BSc	45	-	30	45	4

(Common to AIDS, BME,CSE,CSE(IoT),CS,ECE,EEE &IT)

PREREQUISITE: The students must have knowledge about basic concepts of light sources, dual nature of radiation, conductivity of metals, semiconducting materials, different types of magnetic materials, super conducting materials and their applications.

OBJECTIVES: To provide a comprehensive understanding of the fundamental principles, mechanisms, applications of lasers, fiber optics, quantum physics, semiconductors, magnetic materials and superconductors in modern Science and technology.

UNIT – I LASER AND FIBRE OPTICS (9)

Lasers: Principles of spontaneous emission and stimulated emission - Einstein's co-efficient A & B– population inversion – CO_2 laser – semiconductor diode laser – homo – junction & hetero – junction (qualitative analysis only) – applications.

Fibre Optics: propagation of light in optical fibre– numerical aperture and acceptance angle – types of optical fibre (materials, refractive index profile and modes of propagation) – applications -fibre optic sensors: pressure and displacement sensors.

UNIT – II QUANTUM MECHANICS (9)

Introduction – black body radiation– Planck's theory (derivation) – deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory– Compton effect (derivation) – de-Broglie concept of matter waves – physical significance of a wave function – Schrödinger wave equations (Time dependent & time independent) – particle in a box (one dimensional).

UNIT – III CONDUCTING MATERIALS (9)

Classical free electron theory – expression for electrical conductivity – thermal conductivity – Wiedemann-Franz law – drawbacks of classical free electron theory – quantum theory – Fermi energy – Fermi -Dirac distribution function – density of states and carrier concentration of metals.

UNIT – IV SEMICONDUCTING MATERIALS (9)

Introduction – Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor– Fermi level of an intrinsic semiconductor– variation of Fermi energy level with temperature – Extrinsic semiconductors: carrier concentration in n– type and p-type semiconductors (qualitative analysis only)– Fermi level of extrinsic semiconductors– variation of Fermi energy level with temperature and carrier concentration in an extrinsic semiconductors – Hall effect – determination of Hall co-efficient for n – and p – type semiconductors– applications.

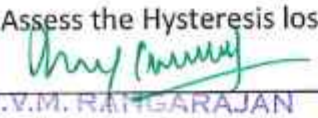
UNIT – V MAGNETIC AND SUPERCONDUCTING MATERIALS (9)

Magnetic Materials: Introduction – origin of magnetic moment – dia, para and ferromagnetic martials– domain theory of ferro-magnetism – Hysteresis – soft and hard magnetic materials.

Superconducting Materials: Introduction to superconductivity – properties and types of superconductor – application of superconductors: magnetic levitation– SQUIDS– cryotron.

List of exercises/experiments:

1. Determine the thickness of the given thin paper using Air wedge method.
2. Find the acceptance angle and numerical aperture of a given optical fibre.
3. Evaluate the wavelength of semiconductor laser.
4. Estimate the particle size of the lycopodium powder using semiconductor laser
5. Enumerate the thermal conductivity of a bad conductor by Lee's disc method.
6. Compute the band gap of an intrinsic semiconductor.
7. Calculate the width of the CD groove with a help of semiconductor laser.
8. Assess the Hysteresis loss of magnetic materials using B-H curve.



Lecture: 45, Laboratory: 30, SL:45, TOTAL: 120 PERIODS

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

COs	Course Outcome	Cognitive level
CO1	Elucidate laser principles, types, light propagation and the applications of optical fibers.	Understand
CO2	Apply quantum theory for Planck's theory, Compton Effect and Schrödinger's equation of matter waves.	Apply
CO3	Calculate electrical conductivity and Fermi energy by considering quantum free electron theory.	Apply
CO4	Infer charge carrier behavior in intrinsic, extrinsic semiconductors and Hall effect.	Understand
CO5	Describe principles, classifications, applications of magnetic materials and superconductors.	Understand

Text Books :

1. M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 11th Edition, 2018.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics", Dhanpat Rai Publication, New Delhi, 7th Edition, 2014.

Reference Books :

1. R. Murugeshan and Kiruthiga Sivaprasath, "Modern Physics", S. Chand & Company, New Delhi, 17th Edition, 2014.
2. V. Rajendran, "Engineering Physics", Tata McGraw-Hill, New Delhi, 1st Edition, 2011.
3. S.O. Pillai, "Solid State Physics", New Age Publication, Chennai, 10th Edition, 2023.
4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill, New Delhi, 7th Edition, 2015.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	-	1	2	2	-	2	-	-
CO2	3	3	2	-	-	-	1	2	2	-	2	-	-
CO3	3	3	2	-	-	-	1	2	2	-	2	-	-
CO4	3	2	-	-	-	-	1	2	2	-	2	-	-
CO5	3	2	-	-	-	-	1	2	2	-	2	-	-
Avg.	3	2	-	-	-	-	1	2	2	-	2	-	-

1-low, 2-medium, 3-high

BoS chairman

Chairman (BoS)

K.S.R. College of Engineering, Tiruchengode-637 215 * Centre for Academic Courses *

24PHI07 - ENGINEERING PHYSICS
I Year B.E (AIDS, BME, CSE, CSE (IOT), CS, ECE, EEE & B.Tech IT)
Requirements for a batch of 30 students
Regulation (2024)

S.No.	Description of Equipment	Quantity required
1.	Air wedge apparatus. (with traveling microscope and accessories)	5 Nos
2.	Acceptance angle and numerical aperture of an optical fibre. (with accessories)	5 Nos
3.	Wavelength of semiconductor laser beam. (with accessories)	5 Nos
4.	Particle size of Lycopodium powder. (with accessories)	5 Nos
5.	Lee's disc apparatus. (with accessories)	5 Nos
6.	Band gap apparatus. (with accessories)	5 Nos
7.	Width of the groove of CD using laser. (with accessories)	5 Nos
8.	B-H curve apparatus. (with accessories)	5 Nos

BoS chairman

Chairman (BoS)

K.S.R. College of Engineering, Tiruchengode-637215, Centre for Academic Courses

24ITP16	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to AUTO, BME, CSE, CSE(CS), CSD, CSE (IoT), IT, ECE, EEE, MECH and SFE)

PREREQUISITE:

Students are expected to have foundational knowledge of basic programming principles. This includes an understanding of variables and data types such as integers, floats, and characters, as well as familiarity with fundamental control structures like conditional statements (if-else) and loops (for, while).

OBJECTIVE:

The lab is designed to provide hands-on experience with fundamental computer applications like MS Word, Excel, PowerPoint, and MS Access. It also aims to develop practical programming skills in C, enabling students to write, debug, and execute programs that incorporate core concepts such as control flow, functions, strings, pointers, and file handling. The lab will help students apply theoretical knowledge to real-world problems, enhancing their problem-solving and programming proficiency.

LIST OF EXPERIMENTS:

1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same to too many recipients using mail merge.
2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and charts.
3. i) Prepare a Power Point presentation for your organization with varying animation effects using timer.
   ii) Prepare a Student Database in MS Access, manipulate the data and generate report.
4. Design an algorithm and flowchart with example.
5. Program using I/O statements and expressions.
6. Programs using decision-making constructs: if-else, goto, switch-case, break-continue.
7. Loops: for, while, do-while.
8. Arrays: 1D and 2D
9. Functions: passing parameters by (value, reference), Recursion.
10. Strings: operations.
11. Pointers.
12. Structures and File operations.

L = 0, T = 0, P = 30, SL = 0, TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Experiment	Cognitive Level
CO1	Apply the basic concept of MS word, Excel, Power Point presentation and MS Access.	1,2,3,4	Apply
CO2	Develop the program using the concept of control statements.	5,6,7	Apply
CO3	Demonstrate the use of functions and arrays in Programming.	8,9	Apply
CO4	Apply the concepts of pointers and strings.	10,11	Apply
CO5	Develop the program using the files and structure operations.	12	Apply

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REFERENCES:

1. Jeff Szuha, "Learn C Programming", Packt Publishing, United Kingdom, Second Edition, 2022.
2. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

LIST OF EQUIPMENTS (For a Batch of 30 Students)

Sl. No	Name of the Equipment's	Qty.
1.	A computer with a modern processor and sufficient RAM.	30 Nos.
2.	Microsoft Office Suite (preferably MS Office 2016 or later) including: • MS Word (for document preparation and mail merge) MS Excel (for mark sheet creation, formulas, functions, and charts). • MS PowerPoint (for presentations with animations and timers). • MS Access (for database creation, data manipulation, and report generation). • Email Client (e.g., Outlook or any configured email system) for sending mail merge outputs.	30 Nos.
3.	Turbo C software or any standard C Compiler (e.g., GCC, Code Blocks)	30 Nos.

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24MEP16	ENGINEERING GRAPHICS LABORATORY	Category	L	T	P	SL	C
		ESC	15	0	30	15	2

(Common to BME, CSE, CSE(CS), AI&DS, CSE(IoT), IT, ECE, EEE)

PREREQUISITE

Engineering Graphics Laboratory requires a good understanding of geometry. This includes knowledge of shapes, angles, dimensions, and spatial reasoning. The ability to visualize and interpret three-dimensional objects from two-dimensional drawings is crucial.

OBJECTIVES:

Instruct the utility of drafting & modeling packages in orthographic and isometric drawings and train the usage of 2D and 3D modeling

List of Exercise/Experiments:

1. Study of drawing tools, commands and coordinate systems in 2D software.
2. Cycloid and Conic curves.
3. Orthographic projections of pictorial views.
4. Orthographic views of straight lines.
5. Orthographic views of planes.
6. Orthographic views of simple solids.
7. The sectional view and the true shape of simple solids.
8. Development of lateral surfaces of simple solids.
9. Isometric projection of simple solids.
10. Drafting the 2D multi-view drawings from 3D model.

LIST OF EQUIPMENT (for a batch of 30 Students)

S.No.	Name of the Equipment	Quantity
1.	Intel i3 Processor, 8 GB RAM with 2 GB Graphics Card	30 Nos
2.	Licensed software for drafting and modeling	30 Nos

L:15 P:30 SL:15 TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Exp. No.	Cognitive Level
CO1	Explain the fundamentals of engineering drawing and AutoCAD tool.	1	Understand
CO2	Construct projections of points, lines, and planes, then develop a virtual drawing using AutoCAD tool.	2,3 & 4	Apply
CO3	Apply projection principles to convert pictorial views into orthographic drawings	5,6	Apply
CO4	Model the Solid Projections and Sectioning of the solids by the AutoCAD tool.	7,8	Apply
CO5	Develop isometric drawings of simple objects reading the orthographic projections of those objects.	9,10	Apply

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REFERENCES:

1. Bhatt. N. D., Engineering Drawing, Charotar Publishing House, Fifty Third Edition, 2014.
2. Basant Agarwal and Agarwal. C. M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, 2018.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24GEP16	ENGINEERING EXPERIENCE LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), ECE, EEE, IT)

PREREQUISITE:

A solid foundation in basic electrical components such as switches, wires, fuses, and light bulbs, including the roles of line, neutral, and ground wires. Basic understanding of physics and core principles of electrical and mechanical engineering.

OBJECTIVE:

To develop practical skills in basic electrical wiring, electronic interfacing with Arduino and IoT, and fundamental mechanical tools and systems.

LIST OF EXPERIMENTS

GROUP - A (ELECTRICAL)

1. Fluorescent lamp wiring.
2. Stair-case wiring.
3. Residential house wiring using switches, fuse, indicator and lamp.
4. Measurement of Energy in single phase system.

GROUP - B (ELECTRONICS)

1. Study of Electronic Components, Instruments, Internet of Things (IoT) and Arduino IDE.
2. Controlling the Light Emitting Diode (LED) with a push button using Arduino.
3. Interfacing of a Sensor (Ultrasonic, Rain, Voltage, Current & PIR) with Arduino Uno.
4. Controlling of LED through Wi-Fi using ESP8266.

GROUP - C (MECHANICAL)

1. Study of plumbing line sketches for water supply and carpentry tools.
2. Study of welding tools and centrifugal pump.

COURSE OUTCOMES:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Construct different types of wiring used in residential houses.	Apply
CO2	Measure the energy in single-phase system.	Apply
CO3	Demonstrate different electronic components, instruments, IoT and Arduino IDE.	Apply
CO4	Construct the control circuit with the help of Arduino and sensors.	Apply
CO5	Describe the plumbing, carpentry, welding components and centrifugal pump works for engineering practices and applications.	Understand

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REFERENCES:

1. Gupta J.P., "A Course in Electrical Installation Estimating and Costing", S.K. Kataria and Sons, Delhi, Reprint 2013 Edition, 2013.
2. Mike Cheich, "Arduino Book for Beginners", Programming Electronics Academy, 2021.

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

LIST OF EQUIPMENT (For a Batch of 30 Students)

S.No.	Name of the Equipment	Qty.
1.	Single-phase house wiring setup	2 Nos.
2.	Staircase wiring setup	2 Nos.
3.	Fluorescent lamp wiring setup	2 Nos.
4.	Energy Meter	5 Nos.
5.	Electrical Measuring Instruments	10 Nos.
6.	Ultrasonic Sensor	5 Nos.
7.	Rain Sensor	5 Nos.
8.	Voltage Sensor	5 Nos.
9.	Current Sensor	5 Nos.
10.	PIR Sensor	5 Nos.
11.	ESP8266 & Cable	15 Nos.
12.	Arduino UNO & Cable	15 Nos.
13.	DHT 11	5 Nos.
14.	Temperature sensor	5 Nos.
15.	Red LED	15 Nos.
16.	2-leg push Button	15 Nos.
17.	4-leg push Button	15 Nos.
18.	Personal Computer	15 Nos.

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24SSP19	APTITUDE AND CODING SKILLS – I	Category	L	T	P	SL	C
		EEC	0	0	30	0	1

(Common to All Branches)

OBJECTIVES:

The course aims to introduce students to the fundamentals of aptitude, highlighting its importance and real-world applications. It is designed to build proficiency in verbal reasoning, thereby enhancing analytical and problem-solving skills. The curriculum also focuses on developing a strong foundation in English grammar, essential for effective communication.

UNIT - I	BASIC OF NUMBER SYSTEMS & FOUNDATION	(6)

Introduction to Number System and its Classification - Divisibility Rules and Problems –Place Value & Face Value - HCF & LCM and its properties.

UNIT - II	BASICS OF SHARE BASED CONCEPTS	(6)

Introduction to Average – Basics of Ratio and proportion – Basics of Partnership–Introduction to Percentage

UNIT - III	LOGICAL REASONING	(4)

Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Direction and distance

UNIT - IV	VERBAL ABILITY	(7)

Introduction to Grammar – Tenses – Parts of Speech – Preposition – Articles – Modal Verbs

UNIT - V	C PROGRAMMING	(7)

C Basics-Control Statements Decision making – Functions – Arrays & Strings – Pointers - User Defined Data Types - Storage Classes - Memory Management - Preprocessor.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome		Cognitive Level
CO1	Explain the classification of number systems, apply divisibility rules to identify number properties		Understand
CO2	Apply the concepts of averages, ratios, and proportions to solve real-life problems and interpret data effectively.		Apply
CO3	Solve number series problems by identifying and applying suitable numerical patterns or rules.		Apply
CO4	Apply the rules of grammar to enhance written and spoken communication.		Apply
CO5	Apply the fundamental concepts of C programming to develop efficient and structured programs.		Apply

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TEXT BOOKS:

1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning
3. Wren & Martin, High School English Grammar & Composition
4. Brian W. Kernighan and Dennis Ritchie, The C Programming Language 2e, Pearson Education, 2015.
5. Yashavant Kanetkar, The C Programming Language 2e, BPB publications,15th Edition, 2016

REFERENCES:

1. https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm
2. Stephen G. Kochana, Programming in C, 3rd Edition.
3. K. N. King, C Programming: A Modern Approach, 2e, 2008.
4. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India, 1990.
5. Robert L. Kruse and Bruce P. Leung, Data Structures and Program Design in C, Pearson Education 2007.
6. https://www.geeksforgeeks.org/c-programming-language/
7. https://www.geeksforgeeks.org/data-structures/

Mapping of COs with POs and PSOs

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

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24CST29	PYTHON PROGRAMMING	Category	L	T	P	SL	C
		ESC	45	0	0	45	3

(Common to All Branches)

PREREQUISITE:

A basic understanding of programming principles such as variables and loops, paired with good problem-solving abilities is required. Logical thinking and analytical skills are critical for effective programming.

OBJECTIVE:

- To provide a comprehensive foundation in Python programming, covering core concepts, data structures, OOP principles, file and database handling as well as web and GUI development using frameworks like Django and Tkinter.

UNIT – I	FUNDAMENTALS OF PYTHON	(9)

Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation – I/O function – Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.

UNIT – II	HANDLING STRINGS AND EXCEPTIONS	(9)

Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception – Modules and Packages.

UNIT – III	OBJECT ORIENTED PROGRAMMING CONCEPTS	(9)

Object Oriented Programming basics –Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling – Duck Typing – Relationships.

UNIT– IV	FILES AND DATABASES	(9)

File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using MySQL.

UNIT – V	WEBPROGRAMINGAND GUI USING PYTHON	(9)

Frameworks: Introduction to Django – Django CRUD – Socket Programming – Sending email – UI design: Tkinter – Events – CGI: Introduction to CGI Programming, GET and POST Methods.

L = 45, SL = 45, TOTAL: 90 PERIODS

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COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Describe Python syntax to write code using data types, operators, loops and conditionals.	Understand
CO2	Interpret string manipulation, data structures and exception handling to build robust applications.	Understand
CO3	Implement object-oriented programming principles including inheritance and polymorphism to design effective solutions.	Apply
CO4	Apply file I/O operations and database management techniques to efficiently manage and manipulate data.	Apply
CO5	Develop web applications and graphical user interfaces using Python frameworks and libraries.	Apply

TEXT BOOKS:

1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, Fifth Edition, 2023.
2. Wesley J.Chun, "Core Python Programming", Pearson Education, Second Edition, 2017.

REFERENCES:

1. Robert Oliver, "Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications", Clyde Bank Media LLC,1st Edition, 2023
2. Allen B. Downey, "Think Python", O'Reilly Media, Second Edition, 2016.
3. David Beazley, Brian K. Jones, "Python Cookbook", O'Reilly Media, Third Edition, 2013
4. Mark Lutz, "Python Pocket Reference", O'Reilly Media, Fifth Edition, 2014
5. www.python.org
6. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

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24ECT21	DESIGN THINKING	Category	L	T	P	SL	C
		PCC	30	0	0	30	2

(COMMON TO BME, EEE & ECE)

PRE-REQUISITE: Nil

OBJECTIVE:

To equip learners with a structured, human-centered approach to problem-solving using the principles and stages of Design Thinking, including empathy, problem definition, ideation, prototyping, and effective communication.

UNIT - I	FUNDAMENTALS OF DESIGN THINKING	(6)

What is Design Thinking? - When to use Design Thinking? - How to do it? - Who are involved in this? – Design The Thinking™– Personal Visualization, The Wheel of Life & Balancing Priorities – Appreciating 'Design' – The 3 Laws of Design Thinking.

UNIT - II	STEP 1: THE 'FEEL' STAGE	(6)

What is this stage about? – What role does a Design Thinker play in this stage? Tools – What is the purpose in this stage? – Persona – Journey Mapping – Stakeholder Mapping & CATWOE Analysis - Cartographic Perspective (LO) – Empathy Map – Case Study: Understanding the Stakeholders.

UNIT - III	STEP 2: THE 'DEFINE' STAGE	(6)

What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Five-Whys – Anti-Pattern – Paraphrasing the Problem – Challenge Mapping – LORD: Definitive skill set for a Design Thinker – Case Study: Relooking at the Problem.

UNIT - IV	STEP 3: THE 'DIVERGENCE' & 'CONVERGENCE' STAGE	(6)

What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Brainstorming – Metaphor – Random Association Technique – End-State Visualization - 10gm-100gm-1000gm – Prototyping – Wire framing for digital products – Case Study: Prototyping and Communicating for Effective Outcome.

UNIT - V	STEP 5: THE 'COMMUNICATION' STAGE	(6)

What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – The 4Cs Framework – Naming – Packaging – Story boarding – Presentation – Distribution.

TOTAL (L:30, SL:30): 60 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Demonstrate an understanding of Design Thinking concepts and principles by explaining their relevance in real-world contexts.	Understand
CO2	Articulate the significance of a Design Mindset and its impact on creative problem-solving.	Understand
CO3	Apply Design Thinking methods effectively at each stage of the problem-solving process.	Apply

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CO4	Identify and implement the phases of Design Thinking to address complex challenges systematically.	Apply
CO5	Use a variety of Design Thinking tools to develop innovative solutions and refine ideas through iteration.	Apply

TEXT BOOKS:

1. UnMukt – The Science & Art of Design Thinking, Arun Jain
2. Don Norman ,The Design of Everyday Things, MIT Press, 2013
3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and inspires innovation, Harper Collins Publishers Ltd, New York, First Edition, 2009.

REFERENCES:

1. Chrisitan Mueller-Roterberg, Handbook of Design Thinking – Tips & Tools for how to design thinking, kindle Direct Publishing, First Edition, 2018.
2. Johnny Schneider, Understanding Design Thinking, Lean and Agile, O'Reilly Media, California, First Edition, 2017
3. Roger Martin, The Design of Business, Why Design Thinking is the next competitive advantage, Harvard Business Press, United States, First Edition, 2009.
4. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, New Jersey, First Edition, 2013.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24GET29	தமிழரும் தொழில் நுட்பமும்	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1

(அனைத்து துறைகளுக்கும் பொதுவானது)

முன் கூட்டிய துறைசார் அறிவு : தேவை இல்லை

அலகு – I	**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**	**[03]**

சங்ககாலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள்-பாண்டகளில் கீறல் குறியீடுகள்

அலகு – II	**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**	**[03]**

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்-சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்-மாமல்லபுரச் சிற்பங்களும், கோவில்களும்-சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள்-நாயக்கர் காலக்கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன்ஆலயம் மற்றும் திருமலைநாயக்கர்மஹால் – செட்டிநாட்டுவீடுகள்-பிரிட்டிஷ்காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு – III	**உற்பத்தித் தொழில்நுட்பம்**	**[03]**

கப்பல் கட்டும் கலை-உலோகவியல்-இரும்புத்தொழிற்சாலை-இரும்பை உருக்குதல், எஃகு-வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்கநாணயங்கள்-நாணயங்கள் அச்சடித்தல்-மணி உருவாக்கும் தொழிற்சாலைகள்-கல் மணிகள்-கண்ணாடி மணிகள்-சுடு மண்மணிகள்-சங்குமணிகள்-எலும்புத்துண்டுகள்-தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு – IV	**வேளாண்மை மற்றும் நீர்ப் பாசனத் தொழில்நுட்பம்**	**[03]**

அணை,ஏரி,குளங்கள்,மதகு-சோழர்காலகுமிழித்தூம்பின் முக்கியத்துவம்-கால்நடை பராமரிப்பு-கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள்-கடல்சார் அறிவு – மீன் வளம்-முத்து மற்றும் முத்துக் குளித்தல்-பெருங்கடல் குறித்த பண்டைய அறிவு-அறிவுசார் சமூகம்.

அலகு – V	**அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்**	**[03]**

அறிவியல் தமிழின் வளர்ச்சி- கணினித்தமிழ் வளர்ச்சி-தமிழ் நூல்களை மின்பதிப்பு செய்தல்-தமிழ் மென் பொருட்கள் உருவாக்கம்-தமிழ் இணையக்கல்விக் கழகம்-தமிழ் மின்நூலகம்-இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.

Total (L= 15, SL=15) =30 Periods

பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரகமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்		அறிவாற்றல் நிலை
CO1	*சங்ககாலத் தமிழிர்களின் நெசவு மற்றும் பானைவனைதல் தொழில் நுட்பம் குறித்து கற்றுணர்தல்.*	*புரிதல்*
CO2	*சங்ககாலத் தமிழிர்களின் கட்டிட தொழில் நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளகும் தளங்கள் குறித்து அறிவு*	*புரிதல்*
CO3	*சங்ககாலத் தமிழிர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு*	*புரிதல்*
CO4	*சங்ககாலத் தமிழிர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.*	*புரிதல்*
CO5	*நவீன அறிவியல் தமிழ் மற்றும் கன்னி தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்தலும்.*	*பகுப்பாய்வு*

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Text Books :	
1	தமிழகவரலாறு- மக்களும் பண்பாடும்- கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)
2	கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
Reference Books :	
1	கீழடி- வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல் துறை வெளியீடு)
2	பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
3	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)
4	Porunai Civilization (Jointly Published by: Department of Archaeology &Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-
1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)													

Chairman (BoS)

24GET29	TAMILS AND TECHNOLOGY	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1

(Common to All Branches)

Prerequisite(s): *No prerequisites are needed for enrolling into the course*

UNIT - I	WEAVING AND CERAMIC TECHNOLOGY	[03]

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

UNIT - II	DESIGN AND CONSTRUCTION TECHNOLOGY	[03]

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) – ThirumalaiNayakar Mahal –Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period.

UNIT - III	MANUFACTURING TECHNOLOGY	[03]

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	[03]

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu 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	[03]

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

Total (L= 15, SL=15) =30 Periods

Course Outcomes: **At the end of the course, the student will be able to**		***Cognitive Level***
CO1	Understand the weaving and ceramic technology of ancient Tamil People nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam Period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

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Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
Reference Books:	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
2	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
3	Keeladi – 'Sangam City Civilzation on the banks of river Vaigai; (Jointly Published by: Department of Archaeology &Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
4	Studies in the History of India with Special Reference to Tamilnadu (dr.K.K.Pillay) (Published by-: The Author)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	**3**	**3**	-	**2**	-	**3**	-	-
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

Chairman (BoS)

24ECT22	CIRCUIT THEORY	Category	L	T	P	SL	C
		PCC	45	15	0	60	4

PREREQUISITE: NIL

OBJECTIVE:

This course aims to build the ability to apply Ohm's Law, KVL, KCL and network theorems for analyzing both simple and complex DC circuits. It also focuses on developing skills to evaluate steady-state and transient responses of RL, RC, RLC circuits and analysis of two-port networks.

UNIT - I	DC NETWORK ANALYSIS	(9+3=12)

Analysis of series and parallel networks - Voltage and Current Division - Networks Reduction - Nodal and Mesh Analysis for Linear Resistive Networks - Network Topology – Duals - Dual Networks.

UNIT - II	NETWORK THEOREMS	(9+3=12)

Superposition Theorem - Thevenin's Theorem - Norton's Theorem - Maximum Power Transfer Theorem - Reciprocity Theorem - Star - Delta Transformation.

UNIT - III	SINUSOIDAL STEADY STATE ANALYSIS	(9+3=12)

Sinusoidal Steady State analysis - Characteristics of Sinusoids - AC Network Power Analysis; Instantaneous Power, Average Power, Apparent Power and Power Factor - Phase Relationship for R, L, and C - Analysis of Simple Series and Parallel AC Networks with Phasor Diagram.

UNIT - IV	TRANSIENTS AND RESONANCE IN RLC NETWORKS	(9+3=12)

Transient Response of RL, RC and RLC Networks for DC Input and Sinusoidal Inputs - Series and Parallel Resonance - Frequency Response - Quality Factor – Bandwidth - Half Power Frequencies.

UNIT - V	TWO PORT AND COUPLED NETWORKS	(9+3=12)

Network parameters: Impedance, admittance transmission parameters and conversion formulae - Magnetically Coupled Networks: Self-Inductance, Mutual Inductance, Co-efficient of Coupling - Single and Double Tuned Networks - Analysis and Applications.

Total (L:45, T:15, SL:60): 120 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Apply foundational electrical laws to calculate current, voltage and power in both simple and complex electric circuits.	Apply
CO2	Apply network theorems to simplify complex circuits and calculate electrical parameters such as current, voltage, and power.	Apply
CO3	Analyze the steady-state behavior of RL, RC, and RLC circuits in AC systems using phasor diagrams.	Analyze
CO4	Analyze the transient response of RL, RC, and RLC circuits when subjected to both DC and AC inputs.	Analyze
CO5	Measure and evaluate the electrical parameters of two-port networks and magnetically coupled circuits.	Apply

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TEXT BOOKS:

1 Mahmood Nahri, Joseph A.Edminister, Electric Circuits, Schaum's Series, Tata McGraw-Hill, New Delhi, Seventh Edition 2017.

2 Charles K. Alexander & Mathew N.O.Sadiku, Fundamentals of Electric Networks, McGraw- Hill New Delhi, Seventh Edition, 2013.

REFERENCES:

1 W.H.Hayt, J.E.Kemmarly, S.M.Durbin, Engineering Circuit Analysis, McGraw- Hill, New Delhi, Eighth Edition, 2013.

2 David A. Bell, Electric Circuits, Oxford University press, UK, Seventh Edition 2009.

3 A.Sudhakar and S.P.Shyam Mohan, Circuits and Network Analysis and Synthesis, Tata McGraw Hill, Fifth Edition 2017.

4 Chakrabati A, Circuits Theory Analysis and synthesis, Dhanpath Rai& Sons, New Delhi, Sixth Edition 2018.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24MAI29	PROBABILITY AND STATISTICS	Category	L	T	P	SL	C
		BSC	30	15	30	45	4

SEMESTER II - B.E / B.TECH (Common to All Branches)

PREREQUISITE:

A basic understanding of algebra, calculus, and introductory statistics is required to grasp the concepts of probability, hypothesis testing, and statistical methods used in engineering and quality control.

OBJECTIVES:

To build a foundational understanding of probability and random variables, enable the application of two-dimensional random variables in engineering contexts, develop the ability to perform hypothesis testing for both small and large samples, introduce the principles of experimental design in agricultural studies, and provide knowledge of statistical quality control techniques.

UNIT - I	ONE DIMESIONAL RANDOM VARIABLES	(9)

One dimensional Random Variable - Discrete and continuous random Variables -Expectations - Moment generating functions and their properties - Binomial, Poisson, Uniform and Normal distributions.

UNIT - II	TWO - DIMENSIONAL RANDOM VARIABLES	(9)

Joint distributions – Marginal and conditional distributions – Covariance – Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Regression Analysis.

UNIT - III	TESTING OF HYPOTHESIS	(9)

One sample and two sample test for means of large samples (Z- test), One sample and two sample test for means of small samples (t-test), Chi-square - Independent of Attributes - F test for equality of variances.

UNIT - IV	DESIGN OF EXPERIMENTS	(9)

Analysis of variance - One way and two way classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design.

UNIT - V	STATISTICAL QUALITY CONTROL	(9)

Control charts for measurements ($\bar{X}$and R charts) – Control charts for C and P charts – Acceptance sampling for construction of an OC curve.

List of Exercise/Experiments (R Software):

1. Determine the probability by using binomial distribution.
2. Find the probability with the help of normal distribution.
3. Determine the correlation co-efficient between X and Y.
4. Calculate and plot the regression lines.
5. Test the significance of difference between experimental and theoretical values of the data by using chi-square test.
6. Examine the small samples using F distribution.
7. Analyze the data using Randomized Block Design (RBD).
8. Inspect the data using Latin Square Design (LSD).
9. Findthe$\bar{X}$ and R charts.
10. Compute c and p charts.

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L = 30 , T = 15 & P = 30 & SL = 45, TOTAL: 120 PERIODS

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COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Apply the concepts of one dimensional random variables to compute expectations and analyze the standard distributions.	Apply
CO2	Apply statistical methods to compute marginal and conditional distributions, and perform correlation and regression analysis.	Apply
CO3	Apply Z-test, t-test, Chi-square test, and F-test to analyze sample data and draw inferences on independence of attributes.	Apply
CO4	Apply analysis of variance techniques for one-way and two-way classifications, and implement experimental designs using CRD, RBD and LSD.	Apply
CO5	Construct control charts for measurements Mean and Range charts and attributes charts to assess process control and product quality.	Apply

TEXT BOOKS:

1. S.P. Gupta, "Statistical Methods", Sulthan Chand & Sons, 46th Edition ,2021.

2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4thedition, 2007.

REFERENCES:

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

2. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2010.

4. R.C.Gupta, "Statistical Quality Controls", Khanna Publishers, Delhi, 8th Edition , 2008.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	3	2	-	-	1	-	-	2	-	-

1-low, 2-medium, 3-high

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24CHI06	CHEMISTRY FOR ENGINEERS	Category	L	T	P	SL	C
		BSC	45	0	30	45	4

(Common to AI&DS, BME, CSE, CSE(CS), CSE(CSD), CSE(IoT), ECE, EEE and IT)

PREREQUISITE

The students must have knowledge about the basic concepts of water parameters, electro chemistry, organic reactions and their applications.

OBJECTIVES:

To equip the leaners to apply the chemical principles and their applications in the engineering fields.

UNIT - I WATER TREATMENT (9)

Hardness – types, units – estimation of hardness by EDTA method; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge – priming and foaming – caustic embrittlement – boiler corrosion. Softening methods – internal conditioning – calgon, phosphate – external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Domestic water treatment (Sterilisation process Only).

UNIT - II ELECTROCHEMISTRY AND CORROSION (9)

Introduction – electrode potential – Nernst equation – EMF series and its significance; E – Vehicles - Need - Types – Advantages and Disadvantages; Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control (Sacrificial anode and Impressed Current Cathodic protection method).

UNIT - III ENERGY STORAGE DEVICES (9)

Batteries – primary battery – Dry cell, secondary batteries – lead-acid and lithium-ion batteries. Fuel cells – H_2-O_2 fuel cell, solar cells – principle, applications and advantages; Nuclear energy: Light water Nuclear power plant - breeder reactor.

UNIT - IV POLYMER CHEMISTRY (9)

Polymer – definition – degree of polymerization – functionality. Polymerization – addition, condensation and co-polymerization – free radical mechanism of addition polymerization; Preparation properties & uses of PVC, Nylon – 6,6 & Teflon. Plastics – classification – thermosetting and thermoplastics. Fabrication of polymers – compression and Injection moulding.

UNIT - V NANO CHEMISTRY AND COMPOSITES (9)

Introduction – basics of nanochemistry – distinction between nanoparticles, molecules and bulk materials - synthesis of nanomaterials [CVD, laser evaporation, pyrolysis] - applications of nanomaterials. Composite – Introduction: Definition and need for composite – Types of composites: Properties and application of FRP and MMC.

List of Exercise/Experiments:

1. Estimation of total, permanent and temporary hardness of water sample By EDTA method
2. Estimation of chloride content in water by Argentometric method [Mohr's Method]
3. Conductometric titration of strong acid with strong base (HCl Vs NaOH)
4. Estimation of dissolved oxygen in water (Winkler's Method)
5. Conductometric titration of mixture of acids (HCl & CH_3COOH) with strong base
6. Estimation of Fe^{2+} ion by potentiometric titration
7. Estimation of HCl by p^H- Metry
8. Conductometric precipitation titration using $BaCl_2$-Na_2SO_4

L = 45, P = 30, SL = 45, TOTAL = 120 PERIODS

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

COs	Course Outcome	Cognitive Level
CO1	Interpret the treatment solutions for drinking water, boiler feed water, and wastewater reuse.	Understand
CO2	Describe different types of electrochemical cells, including galvanic and electrolytic cells.	Understand
CO3	Categorize different energy storage methods, such batteries, fuel cell and solar cell for the production of electricity.	Understand
CO4	Summarize the basics concepts of polymer chemistry in designing the materials for engineering and technology.	Understand
CO5	Illustrate the nano materials and composites for engineering and technology.	Understand

TEXT BOOKS:

1. S S. Dara and S. S. Umare, "A Text book of Engineering Chemistry", S.Chand & Co.Ltd., 12th Edition, 2015.
2. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub. Co., 16th Edition, 2013.
3. Wiley, "Engineering Chemistry", Wiley India Pvt. Ltd., 2nd Edition, 2013.

REFERENCES:

1. Dr. A. Ravikrishnan, "Engineering Chemistry", Srikrishna Hi-tech Publishing Company Pvt. Ltd., 21st Edition, 2022.
2. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Text book of Quantitative Chemical Analysis", Pearson Education Pvt., Ltd., 6th Edition, 2019.
3. Shashi Chala, "A Text book of Engineering Chemistry", Dhanpat Rai Pub. Co., 2015.
4. S. K. Bhasin and Sudha Rani, "Laboratory Manual of Engineering Chemistry", Dhanpat Rai Publishing Company Private Limited,3rd Edition, 2012.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	1	-	2	1	-	1	-	-
CO2	3	2	-	-	-	1	-	2	1	-	1	-	-
CO3	3	2	-	-	-	1	-	2	1	-	1	-	-
CO4	3	2	-	-	-	1	-	2	1	-	1	-	-
CO5	3	2	-	-	-	1	-	2	1	-	1	-	-

1-low, 2-medium, 3-high

Laboratory Equipment Details
(Requirements for a batch of 30 students)

S.No.	Description of Equipment	Quantity required
1.	Electronic balance	1 No.
2.	pH meter	6 Nos.
3.	Conductivity meter	6 Nos.
4.	Potentiometer	6 Nos.

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24ENP29	PROFESSIONAL COMMUNICATION LABORATORY	Category	L	T	P	SL	C
		HSMC	0	0	30	0	1

(Common to All Branches)

OBJECTIVE:

To enhance learners' proficiency in listening, speaking, reading, and writing through structured activities and professional communication practices relevant to academic and workplace settings.

UNIT - I	VERBAL AND CRITICAL REASONING	(6)

Syllogism – Drawing conclusions from given logical statements, **Assertion and Reason** – Judging the link between a claim and its reason, **Verbal Analogies** – Completing word pairs based on relationships, **Statement and Assumption** – Identifying hidden assumptions in statements, **Statement and Conclusion** – Choosing valid conclusions from given data, **Critical Reasoning** – Evaluating arguments for logic and consistency.

UNIT - II	LISTENING	(6)

Listening to Announcement – Understanding key details and context from public messages, **Short Conversation** – Extracting specific information from brief dialogues, **Motivational Speech** – Grasping main ideas, tone, and speaker's intent, **Telephone Conversation** – Comprehending spoken exchanges over the phone.

UNIT - III	SPEAKING	(6)

Talking about Oneself – Sharing personal details clearly and confidently, **Oral-presentation on a General Topic** – Presenting ideas briefly with clarity and structure, **Group Discussion on Current Affairs** – Expressing and support opinions in group settings, **Role Play** – Performing situational conversations using appropriate language, **Mock & HR Interview** – Answering common interview questions with clarity and confidence.

UNIT - IV	READING	(6)

Reading Short Texts – Understanding the main message and key ideas, **Reading for General and Specific Information** – Locating relevant details in various texts, **Case Studies on Problem Solving** – Analyzing real-life scenarios to identify issues and solutions.

UNIT - V	WRITING	(6)

Written communication: Letters (Apology & Complaint) – Writing formal letters using appropriate tone and structure, **E-mails (Appreciation & Permission)** – Composing clear and courteous emails, **Technical Report** – Using standard format for preparing structured technical report, **Agenda / Minutes** – Preparing format for meeting agendas and recording minutes.

TOTAL (P:30) = 30 PERIODS

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List of Experiments:

1. Syllogism, Assertion & Reason and Verbal Analogies
2. Statement & Assumption, Statement & Conclusion and Critical Reasoning
3. Listening: Announcement and Short Conversation
4. Listening: Motivational Speech and Telephone Conversation
5. Speaking: Taking about oneself, Mock & HR Interview and Mini-presentation
6. Speaking: Group Discussion and Role Play
7. Reading: Multiple Choice & Fill in the Blanks
8. Reading: Analyzing Case Studies on Problem Solving
9. Writing: Complaint/Apology Letter and Appreciation/Permission Email
10. Writing: Format of Technical Report and Format of Agenda/Minutes

COURSE OUTCOMES:

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

COs	Description	Ex. No.	Cognitive Level
CO1	Comprehend assumptions and draw conclusions from verbal reasoning tasks.	1 & 2	Understand
CO2	Understand spoken texts to identify key points and the speaker's intent.	3 & 4	Understand
CO3	Use appropriate language and tone in personal, group, and interview conversations.	5 & 6	Understand
CO4	Recognize main ideas and supporting points in short texts and case studies.	7 & 8	Understand
CO5	Draft formal letters, emails, reports, and meeting notes in the correct format.	9 & 10	Understand

TEXT BOOKS:

1. Bhatnagar Nitin, Communicative English for Engineers and Professionals, Pearson India, 2010.
2. Kulbhusan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2018.

REFERENCES:

1. Jack C Richards, Interchange, Cambridge University Press, 2022.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S Chand, 2024.

Mapping of COs with POs and PSOs

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

1-Low, 2-Medium, 3-High

2

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Lab Requirement for a batch of 30 Students

Sl. No.	Description of Equipment / Software	Quantity required
1.	Server	1
	Intel core i3 - 2120	
	4 GB RAM / 240 GB SSD	
	OS: Windows 2011	
	Headphones with mike	
2.	Client Systems	30
	Intel core i3 - 2120	
	4 GB RAM / 240 GB SSD	
	OS: Windows 2011	
	Headphones with mike	
3.	Software	1
	a) Interactive Teacher control software	
	b) English Language Lab Software	
	c) Career Lab Software	

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3

24CSP29	PYTHON PROGRAMMING LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to All Branches)

PREREQUISITE:

Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.

OBJECTIVE:

To develop programming skills in Python by performing string operations using functions for mathematical problem-solving, applying conditionals and loops, exploring sets and dictionaries for data handling and gaining foundational knowledge in polymorphism, exception handling, GUI design and web development.

LIST OF EXERCISE/EXPERIMENTS:

1. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters).
2. Implementing programs using Functions (GCD of two numbers, Factorial).
3. Scientific problems using conditional statements and loops. (Largest among three numbers, Number series, Number Patterns).
4. Implementing real-time applications using Sets, Dictionaries (Sorting, Searching, Remove Duplicates).
5. Implementing real-time/technical applications using Lists, Tuples. (Swapping two elements, Reversing a List / Sorting Tuples).
6. Create a Python program to demonstrate polymorphism with inheritance. (Single, Multilevel Inheritance, Hierarchical).
7. Implement a simple calendar in python program without using the calendar module using string array or list.
8. Write a program to demonstrate the user-defined exception handling mechanism in Python.
9. Design and implement a graphical user interface to perform any arithmetic operation.
10. Implementing a web application with MySQL database integration for CRUD operations (Flask / Django Framework).

L = 0, T = 0, P = 30, TOTAL: 30 PERIODS

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COURSE OUTCOMES:

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

COs	Course Outcome	Exp.	Cognitive Level
CO1	Apply string operations and functions to solve problems like reversing text, palindrome check, GCD, and factorial.	1,2	Apply
CO2	Solve problems and manage data efficiently using conditionals, loops, sets, and dictionaries.	3,4	Apply
CO3	Develop applications using lists, tuples, and demonstrate polymorphism through inheritance in Python.	5,6	Apply
CO4	Build programs in Python that effectively use arrays or lists along with custom exception handling.	7,8	Apply
CO5	Implement GUI applications and web-based systems with MySQL integration to perform CRUD operations.	9,10	Apply

REFERENCES:

1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, Fifth Edition, 2023.
2. Wesley J.Chun, "Core Python Programming", Pearson Education, Second Edition, 2017.

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

LIST OF EQUIPMENTS (For a Batch of 30 Students)

Sl.No	Name of the Equipment's	Qty.
1.	A computer with a modern processor, RAM and Windows or Linux.	30 Nos.
2.	Programming Tools: Python 2.7.11 / 3.x with IDLE	30 Nos.
3.	IDEs: Eclipse (PyDev), VS Code, Jupyter Notebook	30 Nos.

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24ECP21	CIRCUIT THEORY LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	30	0	1

PREREQUISITE: NIL

OBJECTIVE:

To validate essential electrical laws and theorems through practical experiments and to analyze the behavior of electrical circuits under transient and steady-state conditions, including the measurement of key parameters like inductance, resonance, power, and power factor.

List of Experiments

1. Verification of following Laws and Theorems
   - Ohm's laws and Kirchhoff's laws
   - Mesh and nodal analysis
   - Superposition theorem
   - Thevenin's and Norton's theorems
   - Maximum power transfer theorem
   - Reciprocity theorem
2. Transient response of RL and RC circuits for DC and AC inputs
3. Frequency response of series and parallel resonance circuits
4. Measurement of self-inductance of a coil
5. Measurement of voltage, current power and power factor in single phase AC circuits
6. Study of frequency response of single tuned coupled circuits.

TOTAL (P:30): 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Exp. No	Cognitive Level
CO1	Apply KCL and KVL to solve electric circuits and verify the results with Theoretical values.	1	Apply
CO2	Calculate voltage, current and power in DC circuits using network theorems and verify the results with theoretical values.	1	Apply
CO3	Analyze the transient behavior of RL and RC circuits and determine the frequency response of resonance circuits.	2,3	Analyze
CO4	Measure the self - inductance of the coil.	4	Apply
CO5	Inspect single-phase AC circuits to measure voltage, current, power and power factor, and frequency response of single tuned circuits.	5,6	Analyze

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REFERENCES:

1. Mahmood Nahri, Joseph A.Edminister, Electric Circuits, Schaum's Series, Tata McGraw-Hill, New Delhi, Seventh Edition 2017.
2. Charles K. Alexander & Mathew N.O.Sadiku, Fundamentals of Electric Networks, McGraw- Hill New Delhi, Seventh Edition, 2013.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

LIST OF EQUIPMENT (For a batch of 30 students)

S.NO	Components / Equipment	Quantity
1.	RPS	10
2.	Bread Board	10
3.	DC Voltmeter (0 - 30) V	30
4.	DC Ammeter (0-100) mA	30
5.	Function Generator	10
6.	CRO	10
7.	AC Voltmeter (0-2) V	10
8.	AC Ammeter (0-100) mA	20
9.	Decade Resistance box	10
10.	Decade inductance box	20
11.	Decade capacitance box	10
12.	Multimeter	10
13.	Resistors (1 KΩ, 470Ω, 220Ω, 330Ω, 1.5KΩ, 100Ω,10 KΩ)	Each 20 Numbers
14.	Capacitors – 1000 uF	10
15.	AC Voltmeter (0-300)V	1
16.	AC Ammeter (0-10)A	1
17.	Wattmeter	1
18.	Auto Transformer	1
19.	Resistive Load	1

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24SSP29	APTITUDE AND CODING SKILLS –II	Category	L	T	P	SL	C
		EEC	0	0	30	0	1

(Common to All Branches)

OBJECTIVES:

This course aims to expose students to various concepts of aptitude problem solving, enabling them to tackle problems effectively and enhance their analytical skills in alignment with company-specific requirements. It also focuses on developing proficiency in verbal reasoning to strengthen critical thinking abilities.

UNIT - I	NUMBERS AND SHARE BASED CONCEPTS	(6)

Problems on Numbers – Unit Digits – Squares and Cubes – Remainder Theorem – Averages - Ratio Proportions and Partnership – Percentage – Profit and Loss.

UNIT - II	BASICS OF WORK BASED CONCEPTS	(6)

Introduction to time and work –Introduction to Time, Speed and Distance, Problems on Trains.

UNIT - III	LOGICAL REASONING	(4)

Blood Relations – Ranking and Ordering – Inequalities – Cause and Effect.

UNIT - IV	VERBAL ABILITY	(7)

Yes or No and "WH" Questions – Conjunctions – Count / Uncounted Nouns – Direct and Indirect Speech – Active and Passive Voice.

UNIT - V	PYTHON PROGRAMMING FUNDAMENTALS	(7)

Introduction-Features-Environment setup; Basic syntax: variable-data types-operators-control statements-if-if-else- loop-break-continue, etc. List- operations on list; String operations- access; Tuple: operations on tuple; Dictionaries: Accessing dictionaries, working with dictionaries; Functions-Exception Handling-Input & Output-Modules-OOPs concepts-Numerical Programming.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Interpret fundamental concepts to analyse and approach basic quantitative problems effectively.	Understand
CO2	Apply the concepts of time and work, time, speed and distance, to solve real-time quantitative aptitude problems effectively.	Apply
CO3	Apply logical reasoning techniques to solve problems related to ranking and ordering, decision-making and analytical skills.	Apply
CO4	Apply grammatical concepts to construct grammatically correct and contextually appropriate sentences.	Apply
CO5	Apply fundamental Python programming concepts to develop and implement basic computational solutions.	Apply

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TEXT BOOKS:

1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning.
3. Wren & Martin, High School English Grammar & Composition
4. Allen B. Downey, Think Python: How to Think like a Computer Scientist, 2nd Edition, O'Reilly Publishers, 2016
5. Karl Beecher, Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1st Edition, 2021.
2. Martin C. Brown, Python: The Complete Reference, 4th Edition, Mc-Graw Hill, 2018.
3. https://www.python.org/

Mapping of COs with POs and PSOs

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

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24MAT31	RANDOM PROCESSES AND NUMERICAL ANALYSIS	Category	L	T	P	SL	C
		BSC	45	15	0	60	4

SEMESTER III – B.E (ECE)

PREREQUISITE:

Basic knowledge of probability theory, signals and systems, calculus, and differential equations is required to effectively understand and apply the concepts in this course.

OBJECTIVES:

To gain knowledge of random processes and their properties, analyze system responses to random inputs, apply numerical techniques for mathematical problems, and solve partial differential equations using finite difference methods.

UNIT - I	CLASSIFICATION OF RANDOM PROCESSES	(12)

Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes.

UNIT - II	CORRELATION AND SPECTRAL DENSITIES	(12)

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function.

UNIT - III	LINEAR SYSTEMS WITH RANDOM INPUTS	(12)

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

UNIT - IV	NUMERICAL DIFFERENTIATION AND INTEGRATION	(12)

Numerical differentiation using Newton's forward and backward interpolation methods - Numerical integration by trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – double integrals.

UNIT - V	BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS	(12)

Finite difference solution of one dimensional heat equation by Crank Nicholson and Bender Schmidt method - One dimensional wave equation and two dimensional Laplace and Poisson equations.

L = 45,T = 15, SL = 60, TOTAL = 120 PERIODS

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COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Apply concepts of stationary and ergodic to analyze stochastic behavior of Markov, Binomial, Poisson and Normal processes.	Apply
CO2	Apply concepts of auto-correlation and cross-correlation to analyze power and cross spectral densities using the Wiener-Khintchine theorem.	Apply
CO3	Apply concepts of LTI systems and transfer functions to evaluate system response to random inputs using autocorrelation and cross-correlation.	Apply
CO4	Apply numerical methods for differentiation and integration to solve practical problems involving interpolation and multiple integrals.	Apply
CO5	Solve boundary value problems in differential equations using finite difference methods for heat, wave, Laplace, and Poisson equations.	Apply

TEXT BOOKS:

1. P. Z. Peebles, "Probability, Random Variables and Random Signal Principles", McGraw Hill Education, 4th Edition, 2002.
2. B. S. Grewal, "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, 2020.

REFERENCES:

1. A. Singaravelu and S. Sivasubramanian, "Probability and Random Process", MA Publications, 2021
2. M. K. Jain, S. R. K. Iyengar, and R. K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International, 7th Edition, 2019.
3. Dr.P.Kandasamy, Dr.Thilagavathy and Dr.K.Gunavathy, Numerical Methods , S.Chand& company Ltd, Third edition, New Delhi, 2003
4. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24ECT31	ELECTRON DEVICES	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE:
Students should be familiar in Electric Circuits

OBJECTIVE:

To build a strong foundation in analog electronics by gaining in-depth knowledge of the principles, operation and characteristics of various electronic devices.

UNIT - I	SEMICONDUCTOR DIODES	(9)

Types of semiconductor: Intrinsic, extrinsic semiconductor, P-type and N- type semiconductors, Fermi energy level, variation of fermi level with temperature, electrical conductivity – Drift & diffusion current – PN Junction: forward bias, reverse bias – Diode current equation – Capacitance.

UNIT - II	TRANSISTORS	(9)

NPN Operations – Configurations – Biasing methods – Bias compensation techniques – Hybrid parameter for CE amplifier – Miller's theorem – Darlington amplifier and bootstrapping emitter follower – Hybrid π equivalent model – Low and high frequency response of CE amplifier.

UNIT - III	FIELD EFFECT TRANSISTOR	(9)

JFET types and operation of N-Channel and P-channel – MOSFET types and operation – CMOS operation, Inverter voltage transfer curve and threshold voltage – Insulated Gate Bipolar Transistor.

UNIT - IV	RECTIFIERS AND POWER SUPPLIES	(9)

Analysis of half wave, full wave and bridge rectifiers with resistive load – Analysis of ripple voltage with C and L filters – Voltage regulators: Zener diode regulator, transistor series and shunt regulator – SMPS.

UNIT - V	SPECIAL SEMICONDUCTOR DEVICES	(9)

Zener diode, Tunnel diode, PIN diode, Varactor diode, LED, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells. SCR, DIAC, TRIAC and UJT.

TOTAL (T:45, SL:45) = 90 PERIODS

COURSE OUTCOMES:
At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Explain the working principles of intrinsic, extrinsic semiconductors and describe the operation of a PN junction Diode.	Understand
CO2	Apply transistor biasing techniques and hybrid parameter models to analyze and design transistor amplifier circuits.	Apply
CO3	Describe the construction, types and working principles of Field effect type transistors and interpret their static and transfer characteristics.	Understand
CO4	Design of rectifiers with filters and regulated power supply circuits.	Apply
CO5	Illustrate the relationship between voltage and current for special semiconductor devices.	Understand

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TEXT BOOKS:

1. Sedra / Smith, "Micro Electronic Circuits" Oxford University Press, Seventh edition, United Kingdom, 2017
2. Anil K Maini, Varsha Agarwal, "Electronic Devices & Circuits", John Wiley United States, Reprint 2012.

REFERENCES:

1. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", Eleventh edition, PHI, Delhi 2015
2. David A. Bell, "Solid State Pulse Circuits", Fourth edition PHI, Delhi 2012
3. Donald .A. Neamen, "Electronic Circuit Analysis and Design", Second edition, Tata McGraw Hill,Delhi 2009
4. Millman.J. and Halkias C.C, "Integrated Electronics", Tata McGraw Hill, Forty eight Reprint Delhi 2008.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24ECT32	ELECTROMAGNETIC WAVES	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE:
Students should be familiar with vector calculus and coordinate systems.

OBJECTIVE:
To introduce the fundamental principles of electrostatics, magnetostatics and electromagnetic fields using vector calculus, enabling students to understand and apply static and time-varying fields behavior. The course also aims to develop an understanding of wave propagation in various guided media using Maxwell's equations.

UNIT - I	STATIC ELECTRIC FIELD	(9)

Introduction to vector calculus – Gradient, divergence and curl – Stokes and Divergence theorem – Coulomb's law – Electric field intensity – Electric field intensity due to line and surface charges – Electric potential – Relationship between potential and electric field – Potential due to infinite uniformly charged line – Electric dipole – Electric flux density – Gauss's law and its applications.

UNIT - II	STATIC MAGNETIC FIELD	(9)

The Biot-Savart's law – Magnetic field intensity due to a finite and infinite wire, the axis of a circular loop – Ampere's circuital law and its applications – Magnetic flux density – The Lorentz force equation for a moving charge – Force on a current carrying wire placed in a magnetic field – Torque on a loop carrying a current .

UNIT - III	ELECTRIC AND MAGNETIC FIELDS IN MATERIALS	(9)

Poisson's and Laplace's equation – Boundary conditions for electric fields – Definition of capacitance – Capacitance of parallel plate capacitor – Electrostatic energy and energy density – Electric current – Current density – Point form of Ohm's law – Continuity equation for current – Definition of inductance, Inductance of Solenoid and Toroid – Energy density in magnetic fields – Magnetic boundary conditions.

UNIT - IV	TIME VARYING FIELDS AND EM WAVES	(9)

Maxwell's first equation from Ampere's circuital law – Equation expressed in point form – Faraday's law – Maxwell's second equation from Faraday's law – Equation expressed in point form – Maxwell's equations in integral form and differential form – Poynting vector and Poynting theorem – Wave equation – Wave equation in phasor form – Plane waves in free space.

UNIT - V	GUIDED WAVES	(9)

Waves between parallel planes of perfect conductors – Field components of TM, TE and TEM waves between parallel planes and its characteristics – Waves in rectangular waveguide, TM and TE waves and its characteristics in rectangular wave guide.

TOTAL(T : 45, SL : 45) : 90 PERIODS

COURSE OUTCOMES:
At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Apply vector calculus and Coulomb's law to calculate electric field intensity and potential for various charge distributions.	Apply
CO2	Determine magnetic field intensity using Biot–Savart's and Ampere's laws and to calculate force on current-carrying conductors in static magnetic fields.	Apply
CO3	Apply boundary conditions and field equations to calculate the boundary value problems, capacitance, inductance and energy storage in electric and magnetic fields.	Apply

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CO4	Derive Maxwell's equations, Poynting theorem and wave equations and explain their importance of propagation in time-varying EM fields.	Understand
CO5	Apply Maxwell's equations to analyze TE, TM and TEM wave behavior in parallel planes and rectangular waveguides.	Apply

TEXT BOOKS:

1 W H.Hayt & J A Buck, "Engineering Electromagnetics", TATA McGraw-Hill, Ninth edition, 2020.

2 Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, Seventh edition, 2021.

REFERENCES:

1 G S N Raju, "Electromagnetic Field Theory and Transmission Lines", Pearson Education, First edition, 2013.

2 E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Prentice Hall, Second edition, 2000.

3 Narayana Rao.N. "Elements of Engineering Electromagnetics", Pearson Education, Sixth edition, 2021.

4 David K.Cheng, "Field and Wave Electromagnetics", Pearson Edition, Second edition, 2013.

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

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24ECT33	MICROPROCESSORS AND MICROCONTROLLERS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE:

Fundamental knowledge in number systems and digital electronics.

OBJECTIVE:

To provide a comprehensive understanding of microprocessor (8085/8086) and microcontroller (8051) architectures, instruction sets and interfacing techniques.

UNIT - I	MICROPROCESSOR ARCHITECTURE AND PROGRAMMING	(9)

Introduction to 8085 Microprocessor- 8086 Microprocessor: Hardware architecture – Signals - Addressing modes - Maximum and minimum mode configurations - Assembler directives - Instruction set - Timing diagram – Interrupts - Assembly language programming.

UNIT - II	8051 MICROCONTROLLER ARCHITECTURE	(9)

8051 Microcontroller: Hardware architecture - Special function register - I/O ports and circuits - Memory organization - External memory-Interfacing 8051 with external memory- Timers and counters- Serial data input/output - Interrupts operation - Addressing modes - Instruction set.

UNIT - III	8051 MICROCONTROLLER PROGRAMMING	(9)

Assembly Language Programming: Timer/Counter Programming - Programming 8051 Timers - Counter Programming - Serial Communication: Basics of serial Communication - 8051interfacing to RS232-Serial Communication Programming - Interrupts Programming: Programming Timer interrupts - Programming External Hardware Interrupts - Programming Serial Communication Interrupt.

UNIT - IV	MICROPROCESSOR PERIPHERAL INTERFACING	(9)

8086 Interfacing: Need of Interfacing - Memory Interfacing - Programmable Peripheral Interface (8255) - Serial Communication Interface (8251) - Keyboard and Display Controller (8279) - DMA Controller (8257) - Programmable Interrupt Controller (8259) - Programmable interval Timer (8253, 8254).

UNIT - V	MICROCONTROLLER PERIPHERAL INTERFACING	(9)

8051 Interfacing: DC motor - Stepper motor - Sensors - Keyboard - Seven segment display- ADC- DAC - LCD. Case study Traffic light control.

TOTAL (T:45, SL:45) : 90 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Explain the architecture of 8086 microprocessor and solve the assembly language programming using 8086 microprocessor.	Apply
CO2	Describe the architecture and instruction set of 8051 microcontroller to perform the ALP using 8051 microcontroller.	Understand
CO3	Write an assembly language programme for timer, counter and serial communication for 8051 microcontroller.	Apply
CO4	Explain the need for interfacing and describe the operation of various peripheral devices with the 8086 microprocessor.	Understand

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CO5	Apply the concepts of peripheral interfacing to connect devices with the 8051 microcontroller.	Apply

TEXT BOOKS:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", Fifth Edition, Prentice Hall, 2002.
2. Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware" TMH, Third Edition, 2012.

REFERENCES:

1. Krishna Kant, "Microprocessors and microcontrollers architecture, programming and system design using 8085, 8086, 8051 and 8096", PHI, Second Edition, 2014.
2. Kenneth Ayala, "The 8051 Microcontroller", Thomson Delmar Learning, Third Edition, 2007.
3. Kenneth J. Ayala, "The 8086 Microprocessor: programming & interfacing the PC", Delmar Publishers, First Edition, 2007.
4. A K Ray, K M Bhurchandi, "Advanced Microprocessors and Peripherals", TMH, Third Edition, 2012.

Mapping of COs with POs and PSOs

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

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24ECI31	DIGITAL ELECTRONICS	Category	L	T	P	SL	C
		PCC	45	0	30	45	4

PREREQUISITE:

Students should have basic knowledge on binary numbers, logic gates, algebra and discrete mathematics.

OBJECTIVE:

To equip the students with fundamental knowledge in Boolean logic, combinational and sequential circuit design, and implementation using gates, PLDs, and HDL. The course also aims to develop practical skills in designing, simulating, and constructing digital systems through hands-on experiments and HDL modeling.

UNIT - I	MINIMIZATION TECHNIQUES AND LOGIC GATES	(9)

Boolean Algebra: Boolean postulates and laws - De-Morgan's theorem - Principle of duality - **Boolean expression:** Sum of Products, Product of Sums - **Minimization of boolean expression:** Algebraic method, Karnaugh map method, Don't care conditions, Quine - McCluskey method.

Logic gates: AND, OR, NOT, NAND, NOR, Exclusive - OR and Exclusive-NOR - Implementation of logic functions using basic gates, NAND and NOR implementations – Characteristics of TTL and CMOS digital logic families.

UNIT - II	COMBINATIONAL CIRCUITS	(9)

Introduction - Design procedure - Half adder - Full adder - Half subtractor - Full subtractor - Parallel binary adder, Parallel binary subtractor - Fast adder: Carry look ahead adder - Serial adder/subtractor - BCD adder, Magnitude Comparator - Code converters - Parity generator - Parity checker - Decoders - Encoders - Multiplexers - Demultiplexers - **Hardware Description Language** : Introduction to VHDL- VHDL model for combinational circuits.

UNIT - III	MEMORY AND PROGRAMMABLE LOGIC DEVICES	(9)

Classification of memories – ROM,PROM, EPROM, EEPROM, EAPROM, RAM - Static RAM cell - Bipolar RAM cell - MOSFET RAM cell - Dynamic RAM cell

Programmable Logic Devices: Programmable Logic Array - Programmable Array Logic - Implementation of combinational logic circuits using ROM, PLA and PAL- Field Programmable Gate Arrays.

UNIT - IV	SYNCHRONOUS SEQUENTIAL LOGIC	(9)

Latches and Flip-flops: SR, JK, D, T and Master-Slave - Characteristic table and equation - Application Table – Edge triggering - Level Triggering - Realization of one flip flop using other flip-flops.

Synchronous Sequential Logic: General model, classification, analysis and design of synchronous sequential circuit.

Counters: Asynchronous and synchronous Up, Down and Up/Down counter - Design of counter - Shift registers - Types - Ring counter and Johnson counter.

UNIT - V	ASYNCHRONOUS SEQUENTIAL LOGIC	(9)

Introduction - classification - Analysis and design of fundamental mode and pulse mode asynchronous sequential circuits - Incompletely specified state machines - Problems in asynchronous sequential circuit.

Hazards: Types of hazard, design of hazard free switching circuits- VHDL model for sequential circuits.

List of Experiments:

1. Realize basic gates using universal gates
2. Construct simple arithmetic circuits- adder and subtractor
3. Construct binary to gray and gray to binary code converters using logic gates
4. Construct parity generator and parity checker circuits
5. Construct 2-bit magnitude comparator
6. Construct multiplexer, demultiplexer, encoder and decoder using logic gates

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7. Construct and verify the functionality of ripple counter and synchronous counter 8. Implement SISO, PIPO shift registers using flip-flops 9. Simulate combinational logic circuits using HDL 10.Simulate sequential logic circuits using HDL 11.Design a Digital System (Any Hardware/ Simulation circuit)
TOTAL(T:45, P:30, SL:45) : 120 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Exp. No	Cognitive Level
CO1	Apply Boolean algebra and minimization methods to simplify logic expressions and implement logic circuits using basic and universal gates.	1	Apply
CO2	Design combinational logic circuits such as adders, subtractors, multiplexers and code converters using a systematic procedure and implement using VHDL.	2,3,4,5,6, 9,11	Apply
CO3	Classify and compare different memory technologies and programmable logic devices; implement combinational logic functions using ROM, PLA, and PAL.	11	Apply
CO4	Analyze and design synchronous sequential circuits such as, counters and shift registers.	7,8,10,11	Analyze
CO5	Analyze and design asynchronous sequential circuits and simulate their behavior using Hardware Description Language (HDL).	10,11	Analyze

TEXT BOOKS:

1	M.Morris Mano, Digital Design with an Introduction to the Verilog HDL, VHDL and System Verilog Pearson Education, Sixth Edition, 2018.
2	John F. Wakerly, Digital Design Principles and Practices, Pearson Education, Fourth Edition, 2008.

REFERENCES:

1	Donald P.Leach, Albert Paul Malvino and Goutam Saha, Digital Principles and Applications, McGraw Hill Education, Eight Edition, 2015.
2	John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, Ninth Edition Reprint, 2012.
3	Donald D.Givone, Digital Principles and Design, Tata McGraw, Twenty first Reprint 2012.
4	Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH, Third Edition 2012.

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

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LIST OF EQUIPMENT (For a batch of 30 students)

Sl.No.	Name of the Equipment	Qty
1	Digital IC Tester	2
2	Digital IC Trainer Kit	15
3	Dual/Single Mode Power Supply	15
4	Digital Multimeter	5
5	Computer with HDL Simulation Software	5
6	IC7400	50
7	IC7404	50
8	IC7402	50
9	IC7408	50
10	IC7411	50
11	IC7432	50
12	IC7483	50
13	IC7485	50
14	IC7486	50
15	IC7474	50
16	IC7476	50
17	IC7447	50
18	Bread Board	20
19	Wires	Sufficient Quantity

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24ECP31	ELECTRON DEVICES LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5

PREREQUISITE:

Students should be familiar in Electric Circuits

OBJECTIVE:

To provide a solid understanding of BJT and FET amplifiers using appropriate design techniques, and to develop hands-on simulation skills using PSPICE tools for analyzing device characteristics and validating theoretical concepts.

List of Experiments:

1. Characteristics of PN and Zener diodes
2. Characteristics of CE, CB and CC configurations
3. Characteristics of JFET
4. Characteristics of UJT & SCR
5. Design and construct CE amplifier using voltage divider bias with and without bypass emitter capacitance
6. Design and construct CC amplifier using voltage divider bias
7. Design and construct CS amplifier
8. Power supply circuit – Half, Full wave rectifier with simple capacitor filter and shunt regulator
9. Simulate the characteristics of PN junction and Zener Diode using SPICE tool
10. Simulate the characteristics of CE amplifier using SPICE tool

TOTAL (P:45) : 45 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Exp. No	Cognitive Level
CO1	Measure the voltage and current characteristics of PN junction and Zenor diode.	1	Apply
CO2	Analyse the behaviour of BJT and FET amplifier configurations (CE, CB, CC, CS).	2,3,4	Analyse
CO3	Design and construct amplifier circuits using appropriate biasing techniques with bypass capacitor.	5,6,7	Apply
CO4	Demonstrate the working of power supply circuits such as half-wave and full-wave rectifiers with capacitor filters and voltage regulators.	8	Apply
CO5	Simulate the characteristics of diode and transistor using PSPICE tool.	9, 10	Apply

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Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	1	3	-	-	2	2	3
CO2	3	3	3	2	-	-	1	3	-	-	2	2	3
CO3	3	3	2	-	-	-	1	3	-	-	2	2	3
CO4	3	3	2	-	-	-	1	3	-	-	2	2	3
CO5	3	3	2	-	3	-	1	3	-	-	2	2	3
1-low, 2-medium, 3-high													

LIST OF EQUIPMENT (For a batch of 30 students)

S.NO	Components / Equipment	Quantity
1.	Dual RPS	10
2.	Bread Board	10
3.	Diode (PN & Zenor)	10 Each
4.	Transistor (BC 107 & BFW10)	20 Each
5.	UJT	10
6.	SCR	10
7.	Transformer	10
8.	DC Voltmeter (0 - 30) V	20
9.	DC Ammeter (0-100) mA	20
10.	Function Generator	10
11.	CRO	10
12.	Decade Resistance box	10
13.	Multimeter	10
14.	Resistors (2.2 KΩ, 10 KΩ, 1 KΩ, 470Ω, 8.2 KΩ, 100Ω, 10 KΩ. 5.6 KΩ, 82 KΩ, 780Ω, 2MΩ, 250KΩ)	Each 20 Numbers
15.	Capacitors – (10 uF, 47 uF, 470uF, 1000uF)	10
16.	Multisim Software	10
17.	Computer	10

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24ECP32	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5

PREREQUISITE:

Students should have a basic understanding of digital electronics and number systems.

OBJECTIVE:

To develop hands-on skills in programming and interfacing 8086 microprocessors and 8051 microcontrollers using assembly language and Keil software, and to apply them in real-time embedded system applications.

1.8086 Microprocessor Programming:

i) Arithmetic Operations
ii) Sorting and Searching
iii) String Manipulation.

2.8051 Microcontroller Programming:

i) Arithmetic Operations

3.Peripheral Interfacing:

i) Programmable peripheral interface (8255) using 8086
ii) Programmable interval timer (8253) using 8086.
iii) ADC and DAC using 8086.
iv) iv)Traffic light controller using 8086
v) Keyboard and Display Controller (8279) using 8051
vi) Stepper motor control using 8051.

4. 8051 programming using KEIL and Proteus Software.

TOTAL (P:45) : 45 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Exp. No	Cognitive Level
CO1	Write and execute an assembly language programs using the 8086 microprocessor to solve computational problems.	1	Apply
CO2	Write and execute an assembly language programs using the 8051 microcontroller to solve computational problems.	2	Apply
CO3	Interface external peripherals with the 8086 microprocessor and perform their functional operation.	3	Apply
CO4	Interface external peripherals with the 8051 microcontroller and perform their functional operation.	3	Apply
CO5	Design and test 8051 microcontroller programs through simulation in KEIL µVision.	4	Apply

REFERENCES:

1. Krishna Kant, "Microprocessors and microcontrollers architecture, programming and system design using 8085, 8086, 8051 and 8096", PHI, Second Edition, 2014.
2. Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware" TMH, Third Edition, 2012.
3. Kenneth J. Ayala, "The 8086 Microprocessor: programming & interfacing the PC", Delmar Publishers, First Edition, 2007.
4. Kenneth J. Ayala, "The 8051 Microcontroller", Thomson Delmar Learning, Third Edition, 2007.

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

LIST OF EQUIPMENT (For a batch of 30 students)

S.NO	Components / Equipment	Quantity
1.	8086 Trainer Kit	15
2.	8051 Trainer Kit	15
3.	8255 Interfacing Card	6
4.	8279 Interfacing Card	6
5.	8253 Interfacing Card	6
6.	ADC Interfacing Card	6
7.	DAC Interfacing Card	6
8.	Stepper motor Interfacing Card	6
9.	Traffic light Interface	6
10.	KEIL Software (Open source)	-
11.	Personal Computer	15

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24ECP36	DESIGN STUDIO – I	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to BME, CSE (IoT), ECE, EEE)

PREREQUISITE:

Basic understanding of design thinking principles, including empathy, problem identification, and user-cantered design, is essential for engaging in the Design Studio.

OBJECTIVE:

To apply design thinking and system design principles to develop, prototype, and present user-cantered electronic solutions through hands-on projects.

Identification of components

Ex: 1 Resistor colour coding, Capacitors etc

Ex: 2: Soldering Practice

Realizing the functionality of components

Ex: 3: Connecting LED with fixed resister, variable resistors

Ex: 4: LED Go- No Go using Diode

Ex: 5: Multiple LED Circuit

Ex: 6: Switch on LED using Transistor

Ex: 7: Electronic LED Lantern

Ex: 8: Light Detector

Ex: 9: IC555 LED Flasher / Beeper

Ex: 10: LED Blinking

Ex: 11: Autodesk Fusion - Simulation

Prototyping

Ex: 11: Mini project

(Choose the problem and apply Design Thinking Concepts - empathy, Define, Ideation, Prototype to solve the problem)

TOTAL(P:30) : 30 PERIODS

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COURSE OUTCOMES:
At the end of the course, the students will be able :

COs	Course Outcome	Cognitive Level
CO1	To identify and interpret the characteristics of basic electronic components such as resistors, capacitors, diodes, LEDs, transistors, and LDRs through visual inspection and standard coding schemes.	Analyze
CO2	To experience hands-on training in soldering techniques and assembling electronic circuits using discrete components on breadboards and PCBs.	Apply
CO3	To understand the working principles of passive and active components by constructing basic circuits and observing their electrical behavior under different conditions.	Apply
CO4	To design and implement functional circuits including switching, blinking, and multiple output systems using fundamental electronics	Create
CO5	To document and effectively communicate the design process, implementation, and outcomes of a project through formal reporting and presentations.	Evaluate

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

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24SDP39	SOFT SKILLS DEVELOPMENT – III	Category	L	T	P	SL	C
		EEC	0	0	30	0	1

(Common to All Branches)

OBJECTIVES:

To the concept of aptitude and its relevance in various fields. It highlights the need for aptitude skills and emphasizes their importance in academic and career development. It also focuses on building a strong foundation in English grammar to improve communication skills.

UNIT - I	TIME SPEED AND DISTANCE	(6)

Relationship Between Time Speed and Distance Time Conversion – Relative Speed – Chasing – Problems on Late, Early and Usual Time

UNIT - II	PROBLEMS ON TRAINS	(6)

Crossing a Static objects – Crossing a Moving Object: Same and Opposite Direction – Time Difference based Problems.

UNIT - III	BOATS AND STREAM	(6)

Introduction to Boat in Still Water and Current – Down Stream Speed – Upstream Speed – Speed in Still Water – Rate of Stream.

UNIT - IV	LOGICAL REASONING	(6)

Seating Arrangements: Circular and Linear Arrangements – Inequalities – Assertion & reasoning.

UNIT - V	VERBAL ABILITY	(6)

Parts of Speech – Sentence Completion – Idioms and Phrases – Reading Comprehension.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Apply time, speed, and distance concepts to solve problems involving relative speed, time conversion, and punctuality scenarios.	Apply
CO2	Solve problems on trains with object crossing and time differences using concepts of relative speed and direction.	Apply
CO3	Solve problems involving boats and streams using concepts of upstream, downstream, and current speed.	Apply
CO4	Apply logical reasoning to solve problems on seating arrangements, inequalities, and assertion-reasoning statements.	Apply
CO5	Demonstrate understanding of grammar, vocabulary, and comprehension to complete sentences and interpret texts effectively.	Understand

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TEXT BOOKS:

1. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations".
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations".
3. Nishit K. Sinha, "Logical Reasoning and Data Interpretation for CAT".
4. R.S. Agarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning".
5. Wren & Martin, "High School English Grammar & Composition".

REFERENCES:

1. Arun Sharma, Quantitative Aptitude for CAT, 11e, 2025.
2. Arun Sharma, Logical Reasoning for CAT, 7e, 2025.
3. English for Competitive Examinations – by Edgar Thorpe & Showick Thorpe.
4. https://prepinsta.com/.
5. https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm.
6. https://www.youtube.com/@FeelFreetoLearn/playlists.

Mapping of COs with POs and PSOs

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

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24ECT41	ELECTRONIC CIRCUITS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE: A comprehensive understanding of 24ECT31.

OBJECTIVES:

To provide an understanding of power amplifiers, feedback mechanisms, and tuned amplifier circuits. It also covers the design and operation of oscillators, wave-shaping circuits, and multivibrators, enabling students to analyze and implement suitable configurations for different frequency applications.

UNIT - I	LARGE SIGNAL AMPLIFIERS	(9)

Classification of amplifiers – RC coupled Class A amplifier – Transformer coupled class A amplifier, efficiency – Second and higher order harmonic distortions – Class B amplifier, push-pull amplifier and efficiency, complementary symmetry and efficiency – Distortion in amplifiers – Class C, Class D and Class E amplifiers – Thermal stability and heat sink.

UNIT - II	FEEDBACK AMPLIFIERS	(9)

Introduction – Classification – Block diagram – Loop gain – Gain with feedback – Effects of negative feedback: Sensitivity, desensitivity of gain, Cut-off frequencies, Distortion, Noise, Input impedance and output impedance with feedback –Negative feedback topologies – Method of identifying feedback topology and feedback factor.

UNIT - III	TUNED AMPLIFIERS	(9)

Coil losses – Loaded and unloaded Q of tank circuit – Small signal tuned amplifier – Analysis of capacitor coupled single tuned and double tuned amplifiers – Effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifier – Large signal tuned amplifier: Class C tuned amplifier, efficiency and applications – Stability of tuned amplifier: Neutralization, Hazeltine neutralization method.

UNIT - IV	OSCILLATORS	(9)

Barkhausen criterion – Mechanism for start of oscillation and stabilization of amplitude – Classification – General form of an LC oscillator – LC oscillators: Hartley, Colpitts and Clapp oscillators – RC oscillators: Phase shift and Wien bridge oscillators – Frequency range of RC and LC oscillators – Quartz crystal – Miller and Pierce crystal oscillators – Frequency stability of oscillators.

UNIT - V	WAVE SHAPPING CIRCUITS	(9)

Diode Clippers and Clampers – Astable, monostable and Bistable multivibrators – Triggering methods for bistable multivibrator – Schmitt trigger circuit – UJT saw tooth waveform generator– Time base circuits.

Total(L:45, SL:45) = 90 Periods

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Design power amplifiers considering efficiency, distortion and	Apply

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	thermal stability.	
CO2	Design the feedback amplifiers and describe how gain, bandwidth, stability and impedance characteristics are varied for negative feedback amplifiers.	Apply
CO3	Design single- and double-tuned amplifiers with their stability considerations.	Apply
CO4	Apply oscillator principles to design LC, RC and crystal oscillators for required frequency and stability conditions.	Apply
CO5	Apply wave shaping circuit concepts to generate, control pulse and timing waveforms using multivibrators, Schmitt triggers and time-base circuits.	Apply

TEXT BOOKS:

1	Sedra / Smith," Micro Electronic Circuits" Oxford University Press, Eighth edition 2019
2	Anil K Maini, Varsha Agarwal, "Electronic Devices & Circuits", John Wiley India, Reprint 2012

REFERENCES:

1	Robert L. Boylestad and Louis Nasheresky," Electronic Devices and Circuit Theory", Eleventh edition, PE / PHI, 2015.
2	David A. Bell, "Electronic Devices and Circuits", Fifth edition, Oxford University Press, 2008.
3	Millman.J. and Halkias C.C, "Integrated Electronics", McGraw Hill, Forty eighth Reprint 2017.
4	Schilling.D.L and Belove.C "Electronic Circuits", Third edition, McGraw Hill 2012.
5	NPTEL Course Link:http://nptel.ac.in/courses/117108107/32.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24ECT42	VERILOG HDL	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE: A solid foundation in 24ECI31.

OBJECTIVES:
To introduce Verilog HDL concepts, including design hierarchy, syntax, and simulation techniques. It focuses on gate-level, dataflow, and behavioral modeling, enabling students to develop and verify digital circuits using effective testbench design.

UNIT - I	INTRODUCTION TO VERILOG HDL	(9)

Verilog as HDL, Levels of design description, Concurrency, Program structure, Top-down and Bottom up design methodology, Differences between modules and module instances, Parts of a simulation, Design block, stimulus block, Verilog data types and Operators, System tasks, Compiler directives.

UNIT - II	GATE LEVEL MODELING	(9)

Modeling using basic Verilog gate primitives, Description of and/or and buf/not type gates, Rise, Fall and turn-off delays, Min, Max, and typical delays, Design of decoders, Multiplexers, Flip-flops, Registers & Counters in Gate-level Modeling.

UNIT - III	DATA FLOW MODELING	(9)

Continuous assignments, Delay specification, expressions, Operators, Design of decoders, Multiplexers, Flip-flops, Registers & Counters in dataflow model.

UNIT - IV	BEHAVIORAL MODELING	(9)

Procedural assignments, Initial and always blocks, Blocking and non-blocking statements, Delay control, Conditional statements, Multi-way branching, Loops, Sequential and parallel blocks, Design of decoders, Multiplexers, Flip-flops, Registers & Counters in behavioral model.

UNIT - V	COMPONENTS TEST AND VERIFICATION	(9)

Test Bench - Combinational circuits testing, Sequential circuits testing, Test bench techniques, Design verification, Assertion verification.

Total(L:45, SL:45) = 90 Periods

COURSE OUTCOMES:
At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Describe the structure, syntax, and simulation flow of Verilog HDL including module instantiation, compiler directives and system tasks.	Understand
CO2	Design and implement digital circuits such as decoders, multiplexers, flip-flops, and counters using gate-level modeling with delays.	Apply
CO3	Apply dataflow modeling to represent digital circuits using continuous assignments, expressions and delay specifications.	Apply
CO4	Develop behavioural models of digital systems using procedural constructs, including blocking/non-blocking statements, loops, and	Apply

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	conditionals.	
CO5	Construct test benches and perform design verification for combinational and sequential circuits using assertion-based and procedural testing methods.	Apply

TEXT BOOKS:

1.	Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", Pearson Education, Second Edition, 2008.
2.	Michel D. Ciletti, "Advanced Digital Design with Verilog HDL", Second Edition, PHI, 2009.

REFERENCES:

1.	Padmanabhan, Tripura Sundari, "Design through Verilog HDL", Wiley-IEEE Press, New Edition, 2016.
2.	S.Brown, Zvonko – Vranesic, "Fundamentals of Digital Logic with Verilog Design, TMH, Third Edition, 2014.
3.	M.Morris Mano and Michale D.Ciletti, "Digital Design with An Introduction to the Verilog HDL, VHDL and System Verilog", Pearson, Sixth Edition, 2017.
4.	Robert B. Reese and Mitchell A. Thornton, "Introduction to Logic Synthesis using Verilog HDL", Springer, First Edition, 2006.
5.	NPTEL-Hardware Modeling Using Verilog. https://www.youtube.com/watch?v=NCrlyaXMAn8&list=PLRsFfXmDi9IYCNIvNjrsD8bLMmNE0UxBH

Mapping of COs with POs and PSOs

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

1-Low, 2-Medium, 3-High

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24ECT43	LINEAR INTEGRATED CIRCUITS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

PREREQUISITE: Fundamental Knowledge in 24ECT31.

OBJECTIVES:

To introduce the fundamental building blocks of linear integrated circuits and the principles of operational amplifiers in linear and non-linear applications. It also covers analog multipliers, phase-locked loops, ADCs, DACs, waveform generation, and special function ICs to build a strong foundation in analog circuit design.

UNIT - I	BASICS OF OPERATIONAL AMPLIFIERS	(9)

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations

UNIT - II	APPLICATIONS OF OPERATIONAL AMPLIFIERS	(9)

Sign changer – Scale changer – Phase shift circuits – Voltage follower – V-to-I and I-to-V converters – Adder – Subtractor – Instrumentation amplifier – Integrator – Differentiator – Logarithmic amplifier – Antilogarithmic amplifier – Comparators, schmitt trigger – Precision rectifier, peak detector, clipper and clamper – First order low-pass, high-pass filters – Phase shift and wein bridge oscillator – Astable and monostable multivibrator.

UNIT - III	ANALOG MULTIPLIER AND PLL	(9)

Analog multiplier using emitter coupled transistor pair – Gilbert multiplier cell – Variable transconductance technique – Analog multiplier IC and their applications – PLL: Closed loop analysis, voltage controlled oscillator, monolithic PLL IC 565 - Applications of PLL: AM/FM detection, FSK modulation/demodulation and frequency synthesizing..

UNIT - IV	ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS	(9)

Analog and digital data conversions - D/A converter: Specifications, Types: Weighted resistor type, R-2R ladder type, voltage and current mode R - 2R ladder types – Switches for D/A converters – A/D Converters: Specifications, Types: Flash, successive approximation, single slope, dual slope.

UNIT - V	WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS	(9)

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators –IC 723 general purpose regulator -Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto- couplers and fibre optic IC .

Total(L:45, SL:45) = 90 Periods

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Infer the DC and AC characteristics of operational amplifiers and its effect.	Understand
CO2	Design the linear and nonlinear applications of OP – AMPS	Apply
CO3	Design applications using analog multiplier and PLL	Apply

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CO4	Design ADC and DAC using OP – AMPS.	Apply
CO5	Generate waveforms using OP – AMP Circuits and Analyze special function ICs.	Apply

TEXT BOOKS:

1.Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", TMH, Fourth edition, 2017.

2 D. Roy Choudhry and Shail Jain, "Linear Integrated Circuits", New Age International Pvt.Ltd , Fifth edition,2018.

REFERENCES:

1 S. Salivahanan& V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, Third edition, 2018.

2 Ramakant A. Gayakwad, "OP- AMP and Linear ICs", Prentice Hall, Fourth edition, 2009.

3 Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley International, Fifth edition, 2009.

4 B.S. Sonde, "Introduction to System Design using Integrated Circuits", New Age Pub, Second edition, 2013.

5 NPTEL Course Link:http://nptel.ac.in/video.php?subjectId=108106068.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24GET09	UNIVERSAL HUMAN VALUES AND ETHICS	Category	L	T	P	SL	C
		HSMC	45	0	0	45	3

(Common to All Branches)

OBJECTIVES:

To understand the concept of Universal Human Values and discuss theoretical and practical implications of UHV. To relate the use of harmony in the family and society and classify the harmony in the nature methods. To construct effective human values in personal and professional in life.

UNIT - I	INTRODUCTION TO VALUE EDUCATION	(09)

Right Understanding, Relationship and Physical Facility, Holistic Development and the Role of Education - Understanding Value Education - Sharing about Oneself - Self-exploration as the Process for Value Education- Continuous Happiness and Prosperity – the Basic Human Aspirations - Exploring Human Consciousness - Happiness and Prosperity – Current Scenario - Method to Fulfil the Basic Human Aspirations - Exploring Natural Acceptance.

UNIT - II	HARMONY IN THE HUMAN BEING	(09)

Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body - Exploring the difference of Needs of Self and Body – The Body as an Instrument of the Self - Understanding Harmony in the Self - Exploring Sources of Imagination in the Self - Harmony of the Self with the Body - Programme to ensure self- regulation and Health - Exploring Harmony of Self with the Body.

UNIT - III	HARMONY IN THE FAMILY AND SOCIETY	(09)

Harmony in the Family – the Basic Unit of Human Interaction - 'Trust' – the Foundational Value in Relationship-Exploring the Feeling of Trust - 'Respect' – as the Right Evaluation -Exploring the Feeling of Respect - Other Feelings, Justice in Human-to-Human Relationship- Understanding Harmony in the Society - Vision for the Universal Human Order – Exploring Systems to fulfil Human Goal.

UNIT - IV	HARMONY IN THE NATURE/EXISTENCE	(09)

Understanding Harmony in the Nature – Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature - Exploring the Four Orders of Nature – Realizing Existence as Co-existence at All Levels - The Holistic Perception of Harmony in Existence -Exploring Co-existence in Existence.

UNIT - V	IMPLICATIONS OF THE HOLISTIC UNDERSTANDING- A LOOK AT PROFESSIONAL ETHICS	(09)

Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct – Exploring Ethical Human Conduct - A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order- Competence in Professional Ethics - Exploring Humanistic Models in Education- Holistic Technologies, Production Systems and Management Models -Typical Case Studies- Strategies for Transition towards Value-based Life and Profession - Exploring Steps of Transition towards Universal Human Order.

TOTAL (L:45, SL:45): 90PERIODS

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COURSE OUTCOMES:
At the end of the course, the leaners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Interpret the concepts of Universal Human Values.	Understand
CO2	Summarize both theoretical and practical implications of Universal Human Values.	Understand
CO3	Understand how the feeling of trust develops through honesty, care, and consistent behavior.	Understand
CO4	Explains how viewing existence as a whole helps us understand harmony among humans, nature, and systems.	Understand
CO5	Relate human values in both personal and professional life.	Understand

TEXT BOOKS:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2. A.N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004.

REFERENCES:

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010.
2. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.
3. Frankl, Viktor E. Yes to Life In spite of Everything, Penguin Random House, London, 2019.
4. Van Zomeren, M., & Dovidio, J. F. The Oxford Handbook of the Human Essence (Eds.), New York Oxford University Press, 2018.
5. https://fdp-si.aicte-india.org/UHVII.php
6. https://nptel.ac.in/courses/109104068

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	2	-	-	-	-	2	-	-
CO2	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	2	-	-
CO5	-	-	-	-	-	3	-	2	-	-	-	-	-

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24ECI41	SIGNALS AND SYSTEMS	Category	L	T	P	SL	C
		PCC	45	0	30	45	4

PREREQUISITE

No prerequisites are needed for enrolling into the course.

OBJECTIVES:

To provide a fundamental understanding of signal classification and the analysis of LTI continuous-time and discrete-time systems. It covers time-domain and transform-domain techniques including Fourier series, Fourier transform, Laplace transform, DTFT, and Z-transform along with their properties for effective signal analysis.

UNIT - I	CLASSIFICATION OF SIGNALS AND SYSTEMS	(9)

Signal representation – Basic operations on signals – Continuous time and Discrete time signals: Step, ramp, impulse, exponential - Classification of CT and DT Signals - Energy and Power signals, Periodic signals, Even and Odd signals, Random signal – Classification of DT systems.

UNIT - II	CONTINUOUS TIME SYSTEMS	(9)

Classification of continuous time systems – Convolution integral – Laplace transform and properties, Representation of continuous time Linear time invariant (LTI) systems using differential equations – Analysis of LTI systems using Laplace transform.

UNIT - III	FOURIER SERIES ANALYSIS	(9)

Fourier series representation of continuous time periodic signals: Trigonometric Fourier series, Exponential Fourier series – Convergence of Fourier series – Gibbs Phenomenon – Properties of continuous time Fourier series.

UNIT - IV	CONTINUOUS TIME FOURIER TRANSFORM	(9)

Continuous Time Fourier transform – Existence of Fourier transform – Fourier transform of standard signals - Properties of continuous time Fourier transform – Analysis of continuous time LTI systems using Fourier transform.

UNIT - V	DISCRETE TIME FOURIER TRANSFORM AND Z-TRANSFORM	(9)

Discrete Time Fourier Transform (DTFT) – Properties of DTFT and Z Transform: Linearity, Time and frequency shifting, Differentiation, Parseval's relation – Z Transform: ROC and properties, Inverse Z Transform: Partial fraction method – Analysis of LTI systems using DTFT and Z Transform.

List of Exercise/Experiments(MATLAB):

1. Generation of Signals: Step Function, Impulse Function, Exponential Function, Ramp Function and Sine Function
2. Basic operations on signals: Time Shifting/Folding, Signal Addition/Subtraction, Signal Multiplication and Amplitude Scaling
3. Fourier transform and Laplace transform of standard signals
4. Step response and Impulse response of Continuous Time systems
5. Discrete time Fourier transform and Z transform of standard signals
6. Step response and Impulse response of Discrete Time systems

Total(L:45, P:30, SL:45) = 120 Periods

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

COs	Course Outcome	Cognitive Level
CO1	Examine the properties of continuous time signals and discrete time signals and systems.	Understand
CO2	Analyze the Continuous Time systems using Laplace Transform.	Apply
CO3	Analyze the continuous time periodic signals using Fourier Series.	Apply
CO4	Compute the Fourier Transform and analyze the CT LTI system using Fourier Transform.	Apply
CO5	Analyze the Discrete Time systems using DTFT and Z-Transform.	Apply

TEXT BOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, Signals and Systems, Pearson Education, Second Edition, 2017.
2. Anand Kumar.A, Signals and Systems, PHI Publications, New Delhi, Third Edition, 2015.

REFERENCES:

1. P.Ramesh Babu and R. Anandanatarajan, Signals and Systems, Scitech Publications, Fourth Edition, 2015.
2. V. Krishnaveni and A. Rajeswari, Signals and Systems, Wiley India Pvt. Ltd., New Delhi, First Edition, 2012.
3. Simon Haykins and Barry Van Veen, Signals and Systems, John Wiley & Sons, Second Edition, 2012.
4. Robert A. Gabel and Richard A. Roberts, Signals and Linear Systems, John Wiley, Third Edition, 2014.

Mapping of COs with POs and PSOs

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

1-low, 2-medium, 3-high

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24ECP41	ANALOG ELECTRONICS LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5

PREREQUISITE: Fundamental knowledge in 24ECT31

OBJECTIVES:

This course aims to provide an understanding of transistor and operational amplifier circuits, including their gain, frequency response, and signal conditioning applications. It also focuses on the design and analysis of amplifiers, oscillators, filters, and multivibrators, along with simulation and performance evaluation using PSpice.

LIST OF EXPERIMENTS

Electronic Circuits Laboratory:

1. Class B complementary symmetry power amplifier.
2. Current Series feedback amplifier.
3. Tuned class C amplifier.
4. Clipper & Clampers.
5. Simulation of Voltage Shunt feedback amplifier.
6. Simulation of Wein Bridge and Colpitts oscillators.

Linear Integrated Circuits Experiments:

1. Inverting, non-inverting and differential amplifiers using op-amp.
2. Instrumentation amplifier using op-amp.
3. Active low pass, high pass filters using op-amp.
4. Astable multivibrator and Schmitt trigger using op-amp.
5. Simulation of Monostable multivibrator and Integrator / differentiator using op-amp in PSpice.

Total(P:45) = 45 Periods

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Design amplifier circuits to determine gain, efficiency, and frequency responseofClass B power amplifiers, feedback amplifiers and tuned Class C amplifiers.	Apply
CO2	Construct wave-shaping circuits to implement and test clippers & clampers for effective signal conditioning applications.	Apply
CO3	Design op-amp circuits forimplement inverting, non-inverting, differential and instrumentation amplifier circuits for linear applications.	Apply
CO4	Design astable multivibrator and Schmitt trigger using op-amp.	Apply
CO5	Apply circuit simulation tools to simulate amplifier, oscillator and signal-processing circuits.	Apply

REFERENCES:

1 Anil KMaini,'VarshaAgarwal, "Electronic Devices & Circuits", John Wiley India, Reprint 2012.

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2	D. Roy Choudhry and Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd,Fifth edition,2018.

Mapping of COs with POs and PSOs

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

1 - Low, 2 - Medium, 3 - High

24ECP46	DESIGN STUDIO II	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

PREREQUISITE: NIL

OBJECTIVES:

To equip students with Design Thinking competencies for addressing real-world challenges aligned with Smart India Hackathon (SIH) themes by fostering empathy, creativity, innovation, and multidisciplinary teamwork, while enabling effective project execution, documentation, and presentation through experiential learning and faculty mentorship.

GENERAL GUIDELINES

1. Students will form teams of 3 members.
2. Each team must select a problem statement from Smart India Hackathon or institute-approved innovation challenges.
3. A faculty mentor will guide each team throughout the semester.
4. Teams must maintain a Design Studio Logbook recording research, ideas, design iterations, feedback and reflections.
5. Projects must follow the Design Thinking Framework: Empathize → Define → Ideate → Prototype → Implement → Communicate.
6. Each phase will include review checkpoints to ensure progress.
7. Final deliverables include Design Process Portfolio, Functional Prototype or Software Demonstration, SIH Submission Document and Reflection Report.

MODULE STRUCTURE

Module 1 – Empathize (Weeks 1–2)

- Understanding SIH domains and societal challenge areas
- Identifying user needs, stakeholders and contexts
- Conducting field studies, surveys and interviews
- Developing empathy maps, personas and user journey maps

Module 2 – Define (Weeks 3–4)

- Synthesizing findings from user research
- Identifying core pain points and opportunity areas
- Framing clear, actionable problem statements
- Establishing project goals, boundaries and success metrics

Module 3 – Ideate (Weeks 5–6)

- Generating diverse ideas through brainstorming and design heuristics
- Sketching and conceptual visualization
- Evaluating ideas based on feasibility, desirability and viability
- Selecting optimal solution paths through mentor feedback and peer review

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Module 4 – Prototype (Weeks 7–8)

- Creating low and medium-fidelity prototypes (hardware, software, hybrid)
- Implementing iterative design improvements
- Conducting usability testing with target users
- Refining prototypes based on functional and experiential feedback

Module 5 – Implement (Weeks 9)

- Developing functional or deployable prototypes
- Integrating technical components (IoT, AI, software modules, sensors, etc.)
- Performing real-time validation, data collection and testing
- Ensuring robustness, scalability and sustainability

Module 6 – Communicate (Week 10)

- Preparing final presentations, poster displays and demo videos
- Showcasing design process and prototype outcomes
- Crafting compelling stories and narratives for SIH jury and stakeholders
- Reflecting on design journey, team collaboration and ethical learnings

TOTAL (P - 30) : 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Empathize with users and identify critical pain points through research, observation and engagement.	Analyze
CO2	Define precise and actionable problem statements based on design insights and contextual understanding.	Analyze
CO3	Generate creative ideas, evaluate them systematically and conceptualize innovative solutions.	Create
CO4	Build, test and refine prototypes using iterative design and implementation practices.	Apply
CO5	Communicate design solutions effectively through storytelling, visual presentation and demonstrations.	Apply

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	3	3	3	-	3	3	3	3	3	3	3	3
CO2	-	3	3	3	-	3	3	3	-	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	-	3	3	3	3
CO5	2	3	3	3	3	3	3	3	3	3	3	3	3
Avg.	1.6	3	3	3	1.8	3	3	3	1.8	3	3	3	3

1-low, 2-medium, 3-high

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24SDP49	SOFT SKILLS DEVELOPMENT – IV	Category	L	T	P	SL	C
		EEC	0	0	30	0	1

(Common to All Branches)

OBJECTIVES:

To the concept of aptitude and make them aware of its growing importance in academics, competitive exams, and professional life. In addition, it seeks to build a strong foundation in English grammar to improve language and communication skills.

UNIT - I	**TIME AND WORK**	(6)

Relationship Between Time and Work – Efficiency Calculation – Wages – Alternate Days – Pipes and Cisterns – Chain Rule.

UNIT - II	**PERMUTATION COMBINATION AND PROBABILITY**	(6)

Permutation Based on Words and Numbers – Combination Based on Committee, Balls and Cards – Probability Based on Persons, Balls, Cards, Dice and Coins.

UNIT - III	**SIMPLE INTEREST AND COMPOUND INTERST**	(6)

Introduction to Principal, Interest and Time – Simple Interest Calculation – Compound Interest: Compounded Annually, Half-yearly and quarterly.

UNIT - IV	**LOGICAL REASONING**	(6)

Syllogism – Clocks – Calendar.

UNIT - V	**VERBAL ABILITY**	(6)

Tenses – Articles – Subject Verb Agreement – Error Spotting – Essay Writing.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Apply time and work concepts to solve problems on efficiency, wages, alternate days and pipes & cisterns, and chain rule.	Apply
CO2	Develop problem solving on permutations, combinations, and probability involving words, objects, and standard.	Understand
CO3	Apply concepts of principal, rate, and time to calculate simple and compound interest under various compounding periods.	Apply
CO4	Demonstrate logical reasoning to solve problems related to syllogisms, clocks, and calendars effectively.	Understand
CO5	Demonstrate grammatical accuracy and coherence in writing by applying rules of tenses, articles, subject-verb agreement.	Understand

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TEXT BOOKS:

1. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations".
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations".
3. Nishit K. Sinha, "Logical Reasoning and Data Interpretation for CAT".
4. R.S. Agarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning".
5. Wren & Martin, "High School English Grammar & Composition".

REFERENCES:

1. Arun Sharma, Quantitative Aptitude for CAT, 11e, 2025.
2. Arun Sharma, Logical Reasoning for CAT, 7e, 2025.
3. English for Competitive Examinations – by Edgar Thorpe & Showick Thorpe.
4. https://prepinsta.com/.
5. https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm.
6. https://www.youtube.com/@FeelFreetoLearn/playlists.

Mapping of COs with POs and PSOs

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

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