

ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS AFFILIATED COLLEGES REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
B.E. ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)

I. PROGRAM EDUCATIONAL OBJECTIVES(PEOs)

1. To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics Engineering.
2. To gain adequate knowledge to become good professional in electronics engineering associated industries, higher education and research.
3. To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.
4. To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and researchoriented methodologies to solve the problems identified.
5. To inculcate in the students a professional and ethical attitude and an ability to visualize the engineering issues in a broader social context.

II. PROGRAM OUTCOMES(POs)

- 1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6 **The engineer and society:** Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.
- 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- 9 **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

III. PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Design, develop and analyze electronic systems through application of relevant electronics, mathematics and engineering principles

PSO2: Design, develop and analyze electronic systems through application of fundamentals from electronic principles, VLSI technology, signal processing, and RF System Design.

PSO3: Adapt to emerging electronics and VLSI technologies and develop innovative solutions for existing and newer problems

PEOs (1to5) mapped with POs and PSOs

PE O	PO												PSO		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
I.	3	3	2	2	2	2	-	-	-	-	-	3	3	2	3
II.	3	3	3	3	2	-	-	-	2	1	2	3	3	3	3
III.	3	2	3	3	3	-	-	-	2	2	-	3	3	3	3
IV.	3	3	3	3	2	-	-	3	-	-	-	2	2	2	2
V.	-	-	-	-	2	2	2	2	-	-	-	-	1	1	1

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

Mapping of Course Outcome and Programme Outcome																	
Year	Sem	Course name	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I	I	Induction Programme															
		Professional English-I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	
		Matrices and Calculus	3	3	1	1	0	0	0	0	2	0	2	3	-	-	
		Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		Programming in C	3	3	3	3	2	1	-	-	3	2	3	3	3	3	-
		தமிழர் மரபு / Heritage of Tamils															
		Engineering Practices Laboratory	3	2			1	1	1					2	2	1	1
		Physics Laboratory	3	2.4	2.6	1	1										
	English Laboratory\$	3	3	3	3	1	3	3	3	3	3	3	3	-	-		
	II	Professional English-II	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-
		Statistics and Numerical Methods	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Semiconductors and Devices	3	2	1.4	1.5	2.5	2	3					1			
		Electrical and Instrumentation Engineering	2	1	1					1					-	-	-
		C++ and Data Structures	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
		Circuit and Network Analysis	3	3	3	2	-	-	-	1	-	1	-	-	-	-	-
		தமிழரும் தொழில்நுட்பமும் / Tamils and Technology															
		Communication Laboratory	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-

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B.E. ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3152	Professional English-I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	GE3251	Engineering Graphics	BSC	2	0	4	6	4
6.	VL3101	Programming in C	ESC	2	0	2	4	3
7.	GE3152	தமிழர் மரபு / Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	VL3111	Physics Laboratory	BSC	0	0	2	2	1
10.	GE3172	English Laboratory	EEC	0	0	2	2	1
TOTAL				14	1	14	29	22

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3252	Professional English-II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	BE3254	Electrical and Instrumentation Engineering	ESC	3	0	0	3	3
4.	VL3201	C++ and Data Structures	ESC	2	0	4	6	4
5.	VL3202	Semiconductors and Devices	PCC	3	0	2	5	4
6.	VL3203	Circuit and Network Analysis	PCC	3	1	2	6	5
7.	GE3252	Tamils and Technology	HSMC	1	0	0	1	1
8.		NCC Credit Course Level1 [#]	-	2	0	0	2	2*
PRACTICALS								
9.	GE3272	Communication Laboratory	EEC	0	0	4	4	2
TOTAL				19	2	12	32	25

[#]NCC Credit Course level1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Probability, Random Processes and Linear Algebra	BSC	3	1	0	4	4
2.		Electromagnetic Fields and Transmission Lines	PCC	3	0	0	3	3
3.		Signals and Systems	PCC	3	0	0	3	3
4.		Analog Circuits	PCC	3	0	4	7	5
5.		Digital System Design	PCC	3	0	2	5	4
6.		Problem Solving and Python Programming	ESC	2	0	2	4	3
PRACTICALS								
7.		Professional Development [§]	EEC	0	0	2	2	1
TOTAL				17	1	10	28	23

[§]Skill Based Course

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Linear Integrated Circuits	PCC	3	0	2	5	4
2.		Principles of Communication Systems	PCC	3	0	2	5	4
3.		Control Systems	PCC	3	0	0	3	3
4.		Digital VLSI Design	PCC	3	0	0	3	3
5.		Digital Signal Processing	PCC	3	0	2	5	4
6.		Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.		NCC Credit Course Level 2 [#]		3	0	0	3	3 [#]
PRACTICALS								
8.		HDL Programming Laboratory	PCC	0	0	4	4	2
TOTAL				17	0	10	27	22

[#]NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Computer Architecture and Organization	PCC	3	0	0	3	3
2.		Analog VLSI Design	PCC	3	0	0	3	3
3.		VLSI Testing and Design For Testability	PCC	3	0	0	3	3
4.		Microprocessors, Microcontrollers and Interfacing	PCC	3	0	2	5	4
5.		Professional Elective I	PEC	-	-	-	-	3
6.		Professional Elective II	PEC	-	-	-	-	3
7.		Mandatory Course-I ^{&}	MC	3	0	0	3	Non-credit course
PRACTICALS								
8.		Analog and Digital VLSI Design Laboratory	PCC	0	0	4	4	2
TOTAL				-	-	-	-	21

[&]Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Wireless Communication	PCC	3	0	0	3	3
2.		Machine Learning for IC Design	PCC	3	0	2	5	4
3.		VLSI Signal Processing	PCC	3	0	0	3	3
4.		Open Elective-I*	OEC	3	0	0	3	3
5.		Professional Elective III	PEC	-	-	-	-	3
6.		Professional Elective IV	PEC	-	-	-	-	3
7.		Mandatory Course-II ^{&}	MC	3	0	0	3	Non-credit course
8.		NCC Credit Course Level 3 [#]		3	0	0	3	3 [#]
PRACTICALS								
9.		Mini Project	EEC	0	0	2	2	1
TOTAL				-	-	-	-	20

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

[&] Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)[#]NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

SEMESTER VII / VIII*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Human Values and Ethics	HSMC	2	0	0	2	2
2.		Elective-Management [#]	HSMC	3	0	0	3	3
3.		IC Packaging Technologies	PCC	3	0	0	3	3
4.		Statistical Analysis and Optimization for VLSI	PCC	3	0	0	3	3
5.		Professional Elective V	PEC	-	-	-	3	3
6.		Professional Elective VI	PEC	-	-	-	3	3
7.		Open Elective– II**	OEC	3	0	0	3	3
PRACTICALS								
8.		Summer internship	EEC	0	0	0	0	2
TOTAL				-	-	-	-	22

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

**Open Elective II (Shall be chosen from the list of open electives offered by other Programmes).

[#]Elective-Management shall be chosen from the Elective Management courses.

SEMESTER VIII / VII*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	EC3811	Project Work/ Internship	EEC	0	0	20	20	10
TOTAL				0	0	20	20	10

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

TOTAL CREDITS: 165

ELECTIVE–MANAGEMENT COURSES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Principles of Management	HSMC	3	0	0	3	3
2.		Total Quality Management	HSMC	3	0	0	3	3
3.		Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.		Human Resource Management	HSMC	3	0	0	3	3
5.		Knowledge Management	HSMC	3	0	0	3	3
6.		Industrial Management	HSMC	3	0	0	3	3

MANDATORY COURSES I*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.		Elements of Literature	MC	3	0	0	3	0
3.		Film Appreciation	MC	3	0	0	3	0
4.		Disaster Risk Reduction and Management	MC	3	0	0	3	0

***Mandatory Courses are offered as Non-Credit Courses**

MANDATORY COURSES II*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.		History of Science and Technology in India	MC	3	0	0	3	0
3.		Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.		State, Nation Building and Politics in India	MC	3	0	0	3	0
5.		Industrial Safety	MC	3	0	0	3	0

***Mandatory Courses are offered as Non-Credit Courses**

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Semiconductor Devices and Technology	Vertical II Chip Design and Testing	Vertical III VLSI Circuits and System Design	Vertical IV Signal Processing	Vertical V RF Technologies	Vertical VI IoT and Applications	Vertical VII VLSI Applications	Vertical VIII Fabrication and Advanced Design Techniques
Semiconductor Device Modeling	ASIC Design	Data Converters	Advanced Digital Signal Processing	RF Transceivers	Embedded Systems and IoT Design	VLSI Architectures for Image Processing	Microchip Fabrication
Fundamentals of Nano Electronics	Validation and Testing Technology	Reconfigurable Architectures	Digital Image and Video Processing	Signal Integrity for High Speed Design	IoT Processors	VLSI Circuits for Biomedical applications	Power Management and Clock Distribution
Advanced Semiconductor Devices	Low Power IC Design	System on chip	Speech processing	VLSI Interconnects	IoT security	VLSI structures for DSP	Reliability in VLSI Circuits
Wide bandgap devices	Mixed Signal IC Design	Hardware Software Co Design For FPGA	Computer Vision	MICs And RF System Design	Wireless Sensor Network Design	VLSI Design Of Neural Networks	Cryptography and Hardware Security
FinFET Devices for VLSI Circuits and Systems	Network On Chip	Multicore Architecture and Programming	DSP Architecture and Programming	EMI / EMC Pre Compliance Testing	Industrial IOT and Industry 4.0	VLSI for Wireless Communications	Synthesis and Optimization of VLSI circuits
Nano Sensors and Devices	CAD for VLSI Design	Semiconductor Memories	Adaptive Signal Processing	RFID System Design & Testing	IoT for Smart Systems	Integrated Circuits for Optical Communication	IP Core Design and Protection

Registration of Professional Elective Courses from Verticals:

Refer to the Regulations 2021, Clause 6.3. (Amended on 27.07.2023)

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: SEMICONDUCTOR DEVICES AND TECHNOLOGY

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Semiconductor Device Modeling	PEC	3	0	0	3	3
2.		Fundamentals of Nano electronics	PEC	2	0	2	4	3
3.		Advanced Semiconductor Devices	PEC	3	0	0	3	3
4.		Wide Bandgap Devices	PEC	2	0	2	4	3
5.		FinFET Devices for VLSI Circuits and Systems	PEC	2	0	2	4	3
6.		Nano Sensors and Devices	PEC	3	0	0	3	3

VERTICAL 2: CHIP DESIGN AND TESTING

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		ASIC Design	PEC	3	0	0	3	3
2.		Validation and Testing Technology	PEC	2	0	2	4	3
3.		Low Power IC Design	PEC	2	0	2	4	3
4.		Mixed Signal IC Design	PEC	3	0	0	3	3
5.		Network On Chip	PEC	3	0	0	3	3
6.		CAD for VLSI Design	PEC	3	0	0	3	3

VERTICAL 3: VLSI CIRCUITS AND SYSTEM DESIGN

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Data Converters	PEC	3	0	0	3	3
2.		Reconfigurable Architectures	PEC	3	0	0	3	3
3.		System on chip	PEC	3	0	0	3	3
4.		Hardware Software Co Design For FPGA	PEC	3	0	0	3	3
5.		Multicore Architecture and Programming	PEC	3	0	0	3	3
6.		Semiconductor Memories	PEC	3	0	0	3	3

VERTICAL 4: SIGNAL PROCESSING

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Advanced Digital Signal Processing	PEC	2	0	2	4	3
2.		Digital Image and Video Processing	PEC	3	0	0	3	3
3.		Speech Processing	PEC	2	0	2	4	3
4.		Computer Vision	PEC	2	0	2	4	3
5.		DSP Architecture and Programming	PEC	2	0	2	4	3
6.		Adaptive Signal Processing	PEC	3	0	0	3	3

VERTICAL 5: RF TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		RF Transceivers	PEC	2	0	2	4	3
2.		Signal Integrity for High Speed Design	PEC	3	0	0	3	3
3.		VLSI Interconnects	PEC	3	0	0	3	3
4.		MICs And RF System Design	PEC	2	0	2	4	3
5.		EMI / EMC Pre Compliance Testing	PEC	2	0	2	4	3
6.		RFID System Design & Testing	PEC	2	0	2	4	3

VERTICAL 6: IOT AND APPLICATIONS

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Embedded Systems and IoT Design	PEC	2	0	2	4	3
2.		IoT Processors	PEC	2	0	2	4	3
3.		IoT Security	PEC	3	0	0	3	3
4.		Wireless Sensor Network Design	PEC	3	0	0	3	3
5.		Industrial IoT and Industry 4.0	PEC	2	0	2	4	3
6.		IoT for Smart Systems	PEC	3	0	0	3	3

VERTICAL 7: VLSI APPLICATIONS

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		VLSI Architectures for Image Processing	PEC	3	0	0	3	3
2.		VLSI Circuits for Biomedical applications	PEC	3	0	0	3	3
3.		VLSI Structures for DSP	PEC	3	0	0	3	3
4.		VLSI Design of Neural networks	PEC	3	0	0	3	3
5.		VLSI for Wireless Communications	PEC	3	0	0	3	3
6.		Integrated Circuits for Optical Communication	PEC	3	0	0	3	3

VERTICAL 8: FABRICATION AND ADVANCED DESIGN TECHNIQUES

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Microchip Fabrication	PEC	3	0	0	3	3
2.		Power Management and Clock Distribution	PEC	3	0	0	3	3
3.		Reliability in VLSI Circuits	PEC	3	0	0	3	3
4.		Cryptography and Hardware Security	PEC	3	0	0	3	3
5.		Synthesis and Optimization of VLSI Circuits	PEC	3	0	0	3	3
6.		IP Core Design and Protection	PEC	3	0	0	3	3

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

OPENELECTIVES-I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.		Embedded Linux	OEC	3	0	0	3	3
2.	OAS351	Space Science	OEC	3	0	0	3	3
3.	OIE351	Introduction to Industrial Engineering	OEC	3	0	0	3	3
4.	OCH353	Energy Technology	OEC	3	0	0	3	3
5.	OCE351	Environmental and Social Impact Assessment	OEC	3	0	0	3	3
6.	OEE351	Renewable Energy System	OEC	3	0	0	3	3
7.	OEI351	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
8.	OMA351	Graph Theory	OEC	3	0	0	3	3
9.	CCW332	Digital Marketing	OEC	2	0	2	4	3
10	OIE352	Resource Management Techniques	OEC	3	0	0	3	3
11	OMG351	Fintech Regulation	OEC	3	0	0	3	3
12	OFD351	Holistic Nutrition	OEC	3	0	0	3	3
13	AI3021	IT in Agricultural System	OEC	3	0	0	3	3
14	OEI352	Introduction to Control Engineering	OEC	3	0	0	3	3
15	CME365	Renewable Energy Technologies	OEC	3	0	0	3	3
16	OAE351	Aviation Management	OEC	3	0	0	3	3
17	CCS342	DevOps	OEC	2	0	2	4	3
18	CCS361	Robotic Process Automation	OEC	2	0	2	4	3
19	OMR351	Mechatronics	OEC	3	0	0	3	3
20	OMR353	Sensors	OEC	3	0	0	3	3
21	AU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
22	OAS352	Space Engineering	OEC	3	0	0	3	3
23	ORA351	Foundation of Robotics	OEC	3	0	0	3	3
24	OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3

25	AU3008	Sensors and Actuators	OEC	3	0	0	3	3
26	OAS353	Space Vehicles	OEC	3	0	0	3	3
27	OML352	Electrical, Electronic and Magnetic materials	OEC	3	0	0	3	3
28	OML353	Nanomaterials and applications	OEC	3	0	0	3	3

OPENELECTIVES-II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	OBT351	Food, Nutrition and Health	OEC	3	0	0	3	3
3.	OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
4.	OME354	Applied Design Thinking	OEC	3	0	0	3	3
5.	MF3003	Reverse Engineering	OEC	3	0	0	3	3
6.	OIM351	Industrial Management	OEC	3	0	0	3	3
7.	OIE354	Quality Engineering	OEC	3	0	0	3	3
8.	OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
9.	OML351	Introduction to Non-Destructive Testing	OEC	3	0	0	3	3
10.	OAE352	Fundamentals of Aeronautical Engineering	OEC	3	0	0	3	3
11.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
12.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
13.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
14.	OEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
15.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
16.	OCH351	Nano Technology	OEC	3	0	0	3	3

17.	OCH352	Functional Materials	OEC	3	0	0	3	3
18.	OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
19.	OFD353	Introduction to Food Processing	OEC	3	0	0	3	3
20.	OPY351	Pharmaceutical Nanotechnology	OEC	3	0	0	3	3
21.	CPE334	Energy Conservation and Management	OEC	3	0	0	3	3
22.	OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
23.	CBM348	Foundation Skills in Integrated Product Development	OEC	3	0	0	3	3
24.	CBM333	Assistive Technology	OEC	3	0	0	3	3
25.	OMA352	Operations Research	OEC	3	0	0	3	3
26.	OCE353	Lean Concepts, Tools and Practices	OEC	3	0	0	3	3
27.	OHS352	Project Report Writing	OEC	3	0	0	3	3
28.	OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
29.	OMA357	Queuing and Reliability Modelling	OEC	3	0	0	3	3
30.	OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
31.	CME343	New Product Development	OEC	3	0	0	3	3
32.	OME355	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3
33.	MF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
34.	OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
35.	AU3002	Batteries and Management system	OEC	3	0	0	3	3
36.	OIE353	Operations Management	OEC	3	0	0	3	3
37.	OSF352	Industrial Hygiene	OEC	3	0	0	3	3
38.	OSF353	Chemical Process Safety	OEC	3	0	0	3	3
39.	ORA352	Concepts in Mobile Robots	OEC	3	0	0	3	3
40.	CRA332	Drone Technologies	OEC	3	0	0	3	3
41.	OGI352	Geographical Information System	OEC	3	0	0	3	3

42.	OAI352	Agriculture Entrepreneurship Development	OEC	3	0	0	3	3
43.	OEN352	Biodiversity Conservation	OEC	3	0	0	3	3
44.	OCH354	Surface Science	OEC	3	0	0	3	3
45.	OFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3
46.	OFD355	Food Safety and Quality Regulations	OEC	3	0	0	3	3
47.	OPE353	Industrial safety	OEC	3	0	0	3	3
48.	CBM370	Wearable Devices	OEC	3	0	0	3	3
49.	OBT356	Lifestyle Diseases	OEC	3	0	0	3	3
50.	OBT357	Biotechnology in Health Care	OEC	3	0	0	3	3

SUMMARY

Name of the Programme: B.E. Electronics Engineering (VLSI Design and Technology)										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	4	3					5		12
2	BSC	12	4	4	2					22
3	ESC	5	7	3						15
4	PCC		9	15	20	15	10	6		75
5	PEC					6	6	6		18
6	OEC						3	3		6
7	EEC	1	2	1			1	2	10	17
8	Non-Credit (Mandatory)					√	√			
Total		22	25	23	22	21	20	22	10	165

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

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

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

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

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

(i) Physical Activity

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

(ii) Creative Arts

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

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and

don't's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

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

(v) Proficiency Modules

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

(vi) Lectures by Eminent People

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

(vii) Visits to Local Area

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

(viii) Familiarization to Dept./ Branch & Innovations

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

(ix) Department Specific Activities

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

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

References:

Guide to Induction program from AICTE

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION TO EFFECTIVE COMMUNICATION 1

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C's of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 8

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh / Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 9

Reading- Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 9

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary -Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 9

Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc.,). Writing–Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive &Relative pronouns. Vocabulary- Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 9

Reading –Reading editorials; and Opinion Blogs; Writing –Essay Writing (Descriptive or narrative).

Grammar–Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL: 45 PERIODS

LEARNING OUTCOMES:

At the end of the course, learners will be able

CO1: To use appropriate words in a professional context

CO2: To gain understanding of basic grammatic structures and use them in right context. CO3: To read and infer the denotative and connotative meanings of technical texts

CO4: To write definitions, descriptions, narrations and essays on various topics

TEXT BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition) English for Science & Technology Cambridge University Press, 2021.
2. Authored by Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr.Deepa Mary Francis, Dr.KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication–Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, McgrawHill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate– Dr.V.Chellammal, Allied Publishing House, New Delhi, 2003.

ASSESSMENT PATTERN

Two internal assessments and an end semester examination to test students’ reading and writing skills along with their grammatical and lexical competence.

CO’s- PO’s & PSO’s MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
2	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
3	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
4	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
5	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
AVg.	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-

1-low, 2-medium, 3-high, ‘-’-no correlation

COURSE OBJECTIVES:

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

UNIT I**MATRICES****9+3**

Eigen values and Eigen vectors of a real matrix –Characteristic equation –Properties of Eigen values and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms –Applications: Stretching of an elastic membrane.

UNIT II**DIFFERENTIAL CALCULUS****9+3**

Representation of functions- Limit of a function-Continuity-Derivatives- Differentiation rules (sum, product, quotient, chain rules)- Implicit differentiation - Logarithmic differentiation -Applications: Maxima and Minima of functions of one variable.

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

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

UNIT IV**INTEGRAL CALCULUS****9+3**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals -Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V**MULTIPLE INTEGRALS****9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals –Applications: Moments and centres of mass, moment of inertia.

TOTAL: 60 PERIODS**COURSE OUTCOMES:**

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

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions.

CO4: Apply different methods of integration in solving practical problems.

CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXTBOOKS:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10thEdition, New Delhi, 2016.
2. Grewal.B.S., "HigherEngineering Mathematics", Khanna Publishers, NewDelhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi,2015. [For Units II & IV- Sections 1.1,2.2,2.3,2.5,2.7(Tangents problems only), 2.8, 3.1 to 3.6,3.11,4.1,4.3,5.1(Area problems only), 5.2,5.3,5.4(excluding net change theorem), 5.5,7.1-7.4 and 7.8].

REFERENCES:

1. Anton.H, Bivens. I and Davis.S, "Calculus", Wiley,10thEdition,2016
2. Bali.N., Goyal.M. and Watkins.C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7thEdition, 2009.
3. Jain.R.K. and Iyengar.S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi,5thEdition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S.Viswanathan Publishers Pvt.Ltd., Chennai, 2009.
5. Ramana.B.V.,"Higher Engineering Mathematics", McGraw Hill Education Pvt.Ltd, New Delhi,2016.
6. Srimantha Pal and Bhunia.S.C, "Engineering Mathematics" Oxford University Press, 2015.
7. Thomas.G.B.,Hass.J, and Weir.M.D, "Thomas Calculus",14thEdition,Pearson India, 2018.

CO's - PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-

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

COURSE OBJECTIVES:

- To make the students effectively achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

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

UNIT II ELECTROMAGNETIC WAVES 9

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

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - populationinversion - Nd-YAG laser, CO₂ laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

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

UNIT V APPLIED QUANTUM MECHANICS 9

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

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

After completion of this course, the students should be able to

CO1: Understand the importance of mechanics.

CO2: Express their knowledge in electromagnetic waves.

CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.

CO4: Understand the importance of quantum physics.

CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ. Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physics – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

CO's - PO's & PSO's MAPPING

CO	PO	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
2	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
3	3	3	2	2	2	1	-	-	-	-	-	1	-	-	-
4	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
5	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
AV	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-

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

COURSE OBJECTIVES:

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

- Drawing engineering curves.
- Drawing free hand sketch of simple objects.
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

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

UNIT I PLANE CURVES 6+12

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

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

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

UNIT III PROJECTION OF SOLIDS AND FREE HAND SKETCHING 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other— obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids—Prisms, pyramids cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

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

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Use BIS conventions and specifications for engineering drawing.

CO2: Construct the conic curves, involutes and cycloid.

CO3: Solve practical problems involving projection of lines.

CO4: Draw the orthographic, isometric and perspective projections of simple solids.

CO5: Draw the development of simple solids.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N.S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I & II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1. IS10711—2001: Technical products Documentation— Size and layout of drawing sheets.
2. IS9609 (Parts 0 & 1)—2001: Technical products Documentation—Lettering.
3. IS10714 (Part 20)—2001 & SP46—2003: Lines for technical drawings.
4. IS11669—1986 & SP46—2003: Dimensioning of Technical Drawings.
5. IS15021(Parts 1 to 4)—2001: Technical drawings—Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
2	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
3	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
4	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
5	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
CO	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-

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

UNIT I BASICS OF C PROGRAMMING**6**

Introduction to programming paradigms — Structure of C program - C programming: Data Types - Constants - Keywords - Operators: Precedence and Associativity - Expressions – Input / Output statements, Assignment statements - Decision making statements - Switch statement.

UNIT II LOOP CONTROL STATEMENTS AND ARRAYS**6**

Iteration statements: For, while, Do-while statements, nested loops, break & continue statements - Introduction to Arrays: Declaration, Initialization - One dimensional array -Two dimensional arrays – Searching and sorting in Arrays – Strings – string handling functions - array of strings.

UNIT III FUNCTIONS AND POINTERS**6**

Modular programming - Function prototype, function definition, function call, Built-in functions – Recursion – Recursive functions - Pointers - Pointer increment, Pointer arithmetic - Parameter passing: Pass by value, Pass by reference, pointer and arrays, dynamic memory allocation with *malloc/calloc*

UNIT IV STRUCTURES AND UNION**6**

Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bit fields, enumerated data types, Union.

UNIT V MACROS AND FILE PROCESSING**6**

Preprocessor directives – Simple and Conditional macros with and without parameters - Files - Types of file processing: Sequential and Random access – File operations – read, write & seek.

30 PERIODS**PRACTICALS:**

1. Programs for i/o operations with different data types and operators
2. Programs using branching and looping statements
3. Programs implementing searching and sorting using arrays
4. Programs using recursive functions
5. Programs using pointers
6. Programs using Structures and Unions
7. Programs using macros
8. Programs to handle file operations

30 PERIODS**COURSE OUTCOMES:**

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

CO1: Write simple C programs using basic constructs.

CO2: Design searching and sorting algorithms using arrays and strings.

CO3: Implement modular applications using Functions and pointers.

CO4: Develop and execute applications using structures and Unions.

CO5: Solve real world problem using files.

TOTAL: 60 PERIODS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
2. Ashok N Kamthane, Programming in C, Pearson, Third Edition, 2020
3. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
4. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C" McGraw-Hill Education, 1996.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	2	2	1	-	-	-	2	-	3	3	3	-
2	3	-	3	3	1	1	-	-	-	-	-	-	3	-	-
3	3	3	3	3	2	-	-	-	3	-	-	-	3	-	-
4	3	3	3	3	2	-	-	-	3	-	3	3	3	-	-
5	3	3	3	3	3	2	-	-	-	-	3	3	3	-	-
Avg	3	3	3	3	2	1	-	-	3	2	3	3	3	3	-

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

- UNIT I LANGUAGE AND LITERATURE 3**
 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 – ROCKART PAINTINGS TO MODERN ART– SCULPTURE 3**
 Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.
- UNIT III FOLK AND MARTIAL ARTS 3**
 Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.
- UNIT IV THINAI CONCEPT OF TAMILS 3**
 Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature
 - Aram Concept of Tamils – Education and Literacy during Sangam Age-Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.
- UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3**
 Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement – Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

TEXT-CUM- REFERENCE BOOKS

1. தமிழக வரலாறு –மக்களும் டண்பொடும் –கக.கக.பிள்ளை (தவளியீடு): தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ்–முளனவர்இல.சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – ளவளக நதிக்களரயில்சங்ககொல நகர நொகரிகம்(ததொல்லியல்Fளற தவளியீடு)
4. தபொருளந–ஆற்றங்களரநொகரிகம்.(ததொல்லியல்Fளறதவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL– (inprint)
6. Social Life of the Tamils-The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian,

- Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
 9. Keeladi- 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
 10. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by: The Author)
 11. Porunai Civilization (Jointly Published by: Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
 12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

அலகு I மொழி மற்றும் இலக்கியம்:

3

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

அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை:

3

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

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:

3

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

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்:

3

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

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:

3

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

TOTAL : 15 PERIODS**TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருதை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
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11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

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

GROUP–A (CIVIL & ELECTRICAL)**PART I CIVIL ENGINEERING PRACTICES****15****PLUMBING WORK:**

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

WOOD WORK:

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

Wood Work Study:

- a) Studying joints indoor panels and wooden furniture
- b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES**15**

- a) Introduction to switches, fuses, indicators and lamps –Basics with board wiring with lamp, fan and three pin socket
- b) Staircase wiring
- c) Fluorescent Lamp wiring with introduction to CFL and LED types.
- d) Energy meter wiring and related calculations / calibration
- e) Study of IronBox wiring and assembly
- f) Study of FanRegulator (Resistor type and Electronic type using Diac / Triac / quadrac)
- g) Study of emergency lamp wiring / Water heater

GROUP–B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES

15

WELDING WORK:

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

BASIC MACHINING WORK:

- a) (simple)Turning.
- b) (simple)Drilling.
- c) (simple)Tapping.

ASSEMBLY WORK:

- a) Assembling a centrifugal pump.
- b) Assembling a household mixer.
- c) Assembling an air conditioner.

SHEET METAL WORK:

- a) Making of a square tray

FOUNDRY WORK:

- a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES

15

SOLDERING WORK:

- a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

- a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

- a) Study an elements of smartphone.
- b) Assembly and dismantle of LED TV.
- c) Assembly and dismantle of computer/Laptop

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Draw pipeline plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3: Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
2	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
3	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
CO	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1

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

COURSE OBJECTIVES:

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

Any Seven Experiments

1. Torsional pendulum-Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending- Determination of Young's modulus
4. Uniform bending–Determination of Young's modulus
5. Laser-Determination of the wavelength of the laser using grating
6. Air wedge -Determination of thickness of a thin sheet/wire
7. a) Optical fibre – Determination of Numerical Aperture and acceptance angle
b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer–determination of the velocity of sound and compressibility of liquids
10. Post office box- Determination of Bandgap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamic skit

TOTAL: 30 PERIODS**COURSE OUTCOMES:**

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

CO1: Understand the functioning of various physics laboratory equipment.

CO2: Use graphical models to analyze laboratory data.

CO3: Use mathematical models as a medium for quantitative reasoning and describing physical reality.

CO4: Access, process and analyze scientific information.

CO5: Solve problems individually and collaboratively.

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	2.4	2.6	1	1										

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

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 6

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

UNIT II NARRATION AND SUMMATION 6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking- Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations*-describing experiences and feelings- engaging in small talk- describing requirements and abilities.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 6

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities (large & small)-talking about precautions.

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 6

Listening– Listening to TED Talks; Listening to lectures - and educational videos. Speaking –Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation.

UNIT V EXPRESSION 6

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions- understanding a website-describing processes

TOTAL: 30 PERIODS**LEARNING OUTCOMES:**

At the end of the course, learners will be able

CO1: To listen to and comprehend general as well as complex academic information

CO2: To listen to and understand different points of view in a discussion

CO3: To speak fluently and accurately in formal and informal communicative contexts

CO4: To describe products and processes and explain their uses and purposes clearly and accurately

CO5: To express their opinions effectively in both formal and informal discussions

ASSESSMENT PATTERN

- One online/ app based assessment to test listening / speaking
- End Semester **ONLY** listening and speaking will be conducted online.
- Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

CO's- PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
2	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
3	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
4	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
5	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
Avg.	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-

1-low,2-medium,3-high,“-“-no correlation

Note: The average value of this course to be used for program articulation matrix.

HS3252

PROFESSIONAL ENGLISH- II

L T P C

2 0 0 2

COURSE OBJECTIVES:

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

UNIT I

MAKING COMPARISONS

6

Reading-Reading advertisements, user manuals, brochures; Writing–Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases

UNIT II EXPRESSING CAUSAL RELATIONSHIPS IN SPEAKING AND WRITING

6

Reading- Reading longer technical texts–Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar -Active Passive Voice transformations, Infinitive and Gerunds

UNIT III **PROBLEM SOLVING** **6**

Reading- Case Studies, excerpts from literary texts, news reports etc. Writing –Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar –Error correction; If conditional sentences

UNIT IV **REPORTING OF EVENTS AND RESEARCH** **6**

Reading–Newspaper articles; Writing–Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V **THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY** **6**

Reading –Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing –Job / Internship application – Cover letter & Resume; Grammar –Numerical adjectives, Relative Clauses.

TOTAL:30 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able

CO1: To compare and contrast products and ideas in technical texts.

CO2: To identify and report cause and effects in events, industrial processes through technical texts

CO3: To analyse problems in order to arrive at feasible solutions and communicate them in the written format.

CO4: To present their ideas and opinions in a planned and logical manner

CO5: To draft effective resumes in the context of job search.

TEXT BOOKS:

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
3. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCE BOOKS:

1. Raman. Meenakshi, Sharma. Sangeeta(2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and LaxmiChandra, Oxford Univ.Press,2001, New Delhi.
3. Learning to Communicate–Dr.V.Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.

ASSESSMENT PATTERN

Two internal assessments and an end semester examination to test students' reading and writing skills along with their grammatical and lexical competence.

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
2	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
3	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
4	3	3	3	3	2	3	3	3	2	3	3	3	-	-	-
5	-	-	-	-	-	-	-	-	3	3	3	3	-	-	-
AVg.	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-

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

Note:The average value of this course to be used for program articulation matrix.

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) –Tests for single variance and equality of variances –Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two way classifications – Completely randomized design –Randomized block design– Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL:60 PERIODS**COURSE OUTCOMES:**

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

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Appreciate the numerical techniques of interpolation in various intervals and apply the

numerical techniques of differentiation and integration for engineering problems.

CO4: Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

CO5: Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R. Land Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

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

COURSE OBJECTIVES:

- To impart knowledge in types, construction and working of transformers
- To impart knowledge in types, construction and working of DC machines
- To impart knowledge in types, construction and working of AC rotating machines
- To introduce the functional elements and working of measuring instruments.
- To introduce the basics of power system and protection schemes

UNIT I TRANSFORMER 9

Introduction - Ideal and Practical Transformer – Phasor diagram-- Per Unit System – Equivalent circuit- Testing- Efficiency and Voltage Regulation– Three Phase Transformers –Applications- Auto Transformers, Advantages- Harmonics.

UNIT II DC MACHINES 9

Introduction – Constructional Features– Motor and Generator mode- EMF and Torque equation – Circuit Model – Methods of Excitation- Characteristics – Starting and Speed Control – Universal Motor- Stepper Motors – Brushless DC Motors- Applications

UNIT III AC ROTATING MACHINES 9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Speed Control - Single phase Induction motors -Construction– Types–starting methods. Alternator: Working principle–Equation of induced EMF – Voltage regulation, Synchronous motors- working principle-starting methods – Torque equation.

UNIT IV MEASUREMENTS AND INSTRUMENTATION 9

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

UNIT V BASICS OF POWER SYSTEMS 9

Power system structure -Generation, Transmission and distribution , Various voltage levels, Earthing – methods of earthing, protective devices- switch fuse unit- Miniature circuit breaker- moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid

TOTAL:45 PERIODS**COURSE OUTCOMES:**

After completing this course, the students will be able to

CO1: Explain the working principle of electrical machines

CO2: Analyze the output characteristics of electrical machines

CO3: Choose the appropriate electrical machines for various applications **CO4:** Explain the types and operating principles of measuring instruments **CO5:** Explain the basic power system structure and protection schemes

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020
2. S. K, Bhattacharya, “Basic Electrical and Electronics Engineering”, Second Edition,

- Pearson Education, 2017.
3. A.K.Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai andCo,NewDelhi,2015.
 4. C.L.Wadhwa,"Generation, Distribution and Utilization of Electrical Energy",New Age International pvt.ltd.,2003

REFERENCES:

1. Kothari D Pandl.J Nagrath,"Basic Electrical Engineering",FourthEdition,McGrawHill Education, 2019
2. Mahmood Nahvi and Joseph A.Ed minister,"Electric Circuits",Schaum'Outline Series, McGraw Hill, 2002.
3. H.S.Kalsi,'Electronic Instrumentation',Tata McGraw-Hill,New Delhi,2010

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
2	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
3	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
4	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
5	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-

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

UNIT I DATA ABSTRACTION & OVERLOADING**6**

Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.

UNIT II INHERITANCE & POLYMORPHISM**6**

Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.

UNIT III LINEAR DATA STRUCTURES**6**

Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an example – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT IV NON-LINEAR DATA STRUCTURES**6**

Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Connected components.

UNIT V SORTING & SEARCHING**6**

Insertion sort – Merge sort – Quick sort – Heap sort – Linear Search – Binary Search.

TOTAL : 30 PERIODS**List of Experiments:**

1. C++ Program to Implement Constructors and Destructors.
2. C++ Program to implement Member Functions, Classes and Friend Functions.
3. C++ Program to Implement Dynamic Memory Allocation and Overloading.
4. C++ Program to Implement Various Inheritances.
5. C++ Program to Implement Virtual Functions and Dynamic Binding.
6. C++ Program to Implement Various Operations on Arrays and Linked Lists.
7. C++ Program to Implement Various Operations on Stacks and Queues using Array and Linked List.
8. C++ Program to Evaluate the Infix Expressions by converting into Prefix and Postfix Expressions.
9. C++ Program to Implement Binary Tree Traversal and Graph Traversal Algorithm.
10. C++ Program to Implement the Single Source Shortest Path Algorithm and All Pair Shortest Path Algorithm.
11. C++ Program to find the Minimal Spanning Tree for a Graph.
12. C++ Program to Implement Linear Search and Binary Search Algorithms.
13. C++ Program to Implement Insertion Sort, Merge Sort, Quick Sort and Heap Sort Algorithms.

30 PERIODS
TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Comprehend and appreciate the significance and role of this course in the present contemporary world

CO2: Select and realize suitable data structure for specific Application.

CO3: Compare and realize Linear and nonlinear data structures for different application.

CO4: Implement different searching and sorting techniques.

CO5: Identify and realize connected components in trees.

CO6: Analyze and realize asymptotic notations.

TEXT BOOKS:

1. Deitel and Deitel, " C++, How To Program", Fifth Edition, Pearson Education, 2005
2. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++, 2nd edition, Universities Press Pvt Ltd., Hyderabad, 2007.

REFERENCE BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison-Wesley, 2007.
2. Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
3. Goodrich, Michael T., Roberto Tamassia, "David Mount. " Data Structures and Algorithms in C++", 7th edition, Wiley. 2004

CO's- PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1		3	1		1	1	1			2	1	1
2	3	2	1		3	1		1	1	1			2	1	1
3	3	2	1		3	1		1	1	1			2	1	1
4	3	2	1		3	1		1	1	1			2	1	1
5	3	2	1		3	1		1	1	1			2	1	1
6	3	2	1		3	1		1	1	1					
AVG	3	2	1		3	1		1	1	1			2	1	1

UNIT I ELECTRONIC STATES**9**

Quantum free electron theory - Fermi distribution and energy – Density of states Dynamics of electrons in periodic potential – Electron in a periodic potential – Energy bands in solids– Conductors – Semiconductors – Insulators – tight binding approximation – Electron effective mass– the concept of hole – properties of conduction and valence bands.

UNIT II CARRIERS AND DOPING**9**

Intrinsic concentration – intrinsic Fermi level – n and p type doping – density of carriers in extrinsic semiconductors and their temperature dependence – extrinsic semiconductor Fermi energy level – degenerate and non-degenerate semiconductors – Direct and Indirect band gap semiconductors - band- gap engineering – electrons and holes in quantum wells and super lattices.

UNIT III PN DIODE AND BIPOLAR JUNCTION TRANSISTOR**9**

PN junction diode, current equations, V-I characteristics, Bipolar Junction Transistor- bipolar transistor action, minority carrier, distribution, low frequency common base, current gain, non-ideal effects, equivalent circuits, Ebers Moll Model, Hybrid- π model, frequency limitations, large signal switching characteristics, SiGe and hetro-junction.

UNIT IV FIELD EFFECT TRANSISTORS**10**

Two terminal MOS structures, threshold voltage and charge distribution, capacitance-voltage characteristics, MOSFET structures, I-V relationships, transconductance and substrate effects, frequency limitations, non-ideal effects, MOSFET scaling, threshold voltage modification due to short and narrow channel effects, avalanche breakdown, drain induced barrier effects, Basic features of FinFET devices and operation.

UNIT V SPECIAL SEMICONDUCTOR DEVICES**8**

IGBT, LED, LCD, Photo transistor, Opto Coupler, Solar cell, MESFET, Schottky barrier diode- Zener diode-Varactor diode –Tunnel diode-Gallium Arsenide device, UJT

45 PERIODS**PRACTICALS:****LIST OF EXPERIMENTS**

1. Characteristics of PN Junction Diode and Zener diode.
2. Characteristics of LED
3. Characteristics of phototransistor
4. Characteristics of BJT
5. Characteristics of UJT
6. MOSFET Drain current and Transfer Characteristics.

30 PERIODS**TOTAL : 75 PERIODS****COURSE OUTCOMES:**

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

CO1: Understand the basics of electronic states and energy band structure formation

CO2: Recognize the importance of carrier concentration and doping in semiconductors

CO3: Understand the operation and characteristics of PN junction and BJTs.

CO4: Comprehend the characteristics of the field effect transistors.

CO5: Realize the physics of special semiconductor devices.

TEXT BOOKS:

1. R.F.Pierret. Semiconductor Device Fundamentals. Pearson, 2006
2. D.Neamen and D.Biswas. Semiconductor physics and devices. McGraw Hill Education, 2017
3. Samar K. Saha. FinFET Devices for VLSI Circuits and Systems. CRC Press, 2021

REFERENCE BOOKS:

1. N.Garcia, A. Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.
2. Umesh Mishra and Jasprit Singh. Semiconductor Device Physics and Design. Springer, 2008.
3. Nandita Dasgupta and Amitava Dasgupta. Semiconductor Devices: Modelling and Technology. PHI Learning Pvt. Ltd. 2004
4. F.H. Mitchell, ' Introduction to Electronics Design" Prentice Hall of India Pvt. Lt, 1995.
5. Robert L. Boylestad, Louis Nashelsky " Electronic devices and circuit theory" , Pearson, 2009.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	-	-	-	-	-	1	-	1	-	-	2	1	1
2	3	1	-	-	-	-	-	1	-	1	-	-	2	1	1
3	2	2	1	1	-	-	-	1	-	1	-	-	2	1	1
4	2	2	1	1	-	-	-	1	-	1	-	-	2	1	1
5	1	2	1	1	-	-	-	1	-	1	-	-	2	1	1
AVG	2.2	1.6	1	1	-	-	-	1	-	1	-	-	2	1	1

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

COURSE OBJECTIVES:

- To learn the basic concepts and behavior of DC and AC circuits.
- To understand various methods of circuit/ network analysis using network theorems.
- To understand the transient and steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations.
- To learn the concept of coupling in circuits and topologies.

UNIT I DC CIRCUIT ANALYSIS 12

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff's Current Law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 12

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits. Analysis using dependent current sources and voltage sources

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 12

Sinusoidal Steady – State analysis, Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 12

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V NETWORK ANALYSIS AND SYNTHESIS 12

An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis, Two port Network Analysis- Z and H parameters, T and Π Representation, Lattice Networks, Synthesis of RL and RC networks.

60 PERIODS**SUGGESTED ACTIVITIES:**

- Practice solving variety of problems

List of Experiments:

1. Verification of KVL&KCL.
2. Verification of Thevenin &Norton theorem.
3. Verification of Superposition Theorem.
4. Verification of maximum power transfer Theorem
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits.
6. Transient analysis of RL and RC circuits.

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1: Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.

CO2: Apply suitable network theorems and analyze AC and DC circuits

CO3: Analyze steady state response of any R, L and C circuits

CO4: Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.

CO5: Analyze the network topologies

TOTAL: 90 PERIODS

TEXT BOOKS:

1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis", Mc Graw Hill education, 9th Edition, 2018.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc Graw-Hill, 2nd Edition, 2003.
3. Joseph Edminister and Mahmood Nahvi, —Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

REFERENCES:

1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7th Edition, 2009.
2. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The Mc Graw Hill companies, 2nd Edition, 2011
3. Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	-	-	-	1		1	-	-	-	-	-
2	3	3	2	2	-	-	-	1		1	-	-	-	-	-
3	3	3	3	3	-	-	-	1		1	-	-	-	-	-
4	3	3	3	3	-	-	-	1		1	-	-	-	-	-
5	3	3	3	2	-	-	-	1		1	-	-	-	-	-
CO	3	3	3	2	-	-	-	1		1	-	-	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

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

UNIT III MANUFACTURING TECHNOLOGY 3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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

TOTAL:15 PERIODS**TEXT-CUM- REFERENCE BOOKS**

1. தமிழகவரலாறு-மக்களும்பண்பொடும்-கக.கக.பிள்ளை(தவளியீடு): தமிழ்நொடுபொடநூல்மற்றும் கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ்-முளனவரீஇல.சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – ளவளக நதிக்களரயில்சங்ககொல நகர நொகரிகம்(ததொல்லியல்Fளற தவளியீடு)
4. தபொருளந-ஆற்றங்களரநொகரிகம்.(ததொல்லியல்Fளறதவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL–(in print)
6. Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) (Publishedby: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Publishedby: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi)(Publishedby: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, TamilNadu)
10. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by:

The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்:

3

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

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

3

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

அலகு III உற்பத்தித் தொழில் நுட்பம்:

3

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

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:

3

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

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

3

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

TOTAL : 15 PERIODS**TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

NX3251

**NCC Credit Course Level1*
(ARMY WING)**

NCC Credit Course Level1

**L T P C
2 0 0 2**

NCC GENERAL

6

NCC1 Aims ,Objectives & Organization of NCC

1

NCC2 Incentives

2

NCC3 Duties of NCC Cadet

1

NCC4 NCC Camps: Types& Conduct

2

NATIONAL INTEGRATION AND AWARENESS

4

NI 1 National Integration: Importance & Necessity

1

NI 2 Factors Affecting National Integration

1

NI 3 Unity in Diversity & Role of NCC in Nation Building

1

NI 4 Threats to National Security

1

PERSONALITY DEVELOPMENT

7

PD1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving

2

PD2 Communication Skills

3

PD3 Group Discussion: Stress & Emotions

2

LEADERSHIP

5

L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code

3

L 2 Case Studies: Shivaji, Jhasi Ki Rani

2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

8

SS1 Basics, Rural Development Programmes, NGOs, Contribution of Youth

3

SS4 Protection of Children and Women Safety

1

SS5 Road/Rail Travel Safety

1

SS6 New Initiatives

2

SS7 Cyber and Mobile Security Awareness

1

TOTAL:30 PERIODS

NX3252

NCCCreditCourseLevel1*
(NAVAL WING)

NCC Credit Course Level-I

L T P C
2 0 0 2

NCC GENERAL

6

NCC1	Aims, Objectives & Organization of NCC	1
NCC2	Incentives	2
NCC3	Duties of NCC Cadet	1
NCC4	NCC Camps: Types& Conduct	2

NATIONALINTEGRATIONANDAWARENESS

4

NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1

PERSONALITYDEVELOPMENT

7

PD1	Self-Awareness, Empathy ,Critical & Creative Thinking, Decision Making and Problem Solving	2
PD2	Communication Skills	3
PD3	Group Discussion: Stress &Emotions	2

LEADERSHIP

5

L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

8

SS1	Basics, Rural Development Programmes, NGOs, Contributionof Youth	3
SS4	Protection of Children and Women Safety	1
SS5	Road/Rail Travel Safety	1
SS6	New Initiatives	2
SS7	Cyber and Mobile Security Awareness	1

TOTAL:30 PERIODS

NX3253

NCCCreditCourseLevel1*
(AIR FORCE WING)

NCC Credit Course Level-I

LT P C
2 0 0 2

NCCGENERAL

6

NCC1	Aims, Objectives & Organization of NCC	1
NCC2	Incentives	2
NCC3	Duties of NCC Cadet	1
NCC4	NCC Camps: Types& Conduct	2

NATIONALINTEGRATIONANDAWARENESS

4

NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1

PERSONALITYDEVELOPMENT

7

PD1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD2	Communication Skills	3
PD3	Group Discussion: Stress & Emotions	2

LEADERSHIP

5

L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

8

SS1	Basics, Rural Development Programmes, NGOs, Contributionof Youth	3
SS4	Protection of Children and Women Safety	1
SS5	Road/Rail Travel Safety	1
SS6	New Initiatives	2
SS7	Cyber and Mobile Security Awareness	1

COURSE OBJECTIVES

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyse concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to communicate effectively through formal and informal writing.
- To be able to use appropriate language structures to write emails, reports and essays
- To give instructions and recommendations that are clear and relevant to the context

UNIT I**12**

Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition-discussing progress toward goals-talking about experiences- talking about events in life-discussing past events-Writing: writing emails (formal & semi-formal).

UNIT II**12**

Speaking: discussing news stories-talking about frequency-talking about travel problems-discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.

UNIT III**12**

Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios-talking about purchasing-discussing advantages and disadvantages- making comparisons-discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.

UNIT IV**12**

Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules-(example- discussing rental arrangements)- understanding technical instructions-Writing: writing instructions-writing a short article.

UNIT V**12**

Speaking: describing things relatively-describing clothing-discussing safety issues (making recommendations) talking about electrical devices-describing controlling actions- Writing: job application(Cover letter + Curriculum vitae)-writing recommendations.

TOTAL: 60 PERIODS**LEARNING OUTCOMES**

CO1:Speak effectively in group discussions held in a formal/semi formal contexts.

CO2:Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions

CO3:Write emails, letters and effective job applications.

CO4:Write critical reports to convey data and information with clarity and precision

CO5:Give appropriate instructions and recommendations for safe execution of tasks

Assessment Pattern

- One online / app based assessment to test speaking and writing skills
- Proficiency certification is given on successful completion of speaking and writing.

CO's-PO's & PSO's MAPPING

CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
2	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
3	2	2	3	3	1	3	3	3	3	3	3	3	-	-	-
4	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
5	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
AV	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-

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

Note: The average value of this course to be used for program articulation matrix.