	K S R INSTITUTE FOR ENGINEERING AND TECHNOLOGY An Autonomous Institution Approved by AICTE and Affiliated to Anna University, Chennai Accredited by NAAC ('A+' Grade) & NBA	Curriculum UG R – 2023
Department	Department of Electrical and Electronics Engineering	
Programme	B.E. Electrical and Electronics Engineering	

SEMESTER I

S. No.	Course Code	Course Title	Category	L	T	P	Tot	Credit	CA	ES	Tot
Induction Programme			-	-	-	-	-	-	-	-	-
THEORY COURSES											
1	23HS1131	Professional Communication	HSMC	3	0	0	3	3	40	60	100
2	23GE1131	Fundamentals of Computer Programming	ESC	3	0	0	3	3	40	60	100
3	23GE1132	Engineering Graphics	ESC	2	0	4	6	4	40	60	100
4	23GE1133	Heritage of Tamils	HSMC	1	0	0	1	1	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	23MA1141	Matrices and Calculus	BSC	2	1	2	5	4	50	50	100
6	23PH1141	Engineering Physics	BSC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	23GE1151	Programming in C Laboratory	ESC	0	0	3	3	1.5	60	40	100
MANDATORY COURSES											
8	23MC1131	Yoga for Stress Management	HSMC	1	0	0	1	0	-	-	-
TOTAL				15	1	11	27	20.5			700

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SEMESTER II

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	23EE1201	Electric Circuit Analysis	PCC	3	1	0	4	**4**	40	60	100
2	23EE1202	Analog Electronics	PCC	3	0	0	3	**3**	40	60	100
3	23GE1231	Python Programming	ESC	2	1	0	3	**3**	40	60	100
4	23GE1232	Tamils and Technology	HSMC	1	0	0	1	**1**	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	23MA1241	Probability and Statistics	BSC	2	1	2	5	**4**	50	50	100
6	23CY1141	Engineering Chemistry	BSC	3	0	2	5	**4**	50	50	100
LABORATORY COURSES											
7	23CS1251	Python Programming Laboratory	ESC	0	0	3	3	**1.5**	60	40	100
8	23GE1251	Communication Laboratory	EEC	0	0	3	3	**1.5**	60	40	100
9	23GE1252	Engineering Experience Laboratory	ESC	0	0	3	3	**1.5**	60	40	100
10		NCC Credit Course level 1*		2	0	0	2	**2***			
		TOTAL		14	3	13	30	**23.5**		900	

* NCC Credit Course level 1 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.

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	An Autonomous Institution	UG
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Department	Department of Electrical and Electronics Engineering
Programme	B.E. Electrical and Electronics Engineering

SEMESTER III

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	23GE1331	Universal Human Values	HSMC	3	0	0	3	3	40	60	100
2	23MA1302	Transforms and Partial Differential Equations	BSC	3	1	0	4	4	40	60	100
3	23EE1301	Electrical Machines I	PCC	3	1	0	4	4	40	60	100
4	23EE1302	Electro Magnetic Field	PCC	3	1	0	4	4	40	60	100
5	23EE1303	Digital Electronics	PCC	3	0	0	3	3	40	60	100
6	23IT1332	Data Structures and Algorithms	ESC	3	0	0	3	3	40	60	100
LABORATORY COURSES											
7	23EE1351	Electrical Machines I Laboratory	PCC	0	0	3	3	1.5	60	40	100
8	23EE1352	Analog and Digital Laboratory	PCC	0	0	4	4	2	60	40	100
9	23IT1351	Data Structures and Algorithms Laboratory	ESC	0	0	3	3	1.5	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
10	23SS1351	Aptitude and Coding Skills I	EEC	0	0	2	2	1	100	-	100
		TOTAL		18	3	12	33	27		1000	

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SEMESTER IV

S. No.	Course Code	Course Title	Category	L	T	P	Tot	Credit	CA	ES	Tot
THEORY COURSES											
1	23EE1401	Control Systems	PCC	3	1	0	4	4	40	60	100
2	23EE1402	Generation Transmission and Distribution	PCC	3	0	0	3	3	40	60	100
3	23EE1403	Electrical Machines II	PCC	3	0	0	3	3	40	60	100
4	23EE1404	Measurements and Instrumentation	PCC	3	0	0	3	3	40	60	100
5		Open Elective - I	OEC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
6	23EE1441	Microprocessor and Microcontrollers	PCC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	23EE1451	Electrical Machines II Laboratory	PCC	0	0	3	3	1.5	60	40	100
8	23EE1452	Control & Instrumentation Laboratory	PCC	0	0	3	3	1.5	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
9	23SS1451	Aptitude and Coding Skills II	EEC	0	0	2	2	1	100	-	100
10	23SS1452	Technical Seminar -I	EEC	0	0	2	2	1	100	-	100
11	23EE1421	Internship - I *	EEC	0	0	0	0	1			
		NCC Credit Course level 2#		2	0	0	2	3#			
TOTAL				18	1	12	31	26		1000	

* Duration - Minimum 2 weeks internship in industry.   Grade – Completed / Not Completed

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SEMESTER V

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	23EE1501	Power System Analysis	PCC	3	1	0	4	4	40	60	100
2	23EE1502	Power Electronics	PCC	3	0	0	3	3	40	60	100
3	23EE1503	Renewable Energy System	PCC	3	0	0	3	3	40	60	100
4	23EE1P ##	Professional Elective - I	PEC	3	0	0	3	3	40	60	100
5		Open Elective - II	OEC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
6	23EE1541	Embedded Systems	PCC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	23EE1551	Power System Simulation Laboratory	PCC	0	0	3	3	1.5	60	40	100
8	23EE1552	Power Electronics Laboratory	PCC	0	0	3	3	1.5	60	40	100
MANDATORY COURSE											
9	23MC15##	Mandatory Course - I	MC	2	0	0	2	0	100	-	100
EMPLOYABILITY ENHANCEMENT COURSES											
10	23SS1551	Advanced Aptitude and Coding Skills I	EEC	0	0	2	2	1	100	-	100
TOTAL				20	1	10	31	24	1000		

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SEMESTER VI

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	23EE1601	Power system Protection & Control	PCC	3	0	0	3	3	40	60	100
2	23EE1602	Electrical Drives	PCC	3	0	0	3	3	40	60	100
4	23EE1P ##	Professional Elective II	PEC	3	0	0	3	3	40	60	100
4	23EE1P ##	Professional Elective III	PEC	3	0	0	3	3	40	60	100
5		Open Elective-III	OEC	3	0	0	3	3	40	60	100
MANDATORY COURSES											
6	23MC16##	Mandatory Course - II	MC	2	0	0	2	0	100	-	100
EMPLOYABILITY ENHANCEMENT COURSES											
7	23EE1621	Mini Project	EEC	0	0	4	4	2	60	40	100
8	23EE1622	Internship - II*	EEC	0	0	0	0	1			
9	23SS1651	Advanced Aptitude and Coding Skills II	EEC	0	0	2	2	1	100	-	100
		NCC Credit Course level 3[#]		2	0	0	2	3[#]			
TOTAL				17	0	6	23	19		800	

* Duration - Minimum 2 weeks internship in industry.   Grade – Completed / Not Completed

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SEMESTER VII

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	23GE1731	Professional Ethics	HSMC	3	0	0	3	3	40	60	100
2	23GE173#	Management Elective	HSMC	3	0	0	3	3	40	60	100
3	23EE1P ##	Professional Elective IV	PEC	3	0	0	3	3	40	60	100
4	23EE1P ##	Professional Elective - V	PEC	3	0	0	3	3	50	50	100
5	23EE1P ##	Professional Elective - VI	PEC	3	0	0	3	3	50	50	100
6		Open Elective - IV	OEC	3	0	0	3	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES											
7	23EE1721	Project Work - Phase I	EEC	0	0	4	4	2	40	60	100
TOTAL				18	0	4	22	20		700	

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SEMESTER VIII

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
EMPLOYABILITY ENHANCEMENT COURSES											
1	23EE1821	Project Work - Phase II	EEC	0	0	16	16	8	40	60	100
TOTAL				0	0	16	16	8	100		
TOTAL CREDITS								168			
TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 168											

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

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HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)

S. No.	Course Code	Course Title	Category	L	T	P	Tot	Credit	CA	ES	Tot
1.	23HS1131	Professional Communication	HSMC	3	0	0	3	3	40	60	100
2.	23GE1133	Heritage of Tamils	HSMC	1	0	0	1	1	40	60	100
3.	23GE1232	Tamils and Technology	HSMC	1	0	0	1	1	40	60	100
4.	23GE1331	Universal Human Values	HSMC	3	0	0	3	3	40	60	100
5.	23GE1731	Professional Ethics	HSMC	3	0	0	3	3	40	60	100
6.	23GE173X	Management Elective	HSMC	3	0	0	3	3	40	60	100
			TOTAL	14	0	0	14	14			

BASIC SCIENCE COURSES(BSC)

S. No.	Course Code	Course Title	Category	L	T	P	Tot	Credit	CA	ES	Tot
1.	23MA1141	Matrices and Calculus	BSC	2	1	2	5	4	50	50	100
2.	23PH1141	Engineering Physics	BSC	3	0	2	5	4	50	50	100
3.	23MA1241	Probability and Statistics	BSC	2	1	2	5	4	50	50	100
4.	23CY1141	Engineering Chemistry	BSC	3	0	2	5	4	50	50	100
5.	23MA1302	Transforms and Partial Differential Equations	BSC	3	1	0	4	4	40	60	100
			TOTAL	13	3	8	24	20			

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ENGINEERING SCIENCES COURSES (ESC)

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
1.	23GE1131	Fundamentals of Computer Programming	ESC	3	0	0	3	3	40	60	100
2.	23GE1132	Engineering Graphics	ESC	2	0	4	6	4	40	60	100
3.	23GE1151	Programming in C Laboratory	ESC	0	0	3	3	1.5	60	40	100
4.	23GE1241	Python Programming	ESC	2	1	0	3	3	40	60	100
5.	23GE1252	Engineering Experience Laboratory	ESC	0	0	3	3	1.5	60	40	100
6.	23CS1251	Python Programming Laboratory	ESC	0	0	3	3	1.5	60	40	100
7.	23IT1332	Data Structures and Algorithms	ESC	3	0	0	3	3	40	60	100
8.	23IT1351	Data Structures and Algorithms Laboratory	ESC	0	0	3	3	1.5	60	40	100
			TOTAL	10	1	16	27	19			

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	L
1.	23GE1251	Communication Laboratory	EEC	0	0	3	3	1.5	60	40	100
2.	23SS1351	Aptitude and Coding Skills I	EEC	0	0	2	2	1	100	-	100
3.	23SS1451	Aptitude and Coding Skills II	EEC	0	0	2	2	1	100	-	100
4.	23SS1452	Technical Seminar -I	EEC	0	0	2	2	1	100	-	100
5.	23EE1421	Internship - I *	EEC	0	0	0	0	1			
6.	23SS1551	Advanced Aptitude and Coding Skills I	EEC	0	0	2	2	1	100	-	100
7.	23SS1651	Advanced Aptitude and Coding Skills II	EEC	0	0	2	2	1	100	-	100
8.	23EE1621	Mini Project	EEC	0	0	4	4	2	100	-	100
9.	23EE1622	Internship - II*	EEC	0	0	0	0	1	-	-	-

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10.	23EE1721	Project Work - Phase I	EEC	0	0	4	4	2	40	60	100
11.	23EE1821	Project Work - Phase II	EEC	0	0	16	16	8	40	60	100
			TOTAL	0	0	37	37	20.5			

PROFESSIONAL CORE COURSES (PCC)

S. No.	Course Code	Course Title	Category	L	T	P	Tot	Credit	CA	ES	Tot
1.	23EE1201	Electric Circuit Analysis	PCC	3	1	0	4	4	40	60	100
2.	23EE1202	Analog Electronics	PCC	3	0	0	3	3	40	60	100
3.	23EE1301	Electrical Machines I	PCC	3	1	0	4	4	40	60	100
4.	23EE1302	Electro Magnetic Field	PCC	3	1	0	4	4	40	60	100
5.	23EE1303	Digital Electronics	PCC	3	0	0	3	3	40	60	100
6.	23EE1401	Control Systems	PCC	3	1	0	4	4	40	60	100
7.	23EE1402	Generation Transmission and Distribution	PCC	3	0	0	3	3	40	60	100
8.	23EE1403	Electrical Machines II	PCC	3	1	0	3	3	40	60	100
9.	23EE1404	Measurements and Instrumentation	PCC	3	0	0	3	3	40	60	100
10.	23EE1441	Microprocessor and Microcontrollers	PCC	3	0	2	5	4	50	50	100
11.	23EE1501	Power System Analysis	PCC	3	1	0	4	4	40	60	100
12.	23EE1502	Power Electronics	PCC	3	0	0	3	3	40	60	100
13.	23EE1503	Renewable Energy System	PCC	3	0	0	3	3	40	60	100
14.	23EE1541	Embedded Systems	PCC	3	0	2	5	4	50	50	100
15.	23EE1601	Power system Protection & Control	PCC	3	0	0	3	3	40	60	100
16.	23EE1602	Electrical Drives	PCC	3	0	0	3	3	40	60	100
17.	23EE1351	Electrical Machines I Laboratory	PCC	0	0	3	3	1.5	60	40	100
18.	23EE1352	Analog and Digital Laboratory	PCC	0	0	4	4	2	60	40	100

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19.	23EE1451	Electrical Machines II Laboratory	PCC	0	0	3	3	1.5	60	40	100
20.	23EE1452	Control & Instrumentation Laboratory	PCC	0	0	3	3	1.5	60	40	100
21.	23EE1551	Power System Simulation Laboratory	PCC	0	0	3	3	1.5	60	40	100
22.	23EE1552	Power Electronics Laboratory	PCC	0	0	3	3	1.5	60	40	100
		Total		**48**	**6**	**23**	**76**	**64.5**			

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PROFESSIONAL ELECTIVE COURSES (PEC) : VERTICALS

S. No	Vertical 1 Power Engineering	Vertical 2 Converters And Drives	Vertical 3 Embedded System	Vertical 4 E- Vehicle	Vertical 5 Advanced Control	Vertical 6 Emerging Technologies	Vertical 7 Diversified Electives
1	Power Plant Engineering	Special Electrical Machines	Embedded Processors	Electrical Vehicle Architecture	Signals and systems	Soft Computing Techniques	PLC & SCADA
2	Solar Photovoltaic System	Multilevel Power Converters	Embedded C-programming	Design of motor and converters for Electrical Vehicles	Digital Signal Processing	Optimization Techniques	Industrial IoT
3	Utilization and Conservation of Electrical Energy	Design of Electrical Machines	Embedded system Design	Electric Vehicle Design Mechanics and Control	System Identification	Computer Control of Processes	Transduces & Sensors
4	HVDC and FACTS	Power Electronics for Renewable Energy Systems	Embedded Control of Electrical Drives	Design of Electric vehicle charging system	Model Based Control	Embedded System Networking	Industrial Automation
5	Energy Management and Auditing	Advanced Power Electronics	VLSI Design and Reconfigurable Architecture	Testing of Electric vehicle	Non Linear Control	Reliability Engineering	Industrial Electronics
6	Restructuring of Power System	Static VAR Controller & Harmonics Filters	Embedded system for Automotive Applications	Grid Integration of Electric Vehicles	Optimal Control	Substation Engineering and Substation Automation	Intelligent Transport
7	Micro and Smart Grids	Control of Power Electronics Circuits	MEMS and NEMS	Intelligent Control Electric Vehicles	Adaptive Control	SMPS and UPS	System chip Design for Electrical Engineering
8	Power Quality and Meticulous Techniques	Resonant Converters	Software for Embedded Systems	Electric Hybrid Vehicle	Modern Control Systems	Distributed Energy resources	Unmanned Aerial Vehicle
9	Reactive Power Compensation and Management	Advanced Electric Drives	IoT for Smart Systems	Electric Vehicle Technology	Digital Control Systems	Energy Storage Systems	Industrial Electrical Safety
10	Power System Operation and Deregulation	Machine Modeling and Analysis	Embedded Computing	Autonomous vehicle	Distributed control System	Wind and Solar Energy System	AI Techniques in Electrical Engineering

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
VERTICAL 1: POWERENGINEERING											
1	23EE1P01	Power Plant Engineering	PEC	3	0	0	3	3	40	60	100
2	23EE1P02	Solar Photovoltaic System	PEC	3	0	0	3	3	40	60	100
3	23EE1P03	Utilization and Conservation of Electrical Energy	PEC	3	0	0	3	3	40	60	100
4	23EE1P04	HVDC and FACTS	PEC	3	0	0	3	3	40	60	100
5	23EE1P05	Energy Management and Auditing	PEC	3	0	0	3	3	40	60	100
6	23EE1P06	Restructuring of Power System	PEC	3	0	0	3	3	40	60	100
7	23EE1P07	Micro and Smart Grids	PEC	3	0	0	3	3	40	60	100
8	23EE1P08	Power Quality and Meticulous Techniques	PEC	3	0	0	3	3	40	60	100
9	23EE1P09	Reactive Power Compensation and Management	PEC	3	0	0	3	3	40	60	100
10	23EE1P10	Power System Operation and Deregulation	PEC	3	0	0	3	3	40	60	100
VERTICAL 2: CONVERTERS AND DRIVES											
1	23EE1P11	Special Electrical Machines	PEC	3	0	0	3	3	40	60	100
2	23EE1P12	Multilevel Power Converters	PEC	3	0	0	3	3	40	60	100
3	23EE1P13	Design of Electrical Machines	PEC	3	0	0	3	3	40	60	100
4	23EE1P14	Power Electronics for Renewable Energy Systems	PEC	3	0	0	3	3	40	60	100
5	23EE1P 15	Advanced Power Electronics	PEC	3	0	0	3	3	40	60	100
6	23EE1P 16	Static VAR Controller & Harmonics Filters	PEC	3	0	0	3	3	40	60	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
7	23EE1P 17	Control of Power Electronics Circuits	PEC	3	0	0	3	3	40	60	100
8	23EE1P 18	Resonant Converters	PEC	3	0	0	3	3	40	60	100
9	23EE1P 19	Advanced Electric Drives	PEC	3	0	0	3	3	40	60	100
10	23EE1P 20	Machine Modeling and Analysis	PEC	3	0	0	3	3	40	60	100
		VERTICAL 3: EMBEDDED SYSTEM									
1	23EE1P 21	Embedded Processors	PEC	3	0	0	3	3	40	60	100
2	23EE1P 22	Embedded C- programming	PEC	3	0	0	3	3	40	60	100
3	23EE1P 23	Embedded system Design	PEC	3	0	0	3	3	40	60	100
4	23EE1P 24	Embedded Control of Electrical Drives	PEC	3	0	0	3	3	40	60	100
5	23EE1P25	VLSI Design and Reconfigurable Architecture	PEC	3	0	0	3	3	40	60	100
6	23EE1P 26	Embedded system for Automotive Applications	PEC	3	0	0	3	3	40	60	100
7	23EE1P 27	MEMS and NEMS	PEC	3	0	0	3	3	40	60	100
8	23EE1P 28	Software for Embedded Systems	PEC	3	0	0	3	3	40	60	100
9	23EE1P 29	IoT for Smart Systems	PEC	3	0	0	3	3	40	60	100
10	23EE1P 30	Embedded Computing	PEC	3	0	0	3	3	40	60	100
		VERTICAL 4: E- VEHICLE									
1	23EE1P 31	Electrical Vehicle Architecture	PEC	3	0	0	3	3	40	60	100
2	23EE1P 32	Design of motor and converters for Electrical Vehicles	PEC	3	0	0	3	3	40	60	100
3	23EE1P33	Electric Vehicle Design Mechanics and Control	PEC	3	0	0	3	3	40	60	100
4	23EE1P34	Design of Electric vehicle charging system	PEC	3	0	0	3	3	40	60	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
5	23EE1P35	Testing of Electric vehicle	PEC	3	0	0	3	3	40	60	100
6	23EE1P36	Grid Integration of Electric Vehicles	PEC	3	0	0	3	3	40	60	100
7	23EE1P37	Intelligent Control Electric Vehicles	PEC	3	0	0	3	3	40	60	100
8	23EE1P38	Electric Hybrid Vehicle	PEC	3	0	0	3	3	40	60	100
9	23EE1P39	Electric Vehicle Technology	PEC	3	0	0	3	3	40	60	100
10	23EE1P40	Autonomous vehicle	PEC	3	0	0	3	3	40	60	100
VERTICAL 5 : ADVANCED CONTROL											
1	23EE1P41	Signals and systems	PEC	3	0	0	3	3	40	60	100
2	23EE1P42	Digital Signal Processing	PEC	3	0	0	3	3	40	60	100
3	23EE1P43	System Identification	PEC	3	0	0	3	3	40	60	100
4	23EE1P44	Model Based Control	PEC	3	0	0	3	3	40	60	100
5	23EE1P45	Non-Linear Control	PEC	3	0	0	3	3	40	60	100
6	23EE1P46	Optimal Control	PEC	3	0	0	3	3	40	60	100
7	23EE1P47	Adaptive Control	PEC	3	0	0	3	3	40	60	100
8	23EE1P48	Modern Control Systems	PEC	3	0	0	3	3	40	60	100
9	23EE1P49	Digital Control Systems	PEC	3	0	0	3	3	40	60	100
10	23EE1P50	Distributed control System	PEC	3	0	0	3	3	40	60	100
VERTICAL 6 : EMERGING TECHNOLOGY											
1	23EE1P51	Soft Computing Techniques	PEC	3	0	0	3	3	40	60	100
2	23EE1P52	Optimization Techniques	PEC	3	0	0	3	3	40	60	100
3	23EE1P53	Computer Control of Processes	PEC	3	0	0	3	3	40	60	100
4	23EE1P54	Embedded System Networking	PEC	3	0	0	3	3	40	60	100
5	23EE1P55	Reliability Engineering	PEC	3	0	0	3	3	40	60	100
6	23EE1P56	Substation Engineering and Substation Automation	PEC	3	0	0	3	3	40	60	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
7	23EE1P57	SMPS and UPS	PEC	3	0	0	3	3	40	60	100
8	23EE1P58	Distributed Energy resources	PEC	3	0	0	3	3	40	60	100
9	23EE1P59	Energy Storage Systems	PEC	3	0	0	3	3	40	60	100
10	23EE1P60	Wind and Solar Energy System	PEC	3	0	0	3	3	40	60	100
VERTICAL 7 : DIVERSIFIED ELECTIVES											
1	23EE1P61	PLC & SCADA	PEC	3	0	0	3	3	40	60	100
2	23EE1P62	Industrial IoT	PEC	3	0	0	3	3	40	60	100
3	23EE1P63	Transduces & Sensors	PEC	3	0	0	3	3	40	60	100
4	23EE1P64	Industrial Automation	PEC	3	0	0	3	3	40	60	100
5	23EE1P65	Industrial Electronics	PEC	3	0	0	3	3	40	60	100
6	23EE1P66	Intelligent Transport	PEC	3	0	0	3	3	40	60	100
7	23EE1P67	System chip Design for Electrical Engineering	PEC	3	0	0	3	3	40	60	100
8	23EE1P68	Unmanned Aerial Vehicle	PEC	3	0	0	3	3	40	60	100
9	23EE1P69	Industrial Electrical Safety	PEC	3	0	0	3	3	40	60	100
10	23EE1P70	AI Techniques in Electrical Engineering	PEC	3	0	0	3	3	40	60	100
MANAGEMENT ELECTIVES											
1	23GE1732	Entrepreneurship and IPR	HSMC	2	0	0	2	2	40	60	100
2	23GE1733	Total Quality Management	HSMC	3	0	0	3	3	40	60	100
3	23GE1734	Principles of Management	HSMC	3	0	0	3	3	40	60	100
4	23GE1735	Human Resource Management	HSMC	3	0	0	3	3	40	60	100
5	23GE1736	Industrial Management	HSMC	3	0	0	3	3	40	60	100
MANDATORY COURSE											
MANDATORY COURSE - I											
1	23MC1131	Yoga for Stress Management	HSMC	1	0	0	1	**0**	-	-	-
2	23MC1531	Environmental Science and sustainability	MC	2	0	0	2	0	100	-	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
3	23MC1532	Indian Constitution	MC	2	0	0	2	0	100	-	100
4	23MC1533	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0	100	-	100
5	23GE1534	Engineering Economics	MC	2	0	0	2	0	100	-	100
6	23MC1535	Introduction to Gender Studies	MC	2	0	0	2	0	100	-	100
MANDATORY COURSE - II											
1	23MC1631	Life Science for Engineers	MC	2	0	0	2	0	100	-	100
2	23MC1632	Disaster Management	MC	2	0	0	2	0	100	-	100
3	23MC1633	Industrial Maintenance and Safety Engineering	MC	2	0	0	2	0	100	-	100
OPEN ELECTIVE COURSES											
OPEN ELECTIVE – I & II (EMERGING TECHNOLOGIES)											
1	23CS1E03	Introduction to Java Programming	OEC	2	0	0	2	3	50	50	100
2	23CS1E34	Foundations of Data sciences	OEC	3	0	0	3	3	40	60	100
3.	23CS1E03	Artificial Intelligence & Machine Learning	OEC	3	0	0	3	3	40	60	100
4	23ME1E42	Drone Technologies	OEC	3	0	0	3	3	40	60	100
5	23IT1E12	Augmented Reality/Virtual Reality	OEC	2	0	2	4	3	50	50	100
6	23IT1E20	Crypto-Currency and Block Chain Technologies	OEC	2	0	2	4	3	50	50	100
OPEN ELECTIVE - III											
1	23BM1E05	Wearable Devices	OEC	3	0	0	3	3	40	60	100
2	23BM1E06	Medical Informatics	OEC	3	0	0	3	3	40	60	100
3	23CS1E05	Operating Systems	OEC	3	0	0	3	3	40	60	100
4	23CB1E05	Penetration Testing Techniques	OEC	3	0	0	3	3	40	60	100
5	23CB1E06	Malware Analysis	OEC	3	0	0	3	3	40	60	100
6	23IT1E06	Multimedia Technologies	OEC	3	0	0	3	3	40	60	100
7	23ME1E05	Industrial Management	OEC	3	0	0	3	3	40	60	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
8	23ME1E06	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3	40	60	100
OPEN ELECTIVE - IV											
1	23BM1E07	Assistive Technology	OEC	3	0	0	3	3	40	60	100
2	23BM1E08	Medical Innovation and Entrepreneurship	OEC	3	0	0	3	3	40	60	100
3	23CS1E08	Cloud Computing	OEC	3	0	0	3	3	40	60	100
4	23CB1E07	Principles of DevSecOps	OEC	3	0	0	3	3	40	60	100
5	23CB1E08	Cloud Security	OEC	3	0	0	3	3	40	60	100
6	23IT1E08	Neural Networks	OEC	3	0	0	3	3	40	60	100
7	23ME1E08	Robotics	OEC	3	0	0	3	3	40	60	100

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Department of Electrical and Electronics Engineering Offering Open Electives for other Department

		OPEN ELECTIVE - I									
1	23EE1E01	Solar and Wind Energy Systems	OEC	3	0	0	3	3	40	60	100
2	23EE1E02	Electrical Wiring and Lighting	OEC	3	0	0	3	3	40	60	100
		OPEN ELECTIVE - II									
1	23EE1E03	Electrical Safety	OEC	3	0	0	3	3	40	60	100
2	23EE1E04	Energy Conservation and Management	OEC	3	0	0	3	3	40	60	100
		OPEN ELECTIVE - III									
1	23EE1E05	Electric Vehicle	OEC	3	0	0	3	3	40	60	100
2	23EE1E 06	Introduction to Embedded System	OEC	3	0	0	3	3	40	60	100
		OPEN ELECTIVE - IV									
1	23EE1E 07	Micro grid and Smart Grid	OEC	3	0	0	3	3	40	60	100
2	23EE1E 08	Sensors and Transducers	OEC	3	0	0	3	3	40	60	100

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Summary

Name of the Programme: Electrical and Electronics Engineering

CATEGORY	I	II	III	IV	V	VI	VII	VIII	TOTAL CREDITS	%
HSMC	4	1	3	-	-	-	6	-	14	8.3
BSC	8	8	4	-	-	-	-	-	20	12
ESC	8.5	6	4.5	-	-	-	-	-	19	11.3
PCC	-	7	14.5	20	17	6	-	-	64.5	38.3
PEC	-	-	-	-	3	6	9	-	18	10.7
OEC	-	-	-	3	3	3	3	-	12	7.1
EEC	-	1.5	1	3	1	4	2	8	20.5	12.2
MC	✓	-	-	-	✓	✓	-	-	-	-
Total	20.5	23.5	27	26	24	19	20	8	168	100 %

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Enrollment for B.E. / B. Tech. (Honours) / Minor degree (Optional)

A student can also optionally register for additional courses (18 credits) and become eligible for Award of B.E./B.Tech. (Honours) Minor degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from Semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for Minor degree the student can register for courses from any one of the following verticals also.

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VERTICAL-1	VERTICAL-2	VERTICAL-3	VERTICAL-4	VERTICAL-5
Fintech and Block Chain	**Entrepreneurship**	**Public Administration**	**Business Data Analytics**	**Environment and Sustainability**
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

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VERTICALS FOR MINOR DEGREE (In addition to all the verticals of other Programs)

S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
VERTICAL 1: FINTECH AND BLOCK CHAIN											
1	23MD1E01	Financial Management	PME	3	0	0	3	3	40	60	100
2	23MD1E02	Fundamentals of Investment	PME	3	0	0	3	3	40	60	100
3	23MD1E03	Banking, Financial Services and Insurance	PME	3	0	0	3	3	40	60	100
4	23MD1E04	Introduction to Blockchain and its Applications	PME	3	0	0	3	3	40	60	100
5	23MD1E05	Fintech Personal Finance and Payments	PME	3	0	0	3	3	40	60	100
6	23MD1E06	Introduction to Fintech	PME	3	0	0	3	3	40	60	100
VERTICAL 2: ENTREPRENEURSHIP											
1	23MD1E07	Foundations of Entrepreneurship	PME	3	0	0	3	3	40	60	100
2	23MD1E08	Team Building and Leadership Management for Business	PME	3	0	0	3	3	40	60	100
3	23MD1E09	Creativity and Innovation in Entrepreneurship	PME	3	0	0	3	3	40	60	100
4	23MD1E10	Principles of Marketing Management for Business	PME	3	0	0	3	3	40	60	100
5	23MD1E11	Human Resource Management for Entrepreneurs	PME	3	0	0	3	3	40	60	100
6	23MD1E12	Financing New Business Ventures	PME	3	0	0	3	3	40	60	100
VERTICAL 3: PUBLIC ADMINISTRATION											
1	23MD1E13	Principles of Public Administration	PME	3	0	0	3	3	40	60	100
2	23MD1E14	Constitution of India	PME	3	0	0	3	3	40	60	100
3	23MD1E15	Public Personnel Administration	PME	3	0	0	3	3	40	60	100
4	23MD1E16	Administrative Theories	PME	3	0	0	3	3	40	60	100
5	23MD1E17	Indian Administrative System	PME	3	0	0	3	3	40	60	100
6	23MD1E18	Public Policy Administration	PME	3	0	0	3	3	40	60	100

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S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
VERTICAL 4: BUSINESS DATA ANALYTICS											
1	23MD1E19	Statistics for Management	PME	3	0	0	3	3	40	60	100
2	23MD1E20	Datamining for Business Intelligence	PME	3	0	0	3	3	40	60	100
3	23MD1E21	Human Resource Analytics	PME	3	0	0	3	3	40	60	100
4	23MD1E22	Marketing and Social Media Web Analytics	PME	3	0	0	3	3	40	60	100
5	23MD1E23	Operation and Supply Chain Analytics	PME	3	0	0	3	3	40	60	100
6	23MD1E24	Financial Analytics	PME	3	0	0	3	3	40	60	100
VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY											
1	23MD1E25	Sustainable infrastructure Development	PME	3	0	0	3	3	40	60	100
2	23MD1E26	Sustainable Agriculture and Environmental Management	PME	3	0	0	3	3	40	60	100
3	23MD1E27	Sustainable Bio Materials	PME	3	0	0	3	3	40	60	100
4	23MD1E28	Materials for Energy Sustainability	PME	3	0	0	3	3	40	60	100
5	23MD1E29	Green Technology	PME	3	0	0	3	3	40	60	100
6	23MD1E30	Environmental Quality Monitoring and Analysis	PME	3	0	0	3	3	40	60	100
7	23MD1E31	Integrated Energy Planning for Sustainable Development	PME	3	0	0	3	3	40	60	100
8	23MD1E32	Energy Efficiency for Sustainable Development	PME	3	0	0	3	3	40	60	100

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INDUCTION PROGRAMME

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

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

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

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

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

(i) Physical Activity
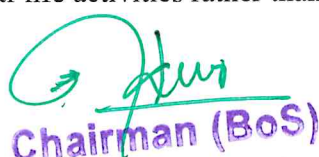
This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day 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 dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real-life activities rather than lecturing.

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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

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23HS1131	PROFESSIONAL COMMUNICATION	Category	L	T	P	C
		HSMC	3	0	0	3

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

- Engage learners in meaningful language activities to improve their reading and writing skills.
- Learn to use basic grammatical structures in suitable contexts.
- Help learners understand the purpose, audience, contexts of different types of writing.
- Develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- Demonstrate an understanding of job applications and interviews for internship and placements.

UNIT - I	Understanding comparisons and contrasts	9

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

UNIT - II	Writing reports and vocabulary	9

Reading - Reading longer technical texts, biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs, Writing - Paragraph writing, Short Report on an event (field trip etc.). Grammar - Active Passive Voice transformations, Infinitive and Gerunds, Past Tenses - Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms, Phrasal verbs.

UNIT - III	Description of process	9

Reading - advertisements, gadget reviews; user manuals, case studies, excerpts from literary texts, news reports etc. Writing – Writing definitions; instructions; and Product /Process description, Checklists, Problem solution essay / Argumentative Essay. Grammar – Degrees of comparison; Future Tenses; If conditional sentences. Vocabulary – Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT - IV	Classifications and Recommendations	9

Reading – Newspaper articles, Journal reports – and Non Verbal Communication (tables, pie charts etc,); Writing – Recommendations, Note-making / Note-taking - Transferring information from non verbal (chart , graph etc, to verbal mode). Grammar – Articles; Pronouns - Possessive & Relative pronouns, Reported Speech, Modals Vocabulary – Collocations.

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UNIT - V	Summation and Description	9

Reading – Reading editorials; and Opinion Blogs, Company profiles, Statement of Purpose; Writing – Essay Writing (Descriptive or narrative), Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses, Vocabulary - Cause & Effect Expressions – Content Vs Function words.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Compare and contrast products and ideas in technical texts.	Analyse
CO2	Identify cause and effects in events, industrial processes through technical texts.	Remember
CO3	Analyse problems in order to arrive at feasible solutions and communicate in the written format.	Analyse
CO4	Report events and the processes of technical and industrial nature.	Analyse
CO5	Present their opinions in a planned and logical manner, and draft effective resumes in context of job search.	Understand

TEXT BOOKS:

1	English for Engineers & Technologists, 2020 edition, Orient Blackswan Private Ltd. Department of English, Anna University.
2	Dr. KN. Shoba, and Dr. Lourdes Joevani, English for Science & Technology Cambridge University Press 2021. Francis, Department of English, Anna University.

REFERENCES:

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

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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	3	3	-	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	-	-	-
CO3	-	-	-	-	-	-	-	2	3	3	-	-	-	-
CO4	-	-	-	-	-	-	-	2	3	3	-	-	-	-
CO5	-	-	-	-	-	-	-	2	3	3	-	-	-	-
Avg.	-	-	-	-	-	-	-	2	3	3	-	-	-	-

Mapping of COs with POs and PSOs

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
3	0	0	3	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23GE1131	FUNDAMENTALS OF COMPUTER PROGRAMMING	Category	L	T	P	C
		ESC	2	1	0	3

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

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

UNIT - I	INTRODUCTION	9

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT - II	BASICS OF C PROGRAMMING	9

Introduction to programming paradigms – Applications of C Language - Structure of C program – C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process

UNIT - III	ARRAYS AND STRUCTURE	9

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search. Structure - Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility.

UNIT - IV	FUNCTIONS AND POINTERS	9

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT - V	FILE PROCESSING	9

Files –: Introduction to file management, Simple file management functions for text files. Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments.

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Demonstrate knowledge on C Programming constructs.	Applying
CO2	Develop simple applications in C using basic constructs.	Applying
CO3	Design and implement applications using arrays and structures.	Applying
CO4	Develop and implement modular applications in C using functions and pointers.	Applying
CO5	Design applications using sequential and random access file processing.	Applying

TEXT BOOKS:

1	ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2	Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition,Pearson Education, 2018.
2	Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3	Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",McGraw-Hill Education, 1996.
4	Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
5	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013
6	https://onlinecourses.nptel.ac.in/noc20_cs91
7	https://www.w3schools.com/c/index.php

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	2	2	-	-
CO2	3	3	3	3	2	-	-	-	-	-	2	2	-	-
CO3	3	3	3	3	2	-	-	-	-	-	2	2	-	-
CO4	3	3	3	3	2	-	-	-	-	-	2	2	-	-
CO5	3	3	3	3	2	-	-	-	-	-	2	2	-	-
Avg.	3	3	3	3	2	-	-	-	-	-	2	2	-	-

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ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)		End Semester Examination (ESE)
2	1	0	3	Theory only (40%)		Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23GE1132	ENGINEERING GRAPHICS	Category	L	T	P	C
		ESC	2	0	4	4

(Common to All Branches)

OBJECTIVES:

The Course will enable learners:

- To expose the students to follow the standards of Engineering Graphics.
- To draw the Engineering curves.
- To demonstrate the concepts of orthographic and isometric projections.
- To draw the section of solids and development of solids.
- To develop the ability to convey the engineering information through drawings.

UNIT - I	PLANE CURVES	6 + 12 =18

Geometrical construction, Curves used in engineering practices: Conic Sections- Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid - Construction of involutes - Drawing of tangents and normal to the above curves.

UNIT - II	PROJECTIONS OF POINTS, STRAIGHT LINES AND PLANES	6 + 12 =18

Projection of points, Projection of straight lines (First angle projections) inclined to both the planes - Determination of true lengths of a straight line and its inclinations with reference planes by rotating line method and traces of a line. Projection of oblique planes.

UNIT - III	PROJECTION OF SOLIDS	6 + 12 =18

Projection of solids like Prisms, Pyramids, Cylinder and Cone when the axis is inclined to one of the reference planes and parallel to the other by rotating object method.

UNIT - IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	6 + 12 =18

Introduction – Sections of solids like Prisms, Pyramids, Cylinders and Cones when the section plane is perpendicular to one of the principal planes and inclined to the other. Development of lateral surfaces of right solids - Prisms, cylinders, pyramids and cones.

UNIT - V	ORTHOGRAPHIC VIEWS AND ISOMETRIC PROJECTION	6 + 12 =18

Introduction – Conversion of pictorial views into orthographic views. Orthographic projection. Isometric drawing of Prisms, pyramids, cylinders and cones.

Introduction to AutoCAD

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)

TOTAL: 30 + 60 = 90 PERIODS

COURSE OUTCOMES -

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

COs	Description	Blooms Taxonomy Level
CO1	Construct the conic curves, involutes and cycloid.	Understand
CO2	Draw the practical problems involving projections of lines and planes.	Apply
CO3	Draw the projections of solids.	Apply
CO4	Draw projections of section of solids and development of surfaces.	Apply
CO5	Draw the Orthographic and isometric views of the objects	Apply

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TEXT BOOKS:

1	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
2	Natarajan K.V, "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

REFERENCES:

1	Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019
2	Gopalakrishnan K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017
3	Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015
4	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
5	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
6	Engineering Drawing Practice for Schools and Colleges BIS SP46:2003 (R2008), Published by Bureau of Indian Standards (BIS), 2008.
7	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.

NPTEL LINK:

1. https://nptel.ac.in/courses/112103019
2. https://nptel.ac.in/courses/112102304

LIST OF EQUIPMENTS/SOFTWARE NEEDED:

1. Computer with CAD software

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	2	2	-	-	-	1	-	-	2	-	-
CO2	2	2	2	2	2	-	-	-	1	-	-	2	-	-
CO3	2	2	3	3	2	-	-	-	1	-	-	2	-	-
CO4	3	2	3	2	3	-	-	-	1	-	-	2	-	-
CO5	3	3	3	3	3	-	-	-	1	-	-	2	-	-
Avg.	2.2	2	2.6	2.4	2.4	-	-	-	1	-	-	2	-	-

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ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
2	0	4	4	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted in to 40 marks for internal assessment.

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23GE1133	HERITAGE OF TAMILS	Category	L	T	P	C
		HSMC	1	0	0	1

Common to All Branches		
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 - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	3

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

UNIT - III	FOLK AND MARTIAL ARTS	3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, 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 Periods:15

TextBooks:	
1	Historical Heritage of the Tamils, Dr.S.V.Subatamanian, Dr.K.D. ThirunavukkarasuPublished by: International Institute of Tamil Studies.
2	The Contributions of the Tamils to Indian Culture, Dr.M.ValarmathiPublished by: International Institute of Tamil Studies.

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References:		
1		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)
2		Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
3		Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
1	0	0	1	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23MA1141	MATRICES & CALCULUS	Category	L	T	P	C
		BSC	2	1	2	4

(Common to All Branches)

OBJECTIVES:

The Course will enable learners:

- To examine the concepts of basic linear algebra techniques needed for deep learning algorithm.
- To familiarize the differential calculus.
- To familiarize the functions of several variables. This is needed in many branches of engineering.
- To understand the various techniques of integration.
- To illustrate the simple applications of multi variable calculus and vector calculus.

UNIT - I	MATRICES	6+3+6=15

Linear and orthogonal transformation (definitions) – Eigen values and eigen vectors – Properties of Eigen values – Cayley- Hamilton theorem– Reduction to diagonal form – Reduction of a quadratic form to canonical form–Nature of quadratic forms.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Calculate the characteristic equation
2. Finding the Eigen values and Eigen vectors.
3. Find diagonalization of a given matrix.

(Laboratory – 6)

UNIT - II	DIFFERENTIAL CALCULUS	6+3+6=15

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

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating the Limits & Continuity
2. Find the derivative of a function.
3. Determine the maxima and minima.

(Laboratory – 6)

UNIT - III	FUNCTIONS OF SEVERAL VARIABLES	6+3+6=15

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

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating Jacobian matrix of any function.
2. Find the Taylor's series for functions of two variables.
3. Evaluating the maxima and minima.

(Laboratory – 6)

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UNIT - IV	INTEGRAL CALCULUS	6+3+6=15

Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions – Integration of rational functions by partial fractions.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating definite integrals.
2. Evaluating indefinite integrals.
3. Evaluation techniques of integration.

(Laboratory – 6)

UNIT - V	MULTIPLE INTEGRALS &VECTOR CALCULUS	6+3+6=15

Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Applications: Moments and center of mass. Scalar and vector point functions – Gradient – Directional derivative – Divergence and curl – Irrotational and Solenoidal fields.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluation double integrals.
2. Evaluation triple integrals.
3. Evaluating directional derivative, divergence and curl.

(Laboratory – 6)

TOTAL: 30+15+30 = 75 PERIODS

COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Apply the concept of change quadratic form to canonical form in various fields of engineering.	Apply
CO2	Solve maxima & minima problems using rules of differentiation.	Apply
CO3	Solve the problems based on maxima and minima for functions of two variables using partial derivatives.	Apply
CO4	Determine integrals using techniques of integration such as, substitution, partial fractions and integration by parts.	Apply
CO5	Apply knowledge about evaluating double integrals, triple integrals and used to calculate area and volume. Understand the fundamentals in vector calculus.	Apply

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TEXT BOOKS:	
1.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2014.
2.	James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015.

REFERENCES:	
1	N. P. Bali, Manish Goyal "A Textbook of Engineering Mathematics", 8th Edition, Laxmi Publications, Delhi.
2	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons,10th Edition, New Delhi, 2016.
3	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
4	Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
5	S. S. Sastry "Engineering Mathematics" Volume 1, 4thEdition, PHI Learning private Limited, New Delhi, 2010.

NPTEL LINKS:	
1	https://archive.nptel.ac.in/courses/111/108/111108157/
2	https://nptel.ac.in/courses/111107112
3	https://archive.nptel.ac.in/courses/111/106/111106146/
4	https://archive.nptel.ac.in/courses/111/104/111104144/

LIST OF EQUIPMENTS/SOFTWARE NEEDED:

1. MATLAB

Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	-	-	-	-	2	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	2	-	-	1	-	-
CO3	3	3	3	2	-	-	-	-	2	-	-	2	-	-
CO4	3	3	3	2	-	-	-	-	2	-	-	2	-	-
CO5	3	3	3	2	-	-	-	-	2	-	-	1	-	-
Avg.	3	3	2.8	2.4	0	0	0	0	2	0	0	1.6	0	0

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ASSESSMENT SYSTEM:					
L	**T**	**P**	**C**	**Continuous Internal Examination (CIE)**	**End Semester Examination (ESE)**
2	1	2	4	Theory (25%) Laboratory (25 %)	Theory (35%) Laboratory (15%)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100*

*The weighted average shall be converted into 25 marks for internal assessment.

LABORATORY

Evaluation of Laboratory Record (100 Marks)	Model Practical Examination (100 Marks)	Total
75	25	100*

*Total marks shall be converted into 25 marks

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23PH1141	ENGINEERING PHYSICS	Category	L	T	P	C
		BSC	3	0	2	4

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:
- Introduce the basics of laser, fibre optics and its application.
- Impart the basic knowledge of quantum physics.
- Equip with the theories of electrical and thermal properties of conducting materials.
- Instill knowledge on physics of semiconductors, determination of charge carriers and device applications.
- Enable the students to gain knowledge of magnetic, superconducting materials and its application.

UNIT - I	LASER AND FIBRE OPTICS	9 + 6 =15

Lasers: Principles of spontaneous emission and stimulated Emission – Population Inversion – Einstein's coefficients A & B - Semiconductor lasers (Homo junction & Hetero junction) - **Fibre Optics**: Propagation of light in optical fibres - Numerical aperture and acceptance angle - Types of optical fibres (material, refractive index, and mode) – Fibre optic sensors: Pressure and Displacement sensors.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of divergence of laser beam.
2. Determination of acceptance angle and numerical aperture of an optical fibre.

(Laboratory – 6)

UNIT - II	QUANTUM MECHANICS	9 + 6 =15

Introduction – Origin of de-Broglie's concept of Matter waves – Physical significance of wave function – Schrödinger wave equation (Time dependent & time independent) – Electron beam in field free space - Electron beam in free state of step barrier - Quantum tunneling (concept only) – Tunneling microscope - Particle in rectangular box.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of Planck's constant by using light-emitting diodes (LEDs).
2. Determination particle size of Lycopodium powder using semiconductor laser.

(Laboratory – 6)

UNIT - III	PROPERTIES OF CONDUCTING MATERIALS	9 + 6 =15

Electrical Properties: Classical free electron theory – Expression for Electrical conductivity – Thermal conductivity – Wiedemann franz law – Drawbacks of classical free electron theory – Quantum theory – Fermi distribution function – Fermi energy and carrier concentration – Density of energy states.

(Theory – 9)

List of Exercise/Experiments:
1. To determine the resistance per unit length of a Carey Foster's bridge wire and resistivity of Unknown wire.
2. Determination of thermal conductivity of a bad conductor by Lee's disc method.

(Laboratory – 6)

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UNIT - IV	SEMICONDUCTOR PHYSICS	9 + 6 =15

Introduction - Intrinsic semiconductors: Carrier concentration in intrinsic semiconductors – Fermi level of intrinsic semiconductors – Variation of fermi level with temperature in intrinsic semiconductor – Extrinsic semiconductors: carrier concentration in n-type & p-type semiconductors – Fermi level of extrinsic semiconductors – variation of fermi level with temperature in extrinsic semiconductor– Hall effect – Reverse bias devices: Photo diodes – Solar cells.

(Theory – 9)

List of Exercise/Experiments:
1. Band gap determination of intrinsic semiconductor.
2. Determination of wavelength of semiconductor diode laser.

(Laboratory – 6)

UNIT - V	MAGNETIC AND SUPERCONDUCTING MATERIALS	9 + 6 =15

Magnetic Materials: Introduction – Origin of magnetic moment – Dia, Para and Ferromagnetic Magnetism – Hysteresis – Soft and Hard magnetic materials
Superconducting Materials: Principle of Superconductivity – Properties and types of superconductors – Application of superconductors: Magnetic levitation.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of hysteresis loss using B-H loop.
2. Determination of width of the groove of CD using laser.

(Laboratory – 6)

TOTAL: 45 + 30 = 75 PERIODS

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

Course Outcome	Description	Bloom's Taxonomy Level
CO1	Apply the comprehended knowledge about LASER and fibre optic communication system in various engineering applications.	Apply
CO2	Understand the fundamental principles of quantum mechanics.	Understand
CO3	Gain knowledge on classical and quantum electron theories and Thermal conductivity.	Understand
CO4	Analyse the working of semiconductor devices like Photo diodes and Solar cells.	Analyse
CO5	Interpret the properties of magnetic materials and their applications in superconducting devices.	Apply

TEXT BOOKS:
1. Bhattacharya D K, Poonam Tandon, Engineering Physics, Oxford University Press, 2017.
2. Gaur R K, Gupta S L, Engineering Physics, Dhanpat Rai Publication, 2016.
3. Avadhanulu M N, Kshirsagar P G and Arun Murthy TVS, A textbook of Engineering Physics 11th Edition, S.Chand and Company Ltd, New Delhi, 2018.

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REFERENCES:
1. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
2. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley 2012.
3. Kasap, S.O. Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

PRACTICAL REFERENCES:
1. A.K. Katiyar (Author), C.K. Pandey, Engineering Physics: Theory and Practical Paperback, 2015.

Learning Resources:
1. https://archive.nptel.ac.in/courses/113/106/113106039/
2. https://vlab.amrita.edu/?sub=1

Mapping of COs with POs and PSOs

COs/ POs	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
CO1	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	-	1	-	-	-	-	-	-	1	-	-
CO3	3	2	1	-	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	-	1	-	-	-	-	-	-	1	-	-
CO5	3	-	-	1	2	-	-	-	-	-	-	1	-	-
Avg.	3	2.3	1	1	1.3	-	-	-	-	-	-	1	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
3	0	2	4	Theory (25%) Laboratory (25 %)	Theory (35%) Laboratory (15 %)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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LABORATORY		Total
Evaluation of Laboratory Record (100 Marks)	**Model Practical Examination (100 Marks)**	
75	25	100*
* Total marks shall be converted into 60 marks		

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23GE1151	PROGRAMMING IN C LABORATORY	Category	L	T	P	C
		ESC	0	0	3	1.5

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

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

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. Search, generate, manipulate data using MS office/ Open Office
2. I/O statements, operators, expressions
3. decision-making constructs: if-else, goto, switch-case, break-continue
4. Loops: for, while, do-while
5. Arrays: 1D and 2D, Multi-dimensional arrays, traversal
6. Strings: operations
7. Functions: call, return, passing parameters by (value, reference), passing arrays to function.
8. Recursion
9. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
10. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
11. Files: reading and writing, File pointers, file operations, random access, processor directives.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Demonstrate knowledge on C programming constructs.	Applying
CO2	Develop programs in C using basic constructs.	Applying
CO3	Develop programs in C using arrays and structures.	Applying
CO4	Develop applications in C using strings, pointers, functions.	Applying
CO5	Develop applications in C using file processing.	Applying

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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Mapping of COs with POs and PSOs														
CO1	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO2	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO3	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO4	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO5	3	3	3	3	2	-	-	-	2	2	3	2	-	-
Avg.	3	3	3	3	2	-	-	-	2	2	3	2	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
0	0	3	1.5	Laboratory only (60 %)	Laboratory only (40 %)

LABORATORY

Evaluation of Laboratory Record (100 Marks)	Model Practical Examination (100 Marks)	Total
75	25	100*
* Total marks shall be converted into 60 marks		

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23EE1201	ELECTRIC CIRCUIT ANALYSIS	Category	L	T	P	C
		PCC	3	1	0	4

OBJECTIVES:

The Course will enable learners to:

- ❖ Impart knowledge on solving circuits using circuit laws
- ❖ Impart knowledge on solving circuits using network theorems
- ❖ Understand the concepts of phasor diagram, power and power factor in three phase circuits.
- ❖ Star Delta Conversion
- ❖ Educate on obtaining the steady and transient response of circuits.

UNIT - I	BASIC CIRCUITS	9 + 3 =12

Fundamentals concepts of R, L, and C elements – Star Delta Conversion – Resistors in series parallel combination – division rules – Voltage and current Sources – Transformations – Ohm's Law – Kirchhoff 's Laws – A.C Circuits – Average value and RMS value, Power triangle – Power Factor – Complex Power Steady – Mesh and Nodal Analysis for DC and AC Circuits.

UNIT - II	NETWORK THEOREMS	9 + 3 =12

Introduction - Thevenin's Theorem – Norton's Theorem – Superposition Theorem – Maximum Power Transfer Theorems – for DC and AC Circuits.

UNIT - III	THREE PHASE CIRCUITS	9 + 3 =12

Introduction – Advantages of three phase system – Relationship between Line and Phase Voltage and Currents in a Star Connection and Delta Connection –Phasor diagram – Measurement of Power and Power Factor –Two wattmeter method.

UNIT – IV	RESONANCE, COUPLED CIRCUITS AND FILTERS	9 + 3 =12

Series and Parallel resonance – frequency response – Quality factor, Bandwidth – Self and mutual inductance – Coefficient of coupling – Series Connection of Coupled Coils – Dot rule in coupled circuits .
Filters: Low pass – High pass –Band pass filters

UNIT - V	TRANSIENT RESPONSE ANALYSIS	9 + 3 =12

Introduction – Laplace Transformation –Inverse Laplace –Step response of Series RL, RC and RLC Circuits – Step response of Parallel RL RC and RLC Circuits using Laplace transform.

Time domain: RL and RC series circuits

TOTAL: 45 + 15= 60 PERIODS

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COURSE OUTCOMES:

Course Outcome	Description	Bloom's Taxonomy Level
CO1	Apply the basic fundamental circuit laws to solve DC/AC circuits	Apply
CO2	Apply the network theorems to solve AC/ DC circuits	Apply
CO3	Illustrate the and measurement of three phase circuits	Apply
CO4	Compute the effect of resonance coupled and filter circuits	Apply
CO5	Analyze the transient response of first order and second order	Analyze

TEXT BOOKS:

1	Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, [2003. Change latest]
2	Sudhakar A, Shyam Mohan SP, "Circuits and Networks: Analysis and Synthesis" TataMcGraw-Hill , NewDelhi,2015.

REFERENCES:

1	William Hayt, Jack Kemmerly, Steven Durbin,"Engineering Circuit Analysis",Tata McGraw Hill, NewDelhi, 2016.
2	ParanjothiSR,"ElectricCircuitAnalysis",4th edition, New Age International Ltd., NewDelhi, 2013.
3	ChakrabartiA,"Circuit Theory(Analysis and Synthesis)",DhanpathRai&Sons, NewDelhi,2018.
4	Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill,First Edition, 2019
5	https://onlinecourses.nptel.ac.in/noc20_ee64/preview http://www.digimat.in/nptel/courses/video/108105159/L28

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	1	-	3	3	3
CO2	3	3	3	3	1	-	-	-	-	1	-	3	3	3
CO3	3	3	3	3	1	-	-	-	-	1	-	3	3	3
CO4	3	3	3	3	1	-	-	-	-	1	-	3	3	3
CO5	3	3	3	3	1	-	-	-	-	1	-	3	3	3
Avg.	3	3	3	3	1	-	-	-	-	1	-	3	3	3

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ASSESSMENT SYSTEM:					
L	T	P	C	**Continuous Internal Examination (CIE)**	**End Semester Examination (ESE)**
3	1	0	4	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION :

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100
*The weighted average shall be converted into 40 marks for internal assessment.				

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23EE1202	ANALOG ELECTRONICS	Category	L	T	P	C
		PCC	3	0	0	3

OBJECTIVES:

The Course will enable learners to:

❖ Expose the semiconductor devices and Transistors.
❖ Study the operation of amplifiers an tunned amplifiers.
❖ Study about feedback amplifiers and oscillators.
❖ Understand operational amplifier and filters
❖ Use the ICs in power supply.

UNIT - I	SEMICONDUCTOR DEVICES AND TRANSISTORS	9

Simple Diode Circuits: PN junction diode, Zener diode, Applications: Rectifiers – Half Wave and Full Wave Rectifier, Zener as regulator – Clipping and Clamping.

Transistors: Characteristics of BJT–Transistor Biasing –Operating Point,MOSFET, UJT –structure, load line and V-I characteristics.

UNIT - II	AMPLIFIERS AND TUNED AMPLIFIERS	9

AMPLIFIERS: Small signal model – Differential amplifier using BJT – Impedance matching – Common mode and Difference mode analysis-Gain and frequency response.

Tuned Amplifiers – Frequency Response of Single and Double Tuned Amplifier.

UNIT - III	FEEDBACK AMPLIFIERS AND OSCILLATORS	9

Feedback Amplifiers: Negative feedback – Advantages of negative feedback – Analysis of Voltage / Current, Series,Shunt feedback Amplifiers – positive feedback.

Oscillators: Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators

UNIT - IV	OPERATIONAL AMPLIFIERS	9

OPAMP: Op Amp 741 – Instrumentational amplifier – VI characteristics –Voltage-shunt feedback and inverting amplifier – Voltage series feedback – D/A converter(R-2R ladder and weighted resistor types), A/D converters using OP-AMPs.

Filters: Design of filters.

UNIT - V	Applications of ICs	9

ICs : Functional block – characteristics of 555 Timer – PWM application – IC voltage-regulators – LM78XX, LM79XX – Fixed voltageregulators its application as Linear power supply –LM317, 723 regulators.

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

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

Course Outcome	Description	Bloom's Taxonomy Level
CO1	Describe the operation of semiconductor devices and Transistors	Understand
CO2	Explain the working differential and tunned amplifiers	Understand
CO3	Understand feedback amplifiers and oscillator principles	Understand
CO4	Explain operational Amplifiers and Filters.	Understand
CO5	Examine and identify ICs for various applications	Applying

TEXT BOOKS:

1	Donald.A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 3rd Edition, 2010
2	D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', , New Age, Fourth Edition, 2018

REFERENCES:

1	R.S.Sedha. " A Text book of Applied Electronics" S.Chand and company,New delhi Ltd, Revised Edition 2022
2	D.Schilling and C.Belove, "Electronic Circuits", McGraw Hill, 3 rd Edition, 1989
3	Fiore,"Opamps& Linear Integrated Circuits Concepts & applications", Cengage, 2010
4	Learning Resources : https://archive.nptel.ac.in/courses/108/105/108105158/ https://onlinecourses.nptel.ac.in/noc23_ee77/

Mapping of COs with POs and PSOs

COs/ POs	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
CO1	3	2	1	-	1	-	-	-	-	1	-	-	2	2
CO2	3	2	1	-	1	-	-	-	-	1	-	-	2	2
CO3	3	2	1	-	1	-	-	-	-	1	-	-	2	2
CO4	3	2	1	-	1	-	-	-		1	-	2	2	2
CO5	3	2	1	-	1	-	-	-	-	1	-	2	2	2
Avg.	3	2	1	-	1	-	-	-	-	1	-	2	2	2

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ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
3	0	0	3	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION :

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23CS1231	PYTHON PROGRAMMING	Category	L	T	P	C
		ESC	2	1	0	3

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

- Understand the basics of problem solving.
- Illustrate the concept of control structures and string operations
- Develop the logical thinking abilities using functions.
- Create programs using list, tuples and dictionaries.
- Implement file handling and exceptions in program.

UNIT - I	INTRODUCTION TO PYTHON PROGRAMMING	9

Fundamentals of Computing – Identification of Computational Problems - Need for Computer languages-Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language)-algorithmic problem solving.

Introduction to Python-Running python-The first program- Arithmetic operators-Values and Types-Assignment statements-variables names-expression and statements-order operations-comments-debugging.

UNIT - II	CONDITIONALS AND ITERATION	9

Conditionals : Floor division and modulus-Boolean expressions-Logical operators-conditional execution-alternative execution-chained conditionals- Nested conditionals

Iteration: Reassignment-updating variables-the while statements-break-square root -algorithms-Strings: len-traversal with for loop-slices-strings are immutable-searching-looping and counting-string methods-The in operator-comparison.

UNIT - III	FUNCTIONSAND FRUITFUL FUNCTIONS	9

Functions: Function calls-Math functions-composition-adding new functions-definitions and uses-flow of execution-parameters and arguments-variables and parameters are local-stack diagram-fruitful functions and void.

Fruitful functions: Return values- Increment development-composition-boolean functions- recursive functions-more recursion examples.

UNIT - IV	COLLECTIONS	9

List: A list is a sequence-mutable-traversing a list-list operations-slices-methods-map,filter and reduce, deleting elements-list and strings –aliasing-list artguments

Dictionary: Mapping- collection of counters-looping and dictionaries-reverse lookup-dictionaries and lists-memos-Global variables.

Tuples: Tuples are immutable- assignment- return vales-variable length argument tuples-list and tuples

dictionaries and tuples-sequences of sequences.

UNIT - V	FILE HANDLING AND EXCEPTIONS	9

Files: Persistence-Reading and writings-format operator-filenames and paths- catching exceptions-databases-pickling-pipes-writing modules-Overview of Numpy and pandas packages.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

Course	Description	Bloom's
CO1	Select appropriate algorithm to simple computational problems	Remember
CO2	Demonstrate various control constructs	Understand
CO3	Construct Python program using functions.	Apply
CO4	Illustrate python programs using list, tuples and dictionary concepts	Apply
CO5	Interpret and handle data using file operations	Apply

TEXT BOOKS:

1	Karl beecher,"Computational thinking:A Beginner's guide to problem solving and Programming",Firstedition,BCS learning and Development limited ,2017.
2	Allen B.Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python3, Shroff/O'Reilly Publishers,2016 (http://greenteapress.com/wp/think-python/)

REFERENCES:

1	Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem Solving Focus,2nd Edition, Wiley India Edition, 2017.
2	Martic C Brown, Python: The Complete Reference, 4th Edition, McGraw Hill Publishers, 2018.
3	Eric Matthes, Python Crash Course: A Hands-On, Project-Based Introduction to Programming, 2nd Edition, No starch Press, 2019.
4	Kenneth A. Lambert, "Fundamentals of Python: First Programs" ,CENGAGE Learning, 2012.
6	https://archive.nptel.ac.in/courses/106/106/106106182/

Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	2	2	3		
CO2	3	3	3	3	2	-	-	-	-	-	2	2	3		
CO3	3	3	3	3	2	-	-	-	-	-	2	2	3		

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CO4	3	3	3	2	1	-	-	-	-	-	2	1	3		
CO5	2	2	2	2	1	-	-	-	-	-	1	1	2		
Avg.	3	3	3	3	2	-	-	-	-	-	2	2	3		

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
2	1	0	3	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23GE1232	TAMILS AND TECHNOLOGY	Category	L	T	P	C
		HSMC	1	0	0	1

<div align="center">Common to All Branches</div>

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

UNIT - III	MANUFACTURING TECHNOLOGY	3

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

UNIT - IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

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

UNIT - V	SCIENTIFIC TAMIL & TAMIL COMPUTING	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.

<div align="right">Total Periods:15</div>

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Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

References:	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
2	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, TamilNadu)

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
1	0	0	1	Theory only (40%)	Theory only (60%)

CONTINUOUS INTERNAL EXAMINATION:

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100

*The weighted average shall be converted into 40 marks for internal assessment.

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23MA1241	PROBABILITY AND STATISTICS	Category	L	T	P	C
		BSC	2	1	2	4

(Common to All Branches)

OBJECTIVES:

The Course will enable learners:

- To provide the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To acquire the knowledge of statistical quality control.

UNIT - I	PROBABILITY AND RANDOM VARIABLES	6+3+6=15

Introduction – Definitions of Probability – Total Probability and the Baye's Theorem – Independent Events – Random variables – Definition – Distribution function – Discrete and Continuous random Variables – Expectation – Moment of random Variables and the Variance – Binomial, Geometric, Poisson, Exponential, Uniform and Normal distributions.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Introduction to Python through Probability.
2. Finding the Conditional probability.
3. Evaluating Normal distributions.

(Laboratory – 6)

UNIT - II	TWO - DIMENSIONAL RANDOM VARIABLES	6+3+6=15

Introduction – Joint Distributions – Properties – Marginal and conditional distributions – Discrete and Continuous Random variables – Covariance and Correlation Coefficient – Linear regression – Application of the Transformation method – Central Limit Theorem.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating the Covariance.
2. Finding the Correlation.
3. Plotting the Random Variable.

(Laboratory – 6)

UNIT - III	MEASURES OF DISPERSION	6+3+6=15

Measures of Central tendency – Mean, Median and Mode – Measure of Dispersion – Skewness and Kurtosis – Coefficient of Dispersion – Graphical Representation of Frequency distribution.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating the Mean, Median and Mode.
2. Evaluating the Karl Pearson's Coefficient of Skewness.
3. Evaluation of Coefficient of Dispersion.

Laboratory – 6)

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UNIT - IV	TESTING OF HYPOTHESIS	6+3+6=15

Hypothesis testing: One sample and two sample test for means and proportions of large samples (Z-test), One sample and two sample test for means of small samples (t-test). Chi-square – Independence of Attribute and Goodness of fit – F distributions for equality of variances.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating large samples.
2. Evaluating small sample using Chi-square test.
3. Evaluation of small sample using F distribution.

(Laboratory – 6)

UNIT - V	STATISTICAL QUALITY CONTROL	6+3+6=15

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

List of Exercise/Experiments: (Theory – 6, Tutorial – 3)

1. Evaluating X and R charts.
2. Evaluating p, c and np charts.
3. Evaluating Tolerance limits.

(Laboratory – 6)

TOTAL: 30+15+ 30 = 75 PERIODS

COURSE OUTCOME:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Illustrate the knowledge of the fundamental concepts of probability and standard distributions which can describe real life phenomenon.	Apply
CO2	Understand the basic concepts of two dimensional random variables and apply in engineering applications.	Apply
CO3.	Apply the concepts of measures of central tendency and measures of dispersion in real life problems.	Apply
CO4	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO5	Understand and apply the concepts of statistical quality control in engineering problems.	Apply

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	TEXT BOOKS:
1	Oliver C.Ibe., "Fundamentals of Applied and Random Processes", Elsevier, New Delhi, 2005.
2	Gupta, S.C, and Kapur, J.N., "Fundamentals of Mathematical Statistics", Sultan Chand, 11th edition, New Delhi, 2002.
3	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th edition, 2007.
	REFERENCES:
1	Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014.
2	Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.
3	Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
4	Johnson, R.A., Miller, I and Freund J.,"Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2011.
5	R.C.Gupta, "Statistical Quality Controls", 8th Edition, Khanna Publishers, Delhi, 2008.
	NPTEL LINKS:
1	https://archive.nptel.ac.in/courses/111/102/111102111/
2	https://archive.nptel.ac.in/courses/111/105/111105090/
3	https://nptel.ac.in/courses/111104146
4	https://nptel.ac.in/courses/110105087

LIST OF EQUIPMENTS / SOFTWARE:

1. Python - Open source

Mapping of COs with POs and PSOs
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	-	-	-	-	2	-	1	2	-	-
CO2	3	2	2	3	-	-	-	-	2	-	-	2	-	-
CO3	3	2	2	3	-	-	-	-	2	-	1	2	-	-
CO4	3	2	2	3	-	-	-	-	2	-	-	2	-	-
CO5	3	2	2	3	-	-	-	-	2	-	-	1	-	-
Avg.	3	2	2	3	0	0	0	0	2	0	1	1.8	0	0

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ASSESSMENT SYSTEM:					
L	**T**	**P**	**C**	**Continuous Internal Examination (CIE)**	**End Semester Examination (ESE)**
2	1	2	4	Theory (25%) Laboratory (25 %)	Theory (35%) Laboratory (15%)

CONTINUOUS INTERNAL EXAMINATION:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	
Other Assessment Methods	Quizzes (10 MCQ per unit)		20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test		20	
				100*

*The weighted average shall be converted into 25 marks for internal assessment.

LABORATORY

Evaluation of Laboratory Record (100 Marks)	Model Practical Examination (100 Marks)	Total
75	25	100*

*Total marks shall be converted into 25 marks

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23CY1141	ENGINEERING CHEMISTRY	Category	L	T	P	C
		BSC	3	0	2	4

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:
- Inculcate sound understanding of water quality parameters and water treatment techniques.
- Introduce the principles of electrochemical reactions.
- Impart knowledge about various methods for corrosion prevention and protection of materials.
- Familiarize the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Facilitate the understanding of the basic concepts of polymer chemistry and the basic principles and preparatory methods of nanomaterials.

UNIT - I	WATER TREATMENT	9 + 6 =15

Introduction - Characteristics imparted by impurities in water - Hardness of water - Equivalents of calcium carbonate - Units of hardness - Scale and sludge formation in boilers - Caustic embrittlement - Boiler Corrosion - Priming and foaming - Softening methods - (Internal: Colloidal, phosphate, Calgon and sodium aluminate - External: Ion exchange process, Zeolite Process) - Drinking water or Municipal water - Desalination of brackish water: Reverse osmosis.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Determination of chloride content of water sample by Argentometric method.

(Laboratory – 6)

UNIT - II	ELECTROCHEMISTRY	9 + 6 =15

Introduction - Types of conductors - Conductance in electrolytic solution - factors affecting conductance - Electrochemical cell - Electrode potential and EMF of a galvanic cell - Measurement of electrode potential - Electrochemical series and its applications - Nernst equation (derivation), numerical problems - types of electrodes - reference electrode (calomel) - ion selective electrode - glass electrode. E-vehicles.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of the amount of NaOH using a conductivity meter.
2. Determination of the amount of acids in a mixture using a conductivity meter.

(Laboratory – 6)

UNIT - III	CORROSION AND ITS CONTROL	9 + 6 =15

Introduction - Dry corrosion - Wet Corrosion - Mechanism of Dry and wet corrosion - Galvanic corrosion - Concentration cell corrosion - Pitting corrosion - Intergranular corrosion - Waterline corrosion - Factors influencing corrosion - Corrosion control - Sacrificial anode and impressed current cathodic method.

(Theory – 9)

List of Exercise/Experiments:
1. Corrosion experiment – Weight loss method.
2. Determination of dissolved oxygen content in water sample by Winkler's method.

(Laboratory – 6)

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UNIT - IV	ENERGY SOURCES AND STORAGE DEVICES	9 + 6 =15

Introduction - Nuclear fission - Nuclear fusion - Nuclear reactor - Breeder reactor - Solar energy conversion: Principle, working and applications of solar cells. Wind energy. Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery; Fuel cells: H_2-O_2 fuel cell.

(Theory – 9)

List of Exercise/Experiments:
1. Estimation of the iron content of the given solution using a potentiometer.
2. Determination of strength of Dil.H_2SO_4 using a conductivity meter.

(Laboratory – 6)

UNIT - V	SMART MATERIALS FOR ENGINEERING APPLICATIONS	9 + 6 =15

Polymers - types of polymerization (addition, condensation and copolymerization only) – mechanism of addition polymerization (free radical mechanism only) – Preparation, properties and uses of polyvinyl chloride (PVC) and polyamides (nylon – 6,6).

Nanomaterials : Introduction – properties of nano materials - Preparation – top-down process (Laser ablation method only) - bottom-up process (Electro deposition method only) – Applications of nanomaterials in various fields.

(Theory – 9)

List of Exercise/Experiments:
1. Determination of concentration of $BaCl_2$ by conductometric titrations.
2. Preparation of ZnO nanocrystal by precipitation method.

(Laboratory – 6)

TOTAL: 45 + 30 = 75 PERIODS

COURSE OUTCOMES

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

Course Outcome	Description	Bloom's Taxonomy Level
CO1	Identify the quality of water from quality parameter data and apply suitable treatment methodologies to treat water.	Apply
CO2	Examine the principle and working of various electrochemical cells.	Analyze
CO3	Implement the concept of corrosion and its control.	Apply
CO4	Recognize different forms of energy resources and apply them for suitable applications in energy sectors.	Apply
CO5	Apply the basic concepts of polymer chemistry and nano-science in designing the materials for engineering and technology applications.	Apply

TEXT BOOKS:

1.	P. C. Jain and Monika Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2022.
2.	S.S.Dara and S.S.Umare, "A Text book of Engineering Chemistry", 12th Edition, S.Chand & Company, New Delhi, 2013.
3.	Shikha Agarwal, "Engineering Chemistry", Cambridge University Press, New Delhi, 2015.

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	REFERENCES:
1.	V.R.Gowarikar, Polymer Science, 2nd edition, New Age International Publishers, 2021.
2.	J.C.Kuriacose and J.Rajaram, "Chemistry in Engineering and Technology", Volume-1 & Volume-2, Tata McGraw-Hill Education Pvt. Ltd., 2010.
3.	Geoffrey A.Ozin, Andre C. Arsenault and Ludovico Cademartiri, "Nanochemistry: A Chemical Approach to Nanomaterials", 2nd Edition, RSC publishers, 2015.
4.	Prasanna Chandrasekhar, "Conducting polymers, fundamentals and applications– Including Carbon Nanotubes and Graphene", Second Edition, Springer Science & Business Media, NewYork, 2019.
5.	J.Mendham, R.C.Denney, J.D.Barnes, M. J.K.Thomas and B.Sivasankar, "Vogel's Quantitative Chemical Analysis", 6th edition, Pearson Education Pvt. Ltd., 2019.

NPTEL LINKS:

1.	https://nptel.ac.in/courses/113101098
2.	https://nptel.ac.in/courses/113105102
3.	https://archive.nptel.ac.in/courses/104/105/104105039/

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	1	1	-	-	-	-	1	-	-
CO2	3	2	-	-		1	2	-	-	-	-	1	-	-
CO3	3	2	-	-	-	1	2	-	-	-	-	1	-	-
CO4	3	1	2	1	-	2	2	-	-	-	-	2	-	-
CO5	3	2	-	-	-	1	2	-	-	-	-	1	-	-
Avg.	3	2	1	1	-	1	2	-	-	-	-	1	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
3	0	2	4	Theory (25%) Laboratory (25 %)	Theory (35%) Laboratory (15 %)

CONTINUOUS INTERNAL ASSESSMENT:

THEORY

Assessment	Portions	Duration	Max. Mark	Max CIE Marks
CIE - 1	2.5 units	3 Hours	100	Best 2 out of 3 and Converted to 60
CIE - 2	2.5 units	3 Hours	100	
Improvement / Missed Test	2.5 units	3 Hours	100	

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Other Assessment Methods	Quizzes (10 MCQ per unit)	20	40
	Assignment / Case Study / Seminar / Tutorial / Mini Project / Open Book Test	20	
			100

*The weighted average shall be converted into 40 marks for internal assessment.

LABORATORY		Total
Evaluation of Laboratory Record (100 Marks)	Model Practical Examination (100 Marks)	
75	25	100*

* Total marks shall be converted into 60 marks

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23CS1251	PYTHON PROGRAMMING LABORATORY	Category	L	T	P	C
		ESC	0	0	3	1.5

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

- To familiarize with Python programming constructs.
- To learn basic programming constructs in Python
- To use Python data structures-Lists,tuples and Dictionaries
- To do input and output with files using python
- To develop solutions for real time applications

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. Variables ,Expressions, Arithmetical operations
2. Selective statements and Iterative statements
3. String operations-Palindrome, substring, length of string
4. Functions, Fruitful functions, Call –by-value and Call-by-reference , Recursion
5. List- Create a list, Slicing, add elements in list, find prime number
6. Dictionary - Create, convert list to dictionary, Change Value of Dictionary
7. Tuples - Create, Iterating through a Tuple, Check if an Item Exists in the Python Tuple
8. Packages – Installation and simple programs
9. Files and Exceptions.
10. Python based Solution to real world problem 1
11. Python based Solution to real world problem 2
12. Python based Solution to real world problem 3

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Demonstrate knowledge on Python programming constructs.	Applying
CO2	Develop programs in python using Functions	Applying
CO3	Implementation Python data structures	Applying
CO4	Develop python programs using functions.	Applying
CO5	Develop applications in python for real time problems	Applying

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
							Mapping of COs with POs and PSOs							
CO1	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO2	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO3	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO4	3	3	3	3	2	-	-	-	2	2	3	2	-	-
CO5	3	3	3	3	2	-	-	-	2	2	3	2	-	-
Avg.	3	3	3	3	2	-	-	-	2	2	3	2	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
0	0	3	1.5	Laboratory only (60 %)	Laboratory only (40 %)

LABORATORY		Total
Evaluation of Laboratory Record (100 Marks)	**Model Practical Examination (100 Marks)**	
75	25	100*
* Total marks shall be converted into 60 marks		

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23GE1251	COMMUNICATION LABORATORY	Category	L	T	P	C
		HSMC	0	0	3	1.5

(Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

- Provide self-paced learning to consolidate their understanding of advanced grammar and vocabulary Methods
- Equip the students with the LSRW skills required to handle advanced communication situations in English
- Speak in simple sentences without any hesitation
- Draft basic formal written communication
- To provide audio and video support to ensure meaningful skill acquisition

UNIT - I	GRAMMAR	9

Types of Sentences - Tenses & Voice- Concord - Auxiliary-Infinitive – Article - preposition - Comparative and Superlative adjective. Discourse Markers - Linkers: sequential – past time (later) Connecting words expressing cause and effect, contrast. Markers to structure informal spoken discourse Verb forms Wh- and Yes/No Questions in present / past Complex question tags

Broader range of intensifiers; So, such, too, enough, Connecting words expressing cause and effect, contrast.

UNIT - II	LISTENING	9

Short conversations / monologues: numbers and spelling (dates, prices, percentages, figures, etc.)

and locate specific information, longer monologue and note taking - gap filling, Understanding the gist and extracting main idea. Conversation between two employees – Description of gadgets – Enquiring about orders and deliveries – Chasing an order: Telephone Conversations – Radio Interview – Voicemail messages and phone conversations – Welcome speech at a conference – Statistical information,

UNIT - III	SPEAKING	9

Talking about oneself, agreeing and disagreeing, expressing preferences - mini-presentation on a business theme (Oral) - Giving information and expressing opinions - discussion on business - related topics - Helping students in achieving clarity and fluency; manipulating paralinguistic features of speaking (voice modulation, pitch, tone stress, effective pauses) Conducting Task oriented interpersonal, informal and semiformal Speaking / Classroom Presentation - Teaching strategies for Group Discussion - Teaching Cohesion and Coherence - Teaching effective communication & strategies for handling criticism and adverse remarks - Teaching strategies of Turn- taking, effective intervention, and courtesies, Role Play, Mock & HR Interview.

UNIT - IV	READING	9

Short texts and understand the main message (signs, messages, postcards, notes, emails, labels) – Read and find specific information- Interpreting visual information-Comprehend detailed factual information—gather the gist- understand grammar and structure of the given passage- transferring information - Radio Commentary, Technical Texts and Case Studies - Guiding students for Intensive & Extensive Reading – Reading notices, messages, adverts, leaflets, contents pages, graphs, charts,

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tables, business letters, product descriptions, reports, minutes, newspaper or magazine articles, memos.

UNIT - V	WRITING	9

Internal written communication - short messages to colleagues - note, message, memo, email-External communication - letter, email, notice-set phrases for letters and e-mails-Cohesive devices - All varieties of Technical Report, Business Letters and Job Application - Punctuation & Spelling, Semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs - Organizational Communication: Memo, Notice, Circular, Agenda / Minutes

TOTAL = 45 PERIODS

COURSE OUTCOMES:

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

Course Outcome	Description	Blooms Taxonomy
CO1	Understand and apply the basic grammar and learn the range of vocabulary	Understand
CO2	Listen enthusiastically and consolidate the messages and information of monologues and dialogues	Remember
CO3	Convey the views and opinions clearly in simple sentences	Apply
CO4	Read and comprehend the statistics and texts with clear understanding	Analyse
CO5	Write the contexts relevant to the topics efficiently.	Understand

TEXT BOOKS:

1	Whitby Norman, Business Benchmark Pre-Intermediate to Intermediate Student's Book CUP Publications, 3rd Edition, 2018
2	Wood Ian, Williams Anne, Cowper Anna, Pass BEC Preliminary , Cengage Learning, 2n Edition, 2015.

REFERENCES:

1	BEC Preliminary – Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000.
2	Hewings Martin – Advanced grammar in use- Upper-Intermediate Proficiency, CUP, 3r Edition, 2013.

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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
							Mapping of COs with POs and PSOs								
CO1	2	-	-	-	-	-	-	-	2	3	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	2	3	-	-	-	-	-
CO3	2	-	-	-	-	-	-	1	2	3	-	-	-	-	-
CO4	2	-	-	-	-	-	-	2	-	3	-	-	-	-	-
CO5	2	-	-	-	-	-	-	1	-	3	-	-	-	-	-
Avg.	2	-	-	-	-	-	-	1	2	3	-	-	-	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
0	0	3	1.5	60	40

CONTINUOUS INTERNAL ASSESSMENT:

LABORATORY		
Evaluation of Laboratory Record (100 Marks)	Model Practical Examination (100 Marks)	Total
75	25	100*
* Total marks shall be converted into 60 marks		

J.C. 2/8/23
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23GE1252	**ENGINEERING EXPERIENCE LAB**	Category	L	T	P	C
		EEC	0	0	3	1.5

<div align="center">(Common to All Branches)</div>

OBJECTIVES:

The Course will enable learners:

- To provide exposure to the students with hands on experience on various basic engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & MECHANICAL)

PART - I	CIVIL ENGINEERING PRACTICES	10

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 and delivery side of a pump

CARPENTRY WORK:

a) Sawing and Planning work

b) Making joints like T-Joint, Cross lap joint, Mortise joint and Tenon joint.\

c) Making of Mini Table, Hammer Handle, Bench, Pencil holder box, etc (Any one)

PART II	MECHANICAL ENGINEERING PRACTICES	13

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Welding of Ladder, Truss Section, Frame, Channel, Tablet / Phone stand, Metal box, etc(Any one)

c) Practicing gas welding.

BASIC MACHINING WORK:

a) (Simple) Turning.

b) (Simple) Drilling and Tapping.

SHEET METAL WORK:

a) Making of a square tray, Funnel.

STUDY EXERCISE:

a) Study of centrifugal pump, household mixer and air conditioner.

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GROUP – B (ELECTRICAL & ELECTRONICS)		
PART III	**ELECTRICAL ENGINEERING PRACTICES**	**12**
	a) Introduction to one way ,Two way and Stair case wiring b) Introduction to Lighting system – CFL, LED, FL c) Energy measurement using Analog and Digital Meters d) Measure the Voltage and current of Fan Regulators(Resistor Type and Electronic Type) e) Study of Electrical and fire safety	
PART IV	**ELECTRONIC ENGINEERING PRACTICES**	**10**
	a) Study and Types of PCBs b) Soldering practice on PCB and Measurement the Resistance values c) Design of full wave Rectifier with & without filter d) Calibrate and Measurement of Different AC parameters using CRO (Peak - Peak, RMS Period, Frequency) e) Study and Familiarization of Linked in.	
	TOTAL: 45 PERIODS	

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

Course Outcome	Description	Blooms Taxonomy Level
CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household woodwork.	Apply
CO2	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping.	Apply
CO3	Making of a basic sheet metal component.	Apply
CO4	Perform Staircase & Lamp wiring and realize the importance of Electrical safety	Apply
CO5	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	Apply

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Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	2	-	-	-	1	-	2	-	-	1	-	-
CO2	2	-	2	-	-	-	1	-	2	-	-	1	-	-
CO3	2	-	2	-	-	-	1	-	2	-	-	1	-	-
CO4	2	-	2	-	-	-	1	-	2	-	-	1	-	-
CO5	2	-	2	-	-	-	1	-	2	-	-	1	-	-
Avg.	**2**	-	**2**	-	-	-	**1**	-	**2**	-	-	**1**	-	-

ASSESSMENT SYSTEM:

L	T	P	C	Continuous Internal Examination (CIE)	End Semester Examination (ESE)
0	0	3	1.5	Laboratory only (60 %)	Laboratory only (40 %)

LABORATORY		Total
Evaluation of Laboratory Record (100 Marks)	**Model Practical Examination (100 Marks)**	
75	25	100*

* Total marks shall be converted into 60 marks

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