B.E-ELECTRICAL AND ELECTRONICS ENGINEERING
Regulation 2024
CURRICULUM & SYLLABI

DEPARTMENT VISION

To be a Centre of Excellence in Electrical and Electronics Education and Research and to transform students into professionals and ethically responsible citizens by nurturing their skills and entrepreneurial spirit.

DEPARTMENT MISSION

As a department, we are committed

- ❖ To impart quality education to students towards excellence and expand their horizon using state of the art facilities in emerging technologies.
- ❖ To produce graduates with remarkable research skills, and the ability to envisage innovative, analytical designs to effectively handle electrical and electronics related problems.
- ❖ To enable graduates to adapt to a competitive multi-disciplinary environment.
- ❖ To develop a passion for entrepreneurship and lifelong learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Graduates of the programme will be technically proficient and have successful career in Electrical and Electronics Engineering or related fields.

PEO 2: Graduates will be competent enough to pursue higher studies as well as engage themselves in research activities related to Electrical and Electronics Engineering.

PEO 3: Graduates of the programme will have an open mind for lifelong learning and value-based contribution in the professional field.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Graduates will be able to:

PSO 1: Apply knowledge of Electrical, Electronics, Networking and processing systems as per industrial standards and needs..

PSO 2: Analyse, Evaluate, Interpret, communicate and provide solutions to design, development and maintenance of Electrical Systems.

PSO 3: Apply project management techniques to build Electrical and Electronic Systems.

B.E-ELECTRICAL AND ELECTRONICS ENGINEERING
CURRICULUM AND SYLLABI (Regulation 2024)
(Applicable for students admitted from the Academic Year 2024-2025)
Minimum Credits to be Earned: 165

SEMESTER I										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA / ES**	**Course Type**	**Category**
1	24HS101	Technical English	2	0	2	3	4	50/50	TP	HSMC
2	24MA101	Matrices and Calculus	3	1	0	4	4	40/60	T	BSC
3	24PH101	Engineering Physics	3	0	2	4	5	50/50	TP	BSC
4	24CY101	Engineering Chemistry	3	0	2	4	5	50/50	TP	BSC
5	24GE101	Problem Solving using Python Programming	3	0	2	4	5	50/50	TP	ESC
6	24GE102	தமிழர்மரபு / Heritage of Tamils	1	0	0	1	1	40/60	T	HSMC
7	24GE111	Engineering Practices Laboratory	0	0	4	2	4	60/40	P	ESC
8	24MC111	Induction Program	3 Weeks						MC	MC
TOTAL						22	28			

SEMESTER II										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24MA201	Transforms and Partial Differential Equations	3	1	0	4	4	40/60	T	BSC
2	24GE201	Computer Aided Engineering Graphics	3	0	2	4	5	50/50	TP	ESC
3	24PH201	Physics for Electrical Engineering	3	0	0	3	3	40/60	T	ESC
4	24CS202	C Programming and Data Structures	3	0	2	4	5	50/50	TP	ESC
5	24EE201	Electric Circuit Analysis	3	0	2	4	5	50/50	TP	PCC
6	24GE202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	1	40/60	T	HSMC
7	24MC201	Environmental Science	2	0	0	0	2	100/0	MC	MC
		Work Integrated Learning (Industrial Practice)	Regulation 2024, Clause 4.4							AP
TOTAL						20	25			

SEMESTER III										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24HS301	Universal Human Values	2	0	0	2	2	100/0	T	HSMC
2	24MA303	Probability and Complex Functions	3	1	0	4	4	40/60	T	BSC
3	24EC305	Electron Devices and Circuits	3	0	2	4	5	50/50	TP	ESC
4	24EE301	Electromagnetic Theory	3	0	0	3	3	40/60	T	PCC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
5	24EE302	Digital Logic Circuits	3	0	2	4	5	50/50	TP	PCC
6	24EE303	DC machines and transformers	3	0	2	4	5	50/50	TP	PCC
7	24SD311	Aptitude and Coding Skills -1	0	0	2	1	2	100/0	P	EEC
8	24EL311	Innovation and Product Development -1 (Idea Generation)	0	0	2	1	2	100/0	EL	EEC
		Work Integrated Learning (Industrial Training-I)	Regulation 2024, Clause 4.4							AP
TOTAL						23	27			

SEMESTER IV										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EE401	Transmission and Distribution	3	0	0	3	3	40/60	T	PCC
2	24EE402	Linear Integrated Circuits	3	0	2	4	5	50/50	TP	PCC
3	24EE403	Measurements and Instrumentation	3	0	0	3	3	40/60	T	PCC
4	24EE404	Power System Analysis	3	0	0	3	3	40/60	T	PCC
5	24EE405	AC Machines	3	0	2	4	5	50/50	TP	PCC
6	24EE406	Microprocessor and Microcontroller	3	0	2	4	5	50/50	TP	PCC
7	24SD411	Aptitude and Coding Skills -2	0	0	2	1	2	100/0	P	EEC
8	24EL411	Innovation and Product Development -2 (Conceptualization)	0	0	2	1	2	100/0	EL	EEC
9		Mandatory Course- 3 (Choose from list)	2	0	0	0	2	100/0	MC	MC
		Work Integrated Learning (Industrial Training-II)	Regulation 2024, Clause 4.4							AP
TOTAL						23	30			

SEMESTER V										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EE501	Fundamentals of IoT	3	0	0	3	3	40/60	T	PCC
2	24EE502	Power Electronics	3	0	2	4	5	50/50	TP	PCC
3	24EE503	Control Systems	3	0	2	4	5	50/50	TP	PCC
	24EE504	Renewable Energy Technologies	3	0	0	3	3	40/60	T	PCC
5		PEC-1	3	0	0	3	3	40/60	T	PEC
6		OEC-1	3	0	0	3	3	40/60	T	OEC
7	24SD511	Advanced Aptitude and Coding Skills 1	0	0	2	1	2	100/0	P	EEC
8	24EL511	Innovation and Product Development-3 (Prototype Development and Testing)	0	0	2	1	2	100/0	EL	EEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
9		Mandatory Course- 4 (Choose from list)	2	0	0	0	2	100/0	MC	MC
		Work Integrated Learning (Industrial Problem Solving-I)	Regulation 2024, Clause 4.4							AP
						TOTAL	22	28			

SEMESTER VI										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24MG601	Economics, Finance & Accounting	3	0	0	3	3	40/60	T	HSMC
2	24EE601	Protection and Switchgear	3	0	0	3	3	40/60	T	PCC
3	24EE602	Power System Operation and Control	3	0	2	4	5	50/50	TP	PCC
4		PEC-2	3	0	0	3	3	40/60	T	PEC
5		PEC-3	3	0	0	3	3	40/60	T	PEC
6		OEC-2	3	0	0	3	3	40/60	T	OEC
	24SD611	Technical Proficiency -1	0	0	2	1	2	100/0	P	EEC
8	24SD612	Advanced Aptitude and Coding Skills 2	0	0	2	1	2	100/0	P	EEC
9	24SD613	Corporate Communication Skills	0	0	4	2	4	100/0	P	HSMC
10	24EL611	Innovation and Product Development–4 (Patent Filing / Startup Registration)	0	0	2	1	2	100/0	EL	EEC
		Work Integrated Learning (Industrial Problem Solving-II)	Regulation 2024, Clause 4.4							AP
						TOTAL	24	30			

SEMESTER VII										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EE701	AI and ML for Electrical Engineering	3	0	0	3	3	40/60	T	PCC
2		PEC-4	3	0	0	3	3	40/60	T	PEC
3		PEC-5	3	0	0	3	3	40/60	T	PEC
4		PEC-6	3	0	0	3	3	40/60	T	PEC
5		OEC-3	3	0	0	3	3	40/60	T	OEC
6		OEC-4	3	0	0	3	3	40/60	T	OEC
7	24EE711	Mini Project	0	0	4	2	4	60/40	P	EEC
8	24SD711	Technical Proficiency -2	0	0	2	1	2	100/0	P	EEC
						TOTAL	21	24		

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
SEMESTER VIII										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24EE811	Project Work / Semester Internship	0	0	20	10	20	60/40	P	EEC
2	Personality and Character Development Activity Points (Refer Regulation 2024, Clause 4.2)									AP
3	Work Integrated Learning Activity Points (Refer Regulation 2024, Clause 4.4)									AP
		TOTAL				10	20			

Humanities, Social Science and Management Courses (12 Credits)										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24HS101	Technical English	2	0	2	3	4	50/50	TP	HSMC
2	24GE102	தமிழர்மரபு / Heritage of Tamils	1	0	0	1	1	40/60	T	HSMC
3	24GE202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	1	40/60	T	HSMC
4	24HS301	Universal Human Values	2	0	0	2	2	100/0	T	HSMC
5	24MG601	Economics, Finance & Accounting	3	0	0	3	3	40/60	T	HSMC
6	24SD613	Corporate Communication Skills	0	0	4	2	4	100/0	P	HSMC

Basic Science Courses (20 Credits)										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24MA101	Matrices and Calculus	3	1	0	4	4	40/60	T	BSC
2	24PH101	Engineering Physics	3	0	2	4	5	50/50	TP	BSC
3	24CY101	Engineering Chemistry	3	0	2	4	5	50/50	TP	BSC
4	24MA201	Transforms and Partial Differential Equations	3	1	0	4	4	40/60	T	BSC
5	24MA303	Probability and Complex Functions	3	1	0	4	4	40/60	T	BSC

Engineering Science Courses (21 Credits)										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24GE101	Problem Solving using Python Programming	3	0	2	4	5	50/50	TP	ESC
2	24GE111	Engineering Practices Laboratory	0	0	4	2	4	60/40	P	ESC
3	24GE201	Computer Aided Engineering Graphics	3	0	2	4	5	50/50	TP	ESC
4	24PH201	Physics for Electrical Engineering	3	0	0	3	3	40/60	T	ESC
5	24CS202	C Programming and Data Structures	3	0	2	4	5	50/50	TP	ESC
6	24EC305	Electron Devices and Circuits	3	0	2	4	5	50/50	TP	ESC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
Professional Core Courses (60 Credits)										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24EE201	Electric Circuit Analysis	3	0	2	4	5	50/50	TP	PCC
2	24EE301	Electromagnetic Theory	3	0	0	3	3	40/60	T	PCC
3	24EE302	Digital Logic Circuits	3	0	2	4	5	50/50	TP	PCC
4	24EE303	DC machines and transformers	3	0	2	4	5	50/50	TP	PCC
5	24EE401	Transmission and Distribution	3	0	0	3	3	40/60	T	PCC
6	24EE402	Linear Integrated Circuits	3	0	2	4	5	50/50	TP	PCC
7	24EE403	Measurements and Instrumentation	3	0	0	3	3	40/60	T	PCC
8	24EE404	Power System Analysis	3	0	0	3	3	40/60	T	PCC
9	24EE405	AC Machines	3	0	2	4	5	50/50	TP	PCC
10	24EE406	Microprocessor and Microcontroller	3	0	2	4	5	50/50	TP	PCC
11	24EE501	Fundamentals of IoT	3	0	0	3	3	40/60	T	PCC
12	24EE502	Power Electronics	3	0	2	4	5	50/50	TP	PCC
13	24EE503	Control Systems	3	0	2	4	5	50/50	TP	PCC
14	24EE504	Renewable Energy Technologies	3	0	0	3	3	40/60	T	PCC
15	24EE601	Protection and Switchgear	3	0	0	3	3	40/60	T	PCC
16	24EE602	Power System Operation and Control	3	0	2	4	5	50/50	TP	PCC
17	24EE701	AI and ML for Electrical Engineering	3	0	0	3	3	40/60	T	PCC

Professional Elective Courses- Vertical-1 (Power Engineering)										
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**C**	**Prds. /wk.**	**CA/ ES**	**Course Type**	**Category**
1	24EEE01	Utilization and Conservation of Electrical Energy	3	0	0	3	3	40/60	T	PEC
2	24EEE02	Under Ground Cable Engineering	3	0	0	3	3	40/60	T	PEC
3	24EEE03	Substation Engineering and Automation	3	0	0	3	3	40/60	T	PEC
4	24EEE04	HVDC and FACTS	3	0	0	3	3	40/60	T	PEC
5	24EEE05	Energy Management and Auditing	3	0	0	3	3	40/60	T	PEC
6	24EEE06	Power Quality	3	0	0	3	3	40/60	T	PEC
7	24EEE07	Smart Grid	3	0	0	3	3	40/60	T	PEC
8	24EEE08	Restructured Power Market	3	0	0	3	3	40/60	T	PEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
9	24EEE09	High Voltage Engineering	3	0	0	3	3	40/60	T	PEC
10	24MEE32	Power Plant Engineering	3	0	0	3	3	40/60	T	PEC

Professional Elective Courses – Vertical-2 (Converters And Drives)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EEE10	Special Electrical Machines	3	0	0	3	3	40/60	T	PEC
2	24EEE11	Analysis of Electrical Machines	3	0	0	3	3	40/60	T	PEC
3	24EEE12	Multilevel Power Converters	3	0	0	3	3	40/60	T	PEC
4	24EEE13	Electrical Drives	3	0	0	3	3	40/60	T	PEC
5	24EEE14	SMPS and UPS	3	0	0	3	3	40/60	T	PEC
6	24EEE15	Power Electronics for Renewable Energy Systems	3	0	0	3	3	40/60	T	PEC
7	24EEE16	Control of Power Electronics Circuits	3	0	0	3	3	40/60	T	PEC

Professional Elective Courses - Vertical -3 (Embedded Systems)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EEE17	Embedded System Design	3	0	0	3	3	40/60	T	PEC
2	24EEE18	Embedded C- programming	3	0	0	3	3	40/60	T	PEC
3	24EEE19	Embedded Processors	3	0	0	3	3	40/60	T	PEC
4	24EEE20	Embedded Control for Electric Drives	3	0	0	3	3	40/60	T	PEC
5	24EEE21	Smart System Automation	3	0	0	3	3	40/60	T	PEC
6	24EEE22	Embedded System for Automotive Applications	3	0	0	3	3	40/60	T	PEC
7	24EEE23	VLSI Design	3	0	0	3	3	40/60	T	PEC
8	24EEE24	MEMS and NEMS	3	0	0	3	3	40/60	T	PEC
9	24EEE25	Digital Signal Processing System Design	3	0	0	3	3	40/60	T	PEC

Professional Elective Courses –Vertical- 4 (Electric Vehicle Technology)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EEE26	Electric Vehicle Architecture	3	0	0	3	3	40/60	T	PEC
2	24EEE27	Design of Motor and Power Converters for Electric Vehicles	3	0	0	3	3	40/60	T	PEC
3	24EEE28	Electric Vehicle Design, Mechanics and Control	3	0	0	3	3	40/60	T	PEC
4	24EEE29	Design of Electric Vehicle Charging System	3	0	0	3	3	40/60	T	PEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
5	24EEE30	Testing of Electric Vehicles	3	0	0	3	3	40/60	T	PEC
6	24EEE31	Grid Integration of Electric Vehicles	3	0	0	3	3	40/60	T	PEC
7	24EEE32	Intelligent Control of Electric Vehicles	3	0	0	3	3	40/60	T	PEC

Professional Elective Courses –Vertical-5 (Advanced Control)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EEE33	Process Modeling and Simulation	3	0	0	3	3	40/60	T	PEC
2	24EEE34	Computer Control of Processes	3	0	0	3	3	40/60	T	PEC
3	24EEE35	System Identification	3	0	0	3	3	40/60	T	PEC
4	24EEE36	Model Based Control	3	0	0	3	3	40/60	T	PEC
5	24EEE37	Non-Linear Control	3	0	0	3	3	40/60	T	PEC
6	24EEE38	Optimal Control	3	0	0	3	3	40/60	T	PEC
7	24EEE39	Adaptive Control	3	0	0	3	3	40/60	T	PEC
8	24EEE40	Machine Monitoring System	3	0	0	3	3	40/60	T	PEC
9	24EEE41	Introduction to Industrial Automation Systems	3	0	0	3	3	40/60	T	PEC

Professional Elective Courses –Vertical-6 (Diversified Courses)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24EEE42	Energy Storage Systems	3	0	0	3	3	40/60	T	PEC
2	24EEE43	Hybrid Energy Technology	3	0	0	3	3	40/60	T	PEC
3	24EEE44	Design and Modeling of Renewable Energy Systems	3	0	0	3	3	40/60	T	PEC
4	24EEE45	Grid integrating Techniques and Challenges	3	0	0	3	3	40/60	T	PEC
5	24EEE46	Sustainable and Environmental Friendly HV Insulation System	3	0	0	3	3	40/60	T	PEC
6	24EEE47	Power System Transients	3	0	0	3	3	40/60	T	PEC
7	24EEE48	PLC Programming	3	0	0	3	3	40/60	T	PEC
8	24CSE02	Big Data Analytics	3	0	0	3	3	40/60	T	PEC

Open Elective Courses (12 Credits)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24CEO01	Environmental Science and Sustainability	3	0	0	3	3	40/60	T	OEC
2	24CEO02	Green Building Design	3	0	0	3	3	40/60	T	OEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
3	24CEO03	Municipal Solid Waste Management	3	0	0	3	3	40/60	T	OEC
4	24CEO04	Sustainable Infrastructure	3	0	0	3	3	40/60	T	OEC
5	24CEO05	Disaster Management	3	0	0	3	3	40/60	T	OEC
6	24CEO06	Geographical Information System	3	0	0	3	3	40/60	T	OEC
7	24CEO07	Environment and Agriculture	3	0	0	3	3	40/60	T	OEC
8	24CEO08	Earthquake Engineering	3	0	0	3	3	40/60	T	OEC
9	24CSO01	Introduction to Algorithms	3	0	0	3	3	40/60	T	OEC
10	24CSO02	Fundamentals of Software Engineering	3	0	0	3	3	40/60	T	OEC
11	24CSO03	Introduction to Cloud Computing	3	0	0	3	3	40/60	T	OEC
12	24CSO04	Principles of Blockchain Technology	3	0	0	3	3	40/60	T	OEC
13	24CSO05	Machine Learning using Python for Beginner	3	0	0	3	3	40/60	T	OEC
14	24CSO06	Multimedia and Computer Graphics	3	0	0	3	3	40/60	T	OEC
15	24CSO07	Introduction to App Development	3	0	0	3	3	40/60	T	OEC
16	24CSO08	Data Analytics	3	0	0	3	3	40/60	T	OEC
17	24ECO01	Micro Sensors and Nano Sensors	3	0	0	3	3	40/60	T	OEC
18	24ECO02	Fundamentals of VLSI	3	0	0	3	3	40/60	T	OEC
19	24ECO03	Mass Communication	3	0	0	3	3	40/60	T	OEC
20	24ECO04	Sensor Technology	3	0	0	3	3	40/60	T	OEC
21	24ECO05	Nanomaterials and Devices	3	0	0	3	3	40/60	T	OEC
22	24ECO06	ML for Electronic Systems	3	0	0	3	3	40/60	T	OEC
23	24ECO07	Wireless and Mobile Communication	3	0	0	3	3	40/60	T	OEC
24	24ECO08	Internet of Things and Applications	3	0	0	3	3	40/60	T	OEC
25	24MEO01	Introduction to MEMS and NEMS	3	0	0	3	3	40/60	T	OEC
26	24MEO02	Energy Conservation and Management	3	0	0	3	3	40/60	T	OEC
27	24MEO03	Fundamentals of Additive Manufacturing	3	0	0	3	3	40/60	T	OEC
28	24MEO04	Lean Six Sigma	3	0	0	3	3	40/60	T	OEC
29	24MEO05	Agriculture Technology	3	0	0	3	3	40/60	T	OEC
30	24MHO01	Robots and systems in smart Manufacturing	3	0	0	3	3	40/60	T	OEC
31	24MHO02	Robotics and Automation	3	0	0	3	3	40/60	T	OEC
32	24MHO03	Autonomous Mobile Robots	3	0	0	3	3	40/60	T	OEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
33	24MHO04	Introduction to Drone Technology	3	0	0	3	3	40/60	T	OEC
34	24MHO05	Medical Mechatronics	3	0	0	3	3	40/60	T	OEC
35	24MHO06	Sensors and Actuators	3	0	0	3	3	40/60	T	OEC
36	24MHO07	Micro Electro Mechanical System	3	0	0	3	3	40/60	T	OEC
37	24MHO08	Industry 4.0	3	0	0	3	3	40/60	T	OEC
38	24BMO01	Fundamentals of Radiological Equipment's	3	0	0	3	3	40/60	T	OEC
39	24BMO02	Basics of Biomedical Instrumentation	3	0	0	3	3	40/60	T	OEC
40	24BMO03	Introduction to Robotics in Medicine	3	0	0	3	3	40/60	T	OEC
41	24BMO04	Principles of Telemedicine	3	0	0	3	3	40/60	T	OEC
42	24BMO05	Hospital Management	3	0	0	3	3	40/60	T	OEC
43	24BMO06	Bio MEMS and Applications	3	0	0	3	3	40/60	T	OEC
44	24BMO07	Fundamentals of Brain Computer Interface	3	0	0	3	3	40/60	T	OEC
45	24BMO08	Principles of Rehabilitation Engineering	3	0	0	3	3	40/60	T	OEC
46	24CHO01	Industrial pollution prevention and control	3	0	0	3	3	40/60	T	OEC
47	24CHO02	Petroleum Technology	3	0	0	3	3	40/60	T	OEC
48	24CHO03	Green Chemistry and Engineering	3	0	0	3	3	40/60	T	OEC
49	24CHO04	Bio-Energy Technology	3	0	0	3	3	40/60	T	OEC
50	24CHO05	Carbon capture utilization and storage	3	0	0	3	3	40/60	T	OEC
51	24CHO06	Battery Technology	3	0	0	3	3	40/60	T	OEC
52	24CHO07	Energy Management	3	0	0	3	3	40/60	T	OEC
53	24CHO08	Environmental Audit	3	0	0	3	3	40/60	T	OEC
54	24ITO01	Introductions to Full Stack Web Development	3	0	0	3	3	40/60	T	OEC
55	24ITO02	Introduction to Digital Marketing	3	0	0	3	3	40/60	T	OEC
56	24ITO03	Social Media Marketing	3	0	0	3	3	40/60	T	OEC
57	24ITO04	Ethical Hacking	3	0	0	3	3	40/60	T	OEC
58	24ITO05	Information Storage Management	3	0	0	3	3	40/60	T	OEC
59	24ITO06	Introductions to Cyber Security	3	0	0	3	3	40/60	T	OEC
60	24ITO07	Software Testing Essentials	3	0	0	3	3	40/60	T	OEC
61	24ITO08	Introductions to UI and UX Design	3	0	0	3	3	40/60	T	OEC
62	24ADO01	Introduction to Machine Learning	3	0	0	3	3	40/60	T	OEC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
63	24ADO02	Introduction to Artificial Intelligence	3	0	0	3	3	40/60	T	OEC
64	24ADO03	Introduction to Big Data	3	0	0	3	3	40/60	T	OEC
65	24ADO04	Basics of Data Science	3	0	0	3	3	40/60	T	OEC
66	24ADO05	R Programming	3	0	0	3	3	40/60	T	OEC
67	24ADO06	Fundamentals of Deep Learning	3	0	0	3	3	40/60	T	OEC
68	24ADO07	AI in Healthcare Applications	3	0	0	3	3	40/60	T	OEC

Employability Enhancement Courses (22 Credits)										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24SD311	Aptitude and Coding Skills -1	0	0	2	1	2	100/0	P	EEC
2	24EL311	Innovation and Product Development -1 (Idea Generation)	0	0	2	1	2	100/0	EL	EEC
3	24SD411	Aptitude and Coding Skills -2	0	0	2	1	2	100/0	P	EEC
4	24EL411	Innovation and Product Development -2 (Conceptualization)	0	0	2	1	2	100/0	EL	EEC
5	24SD511	Advanced Aptitude and Coding Skills 1	0	0	2	1	2	100/0	P	EEC
6	24EL511	Innovation and Product Development-3 (Prototype Development and Testing)	0	0	2	1	2	100/0	EL	EEC
7	24SD611	Technical Proficiency -1	0	0	2	1	2	100/0	P	EEC
8	24SD612	Advanced Aptitude and Coding Skills 2	0	0	2	1	2	100/0	P	EEC
9	24EL611	Innovation and Product Development–4 (Patent Filing / Startup Registration)	0	0	2	1	2	100/0	EL	EEC
10	24EE711	Mini Project	0	0	4	2	4	60/40	P	EEC
11	24SD711	Technical Proficiency -2	0	0	2	1	2	100/0	P	EEC
12	24EE811	Project Work / Semester Internship	0	0	20	10	20	60/40	P	EEC

MANDATORY COURSES –1 & 2										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24MC111	Induction Program	3 Weeks						MC	MC
2	24MC201	Environmental Science	2	0	0	0	2	100/0	MC	MC

MANDATORY COURSES – 3										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24MC301	Introduction to Women and Gender Studies	2	0	0	0	2	100/0	MC	MC
2	24MC302	Elements of Literature	2	0	0	0	2	100/0	MC	MC

S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA / ES	Course Type	Category
3	24MC303	Film Appreciation	2	0	0	0	2	100/0	MC	MC
4	24MC304	Well, Being with Traditional Practices Yoga, Ayurveda and Siddha	2	0	0	0	2	100/0	MC	MC
5	24MC305	History of Science and Technology in India	2	0	0	0	2	100/0	MC	MC
6	24MC306	Political and Economic Thought for a Humane Society	2	0	0	0	2	100/0	MC	MC
7	24MC307	Indian Constitution	2	0	0	0	2	100/0	MC	MC
8	24MC308	Bureau of Indian Standards (BIS)	2	0	0	0	2	100/0	MC	MC

MANDATORY COURSES - 4										
S.No.	Course Code	Course	L	T	P	C	Prds. /wk.	CA/ ES	Course Type	Category
1	24MC401	Japanese Language	2	0	0	0	2	100/0	MC	MC
2	24MC402	German Language	2	0	0	0	2	100/0	MC	MC
3	24MC403	Korean Language	2	0	0	0	2	100/0	MC	MC
4	24MC404	French Language	2	0	0	0	2	100/0	MC	MC
5	24MC405	Hindi Language	2	0	0	0	2	100/0	MC	MC
6	24MC406	Industrial Safety	2	0	0	0	2	100/0	MC	MC
7	24MC407	Disaster Risk Reduction and Management	2	0	0	0	2	100/0	MC	MC
8	24MC408	State, Nation Building and Politics in India	2	0	0	0	2	100/0	MC	MC

B.E-ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM AND SYLLABI (Regulation 2024)

SEMESTERWISE CREDITS DISTRIBUTION									
Category	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Credits**
HSMC	4	1	2			5			12
BSC	12	4	4						20
ESC	6	11	4						21
PCC		4	11	21	14	7	3		60
PEC					3	6	9		18
OEC					3	3	6		12
EEC			2	2	2	3	3	10	22
MC									
Total	**22**	**20**	**23**	**23**	**22**	**24**	**21**	**10**	**165**

Course Code	24HS101	Course Name	TECHNICAL ENGLISH	Course Category	TP	Humanities, Social Science and Management Courses	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is :***

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

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Employ grammar and appropriate terminologies for day-to-day situations	U								2	2	3		2		1	
CO-2:	Understand the nuances within both spoken and written interactions	U								3	2	3		2		1	
CO-3:	Utilize vivid and analytical vocabulary, expressions, and sentence structures	R								2	2	3		2		1	
CO-4:	Read various forms of writing and grasp both their literal and implied interpretations	E								2	2	3		2		1	
CO-5:	Compose various kinds of writing employing suitable structures	AP								2	2	3		2		1	

Unit-1 BASICS OF COMMUNICATION **6 Periods**

Grammar – Simple present tense, Present continuous tense, Asking questions (Wh-questions); Vocabulary: One-word substitutions, Synonyms; Writing: Personal profile

Unit-2 NARRATION **6 Periods**

Grammar – Subject – verb agreement, Simple past, Past continuous tense; Vocabulary – Antonyms, Word formation (Prefixes and Suffixes). Writing – Narrative (Event: Festivals, Birthday, personal experience)

Unit-3 DESCRIPTION **6 Periods**

Writing – Definitions, Descriptive writing, Checklists; Grammar: Future tense, Perfect tense, Preposition; Vocabulary: Adjectives and Adverbs

Unit-4 CLASSIFICATION **6 Periods**

Writing – Note-making, Note-taking; Grammar: Connectives, Transition words (linkers); Vocabulary: Contextual vocabulary, Words used Both as Noun and Verb, Classification-related words

Unit-5 EXPRESSION OF VIEWS **6 Periods**

Writing – Letter writing / Email writing (Enquiry / Permission, Letter to Editor); Grammar: Question tags, Indirect questions, Yes / No questions; Vocabulary: Compound words, Phrasal verbs.

Total Theory: 30 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Listening – Telephone conversation & Writing message, gap filling 2. Reading – Telephone message, bio-note; Writing – Personal profile 3. Listening – Travel podcast / Watching a travel documentary 4. Reading – An excerpt from a travelogue, Newspaper Report 5. Writing – Narrative (Event: Festivals, Birthday, and personal experience: Excursion, Sports, Conference, etc.) 6. Listening – Conversation, Radio/TV advertisement, Commentary 7. Reading – A tourist brochure and planning an itinerary, descriptive article / excerpt from literature 8. Listening – Announcements and filling a table, Catalogue, List of Equipments 9. Reading – An article, social media posts and classifying (channel conversion – text to table) 10. Listening – Debate / Discussion; Reading – Formal letters, Letters to the Editor, Opinion articles / Blogs	

	Text Books	**References**
Learning Resources	1.Using English: A Course book for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015. 2.Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai, 2011.	1.Anderson, Paul V. Technical Communication: A Reader–Centered Approach. Cengage, New Delhi, 2008. 2.Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%				

Course Code	24MA101	Course Name	MATRICES AND CALCULUS	Course Category	T	Basic Science Courses	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is:***

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

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Use the matrix algebra methods for solving practical problems.	U	3	2	2	2								2		1	
CO-2:	Use differential calculus ideas on several variable functions.	R	3	2	2	2								2		1	
CO-3:	Apply different methods of integration in solving practical problems by using Beta and Gamma functions.	AP	3	2	2	2								2			
CO-4:	Apply multiple integral ideas in solving areas and volumes problems.	AP	3	2	2	2								2			
CO-5:	Apply the concept of vectors in solving practical problems.	AN	3	2	2	2								2		1	

Unit-1 MATRICES ***12 Periods***

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues - Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices - Reduction of Quadratic form to canonical form by using orthogonal transformation - Nature of a Quadratic form - Applications: Stretching of an elastic membrane.

Unit-2 FUNCTIONS OF SEVERAL VARIABLES ***12 Periods***

Limit, continuity, partial derivatives – Homogeneous functions and Euler's theorem - Total derivative – Differentiation of implicit functions - Taylor's formula for two variables - Errors and approximations – Lagrange's method of undetermined multipliers - Applications of Maxima and Minima in Temperature problems.

Unit-3 INTEGRAL CALCULUS ***12 Periods***

Improper integrals of the first and second kind and their convergence – Differentiation under integrals - Evaluation of integrals involving a parameter by Leibnitz rule –Beta and Gamma functions - Properties – Evaluation of integrals by using Beta and Gamma functions – Error functions.

Unit-4 MULTIPLE INTEGRALS ***12 Periods***

Double integrals – Change of order of integration – Double integrals in polar coordinates – Triple integrals – Volume of Solids –Change of variables in double and triple integrals-Area enclosed by plane curves using MATLAB.

Unit-5 VECTOR CALCULUS ***12 Periods***

Gradient of a scalar field, directional derivative – Divergence and Curl – Solenoidal and Irrotational vector fields - Line integrals over a plane curve - Surface integrals – Area of a curved surface – Volume Integral - Green's theorem, Stoke's and Gauss divergence theorems – Applications and Verification in evaluating line, surface and volume integrals.

	Text Books	References
Learning Resources	1.Joel Hass, Christopher Heil, Maurice D.Weir "'Thomas' Calculus", Pearson Education., New Delhi, 2018. 2.Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017. 3.Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009. 4.Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7 th Edition, New Delhi , 2012. 5.Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010	1.Erwin Kreyszig "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015. 2.Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education 2nd Edition, 5th Reprint, Delhi, 2009. 3.Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics",Narosa Publications, 5 th Edition, New Delhi, 2017.

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	
***** The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24PH101	Course Name	ENGINEERING PHYSICS	Course Category	TP	Basic Science Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil.	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Make the students effectively to achieve an understanding of mechanical properties of materials.
- Enable the students to gain knowledge of oscillations, sounds and applications of thermal physics.
- Introduce the basics of optics and lasers and its applications.
- Equipping the students to successfully understand the importance of quantum physics.
- Introduce the significance and structure of crystal physics.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the important mechanical properties of materials.	U	3	2	2		2				1			2			
CO-2:	Analyse and apply the principles of oscillations, sound, and thermal physics to solve real-world problems.	AN	3	2	2		2				1			2			
CO-3:	Applying the principles of optics and lasers to analyse and design optical systems and devices.	AP	3	2	2		2				1			2			
CO-4:	Apply quantum mechanical principles to analyse and predict the behaviour of particles and systems at the atomic and subatomic levels.	AP	3	2		2								2			
CO-5:	Understanding and predicting material properties based on crystal structure and symmetry principles.	U	3	2			2							2			

Unit-1 MECHANICS OF MATERIALS **9 Periods**

Rigid Body – Centre of mass – Rotational Energy - Moment of inertia (M.I)- Moment of Inertia for uniform objects with various geometrical shapes. Elasticity –Hooke's law - Poisson's ratio -stress-strain diagram for ductile and brittle materials – uses- Bending of beams – Cantilever - Simply supported beams - uniform and non-uniform bending - Young's modulus determination- I shaped girders and application in Engineering field –Twisting couple – Shafts. Viscosity – Viscous drag – Surface Tension.

Unit-2 OSCILLATIONS, SOUND AND THERMAL PHYSICS **9 Periods**

Simple harmonic motion - Torsional pendulum –- Damped oscillations –Shock Absorber –Forced oscillations and Resonance –Applications of resonance.- Waves and Energy Transport –Sound waves – Intensity level – Standing Waves - Doppler effect and its applications - Speed of blood flow. Ultrasound – applications - Echolocation and Medical Imaging. Thermal Expansion– Expansion joints – Bimetallic strip – Seebeck effect – thermocouple -Heat Transfer Rate – Conduction – Convection and Radiation.

Unit-3 OPTICS AND LASERS **9 Periods**

Interference - Thin film interference - Air wedge- Applications -Interferometers–Michelson Interferometer –- Diffraction - CD as diffraction grating – Diffraction by crystals - Polarization -polarizers –- Laser – characteristics – Spontaneous and Stimulated emission- population – inversion - Metastable states - optical feedback - Nd-YAG laser, CO2 laser, Semiconductor laser -Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication – Fiber sensors – Fiber lasers

Unit-4 QUANTUM MECHANICS	**9 Periods**
Black body radiation (Qualitative) – Planck's hypothesis – Einstein's theory of Radiation - Matter waves–de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Meaning and Physical significance of wave function - Normalization -Particle in an infinite potential well-particle in a three-dimensional box - Degenerate energy states - Barrier penetration and quantum tunnelling - Tunnelling microscope and its application in nano field.	
Unit-5 CRYSTAL PHYSICS	**9 Periods**
Crystal Bonding – Ionic – covalent – metallic and Vander Walls's/ molecular bonding. Crystal systems -unit cell, Bravais lattices, Miller indices - Crystal structures - atomic packing density of BCC, FCC and HCP structures. NaCl, Diamond, Graphite, Graphene, Zincblende and Wurtzite structures – crystal imperfections- point defects - edge and screw dislocations – grain boundaries. Crystal Growth – Czocharalski method – vapor phase epitaxy – Molecular beam epitaxy- Introduction to X-Ray Diffractometer.	
	Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.	
2. Non-uniform bending - Determination of Young's modulus	
3. Uniform bending – Determination of Young's modulus	
4. Simple harmonic oscillations of cantilever.	
5. Laser- Determination of the wavelength of the laser using grating	
6. Air wedge - Determination of thickness of a thin sheet/wire	
7. Optical fibre -Determination of Numerical Aperture and acceptance angle	
8. Compact disc- Determination of width of the groove using laser.	
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.	
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids	
11. Post office box -Determination of Band gap of a semiconductor.	
12. Photoelectric effect	
13. Michelson Interferometer.	
14. Melde's string experiment	
15. Experiment with lattice dynamics kit.	

	Text Books	**References**
Learning Resources	1.Raymond A. Serway, John W. Jewett, Physics for Scientists and Engineers, Thomson Brooks/Cole, 2013. 2.D. Halliday, R. Resnick and J. Walker, Principles of Physics. John Wiley & Sons, 2011. 3.N. Garcia, A. Damask and S. Schwarz, Physics for Computer Science Students, Springer Verlag, 2012. 4.Alan Giambattista, Betty McCarthy Richardson and Robert C. Richardson, College Physics, McGraw-Hill Higher Education, 2012.	1.R. Wolfson, Essential University Physics. Volume 1 & 2. Pearson, 2016. 2.D. Kleppner and R. Kolenkow. An Introduction to Mechanics, McGraw Hill Education, 2017. 3.K. Thyagarajan and A. Ghatak. Lasers: Fundamentals and Applications. Springer, 2012.

<table>
<tr><td colspan="5">Learning Assessment</td></tr>
<tr><td colspan="4">Continuous Learning Assessment (CLA) (50% weightage)</td><td rowspan="3">End Semester Examination
(50% weightage)</td></tr>
<tr><td colspan="2">Theory (25% weightage)</td><td colspan="2">Practical (25% weightage)</td></tr>
<tr><td>Average of Internal Test
(15%)</td><td>Critical Thinking
Assessment (10%)</td><td>Evaluation of Laboratory
Observation, Record
(15%)</td><td>Model Lab Exam
(10%)</td></tr>
<tr><td colspan="5">* The expected levels for Bloom’s Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%</td></tr>
</table>

Course Code	24CY101	Course Name	ENGINEERING CHEMISTRY	Course Category	TP	Basic Science Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is :***

- To inculcate knowledge on different types of polymers, their properties and preparation techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of different types of corrosion and its control methods.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- To inculcate sound understanding of water quality parameters and water treatment techniques.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand and apply basic knowledge on different types of polymeric materials, their properties and various techniques of their fabrication.	U	3	2	1		2			1				2			
CO-2:	Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technological applications.	AP	3	3	3		3							2			
CO-3:	Proficiently identify corrosion mechanisms, select control methods, and apply protective coatings.	AP	3	3	2	2		2			1			1			
CO-4:	Analyse and compare energy sources, discerning characteristics and applications.	AN	3	2	2		3					1					
CO-5:	Develop competence in assessing water quality, applying treatment methods, and implementing conditioning techniques.	AP	3	2	2		1		3	2	1			2			

Unit-1 POLYMER CHEMISTRY **9 Periods**

Introduction: Functionality-degree of polymerization. Classification of polymers (Source, Structure, Synthesis and Intermolecular forces). Mechanism of free radical addition polymerization. Properties of polymers: Tg, tacticity, molecular weight-number average, weight average, viscosity average and polydispersity index .Techniques of polymerization: Bulk, emulsion, solution and suspension.

Unit-2 NANOCHEMISTRY **9 Periods**

Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties (optical, electrical, mechanical, magnetic and catalytic). Types –nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, chemical vapour deposition and electrospinning. Characterization - Scanning Electron Microscope and Transmission Electron Microscope - Principle and instrumentation (block diagram). Applications of nanomaterials - medicine, agriculture, electronics and catalysis.

Unit-3 CORROSION AND ITS CONTROL **9 Periods**

Introduction to corrosion - chemical and electrochemical corrosions-mechanism of electrochemical and galvanic corrosions-differential aeration corrosion-pitting, water line corrosions, factors influencing corrosion. Corrosion control-material selection and design- - sacrificial anodic protection and impressed current cathodic protection. Protective coatings-metallic coatings (galvanizing, tinning), organic coatings (paints). Paints: Constituents and functions

Unit-4 ENERGY SOURCES	**9 Periods**
Batteries - Characteristics - types of batteries – primary battery (dry cell), secondary battery (lead acid, lithium-ion-battery)- emerging batteries – nickel-metal hydride battery, aluminum air battery, batteries for automobiles and satellites - Fuel cells (Types) – H2-O2 fuel cell - Supercapacitors-Types and Applications, Renewable Energy: Solar- solar cells, DSSC	
Unit-5 WATER TECHNOLOGY	**9 Periods**
Water – sources and impurities – water quality parameters: colour, odour, pH, hardness, alkalinity, TDS, COD, BOD and heavy metals. Boiler feed water – requirement –troubles (scale & sludge, caustic embrittlement, boiler corrosion and priming & foaming. Internal conditioning – phosphate, Calgon and carbonate treatment. External conditioning - demineralization. Municipal water treatment (screening, sedimentation, coagulation, filtration and disinfection-ozonolysis, UV treatment, chlorination), Reverse Osmosis.	
	Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Estimation of HCl using Na2CO3 as primary standards 2. Determination of alkalinity in water sample. 3. Determination of hardness of water by EDTA method. 4. Determination of DO content of water sample by Winkler's method 5. Determination of chloride content of water sample by Argentometric method. 6. Determination of strength of given hydrochloric acid using pH meter. 7. Determination of strength of acids in a mixture of acids using conductivity meter 8. Estimation of iron content of the given solution using potentiometer. 9. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline/thiocyanate method). 10. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer 11. Determination of strength of an acid using conductivity meter. 12. Estimation of nickel content of the given solution by EDTA method	

	Text Books	**References**
Learning Resources	1.Jain P. C. & Monica Jain., "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi,2015. 2.Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi,2012. 3.Dara S.S., "A Textbook of Engineering Chemistry", Chand Publications, 2004.	1.Sachdeva M.V., "Basics of Nano Chemistry", Anmol Publications Pvt Ltd, 2011. 2. Friedrich Emich, "Engineering Chemistry", MedTech, 2014. 3.Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science" New AGE International Publishers, 2009.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%				

Course Code	24GE101	Course Name	PROBLEM SOLVING USING PYTHON PROGRAMMING	Course Category	TP	Engineering Science Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Understand the basics of algorithmic problem solving.
- Learn to solve problems using Python conditionals and loops
- Define Python functions and use function calls to solve problems
- Use Python data structures – lists, tuples, and dictionaries to represent complex data.
- Perform input/output operations with files in Python

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Develop algorithmic solutions to simple computational problems	AP	3	2	2	2	3										
CO-2:	Develop and execute simple Python programs	AP	3	2	2	2	3										
CO-3:	Develop Python programs using conditionals and loops for solving problems and decompose a Python program into functions.	AN	3	2	2	2	3										
CO-4:	Represent compound data using Python lists, tuples, dictionaries etc.	AP	3	2	2	2	3										
CO-5:	Read and write data from/to files in Python programs	AP	3	2	2	2	3										

Unit-1 COMPUTATIONAL THINKING AND PROBLEM SOLVING **9 Periods**

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

Unit-2 DATA TYPES, EXPRESSIONS, STATEMENTS **9 Periods**

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string , and list; variables, expressions, statements, tuple assignment, precedence of operators, comments.

Unit-3 CONTROL FLOW, FUNCTIONS, STRINGS **9 Periods**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

Unit-4 LISTS, TUPLES, DICTIONARIES **9 Periods**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.

Unit-5 FILES, MODULES, PACKAGES **9 Periods**

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages;

Total Theory: 45 Periods

Suggested List of Experiments	**Total Practical: 30 Periods**

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.
4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
8. Implementing programs using written modules and Python Standard Libraries
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool.
12. Developing a game activity using Pygame.

	Text Books	**References**
Learning Resources	1. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016. 2. Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and Programming”, 1st Edition, BCS Learning & Development Limited, 2017	1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021. 2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, 1st Edition, Notion Press, 2021. 3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data”, Third Edition, MIT Press, 2021 4. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019. 5. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	

* The expected levels for Bloom’s Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24GE102	Course Name	தமிழர் மரபு /HERITAGE OF TAMILS	Course Category	T	Humanities, Social Science and Management Courses	L	T	P	C
							1	0	0	1

Pre-requisite Courses	NIL	Co- requisite Courses	NIL	Progressive Courses	NIL
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	NIL		

Course Objective: ***The purpose of learning this course is to:***

- Explore the history, significance, and classical status of the Tamil language and analyze the timeless management principles found in Thiruvalluvar's Thirukural.
- Learn about the development of Tamil art and sculpture over time, including temple arts, traditional crafts, and musical instruments.
- Familiarize the students with various Tamil folk dances, performances, and martial arts, and their significance in Tamil culture.
- Get the ancient Tamil way of classifying landscapes and life, their connection to nature, and the trade and conquests of the Chola dynasty.
- Explore the role of Tamils in India's freedom movement, their cultural influence across India, the Self-Respect Movement, and contributions to traditional medicine and literature.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Gain comprehensive knowledge about the linguistic diversity in India and the Dravidian language family and appreciate the classical status of Tamil and its rich literary heritage.	U															
CO-2:	Students will learn about the development of Tamil art and sculpture over time, including temple arts, traditional crafts, and musical instruments.	U															
CO-3:	Students will become familiar with various Tamil folk dances, performances, and martial arts, and their significance in Tamil culture.	U															
CO-4:	Students will understand the ancient Tamil way of classifying landscapes and life, their connection to nature, and the trade and conquests of the Chola dynasty.	U															
CO-5:	Students will learn about the role of Tamils in India's freedom movement, their cultural influence across India, the Self-Respect Movement, and contributions to traditional medicine and literature.	U															

Unit-1 மொழி மற்றும் இலக்கியம் **/LANGUAGE AND LITERATURE** ***3 Periods***

இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழில் செம்மொழி இலக்கியம் - சங்க இலக்கியத்தின் மதச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல்அறம் - திருக்குறளில் மேலாண்மைக் கோட்பாடுகள் - தமிழ் இதிகாசங்கள் மற்றும் தமிழ் நிலத்தில் பௌத்தம் மற்றும் சமணத்தின் தாக்கம் - பக்தி இலக்கியம் ஆழ்வார்களும் நாயன்மார்களும் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கிய வளர்ச்சி - பாரதியார் மற்றும் பாரதிதாசன் பங்களிப்பு

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-2	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை/ **HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	***3 Periods***
நடுகல் முதல் நவீன சிற்பம் - ஐம்பொன்சிற்பங்கள் - பழங்குடியினர் மற்றும் அவர்களின் கைவினைப்பொருட்கள் - கோவில் தேர் செய்யும் கலை - - சுடுமண் சிற்பங்கள், கிராம சிறுதெய்வங்கள், கன்னியாகுமரியில் திருவள்ளுவர் சிலை, இசைக்கருவிகள் தயாரித்தல் - மிருதங்கம், பறை, வீணை, யாழ் மற்றும் நாதஸ்வரம். தமிழர்களின் சமூக மற்றும் பொருளாதார வாழ்வில் கோவில்களின் பங்களிப்பு. 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-3	நாட்டுப்புற மற்றும் தற்காப்பு கலைகள்/ **FOLK AND MARTIAL ARTS**	***3 Periods***
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியன் கூத்து, ஒயிலாட்டம், தோல் பொம்மலாட்டம், சிலம்பாட்டம், வளரி, புலி நடனம் - தமிழர்களின் தனி மற்றும் குழு விளையாட்டுகள். Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
Unit-4	தமிழர்களின் திணைக் கோட்பாடுகள்/**THINAI CONCEPT OF TAMILS**	***3 Periods***
தமிழக தாவரங்கள் மற்றும் விலங்கினங்கள் & தொல்காப்பியம் மற்றும் சங்க இலக்கியம் குறிப்பிடும் அகம் மற்றும் புறம் பற்றியக் கோட்பாடுகள் - தமிழர்களின் அறக் கோட்பாடுகள் - சங்க காலத்தில் கல்வி மற்றும் எழுத்தறிவு - பண்டைய நகரங்கள் மற்றும் சங்க காலத்தில் துறைமுகங்கள் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - சோழர்களின் வெளிநாட்டு வெற்றி. 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-5	இந்திய தேசிய இயக்கத்திற்கும் இந்திய கலாச்சாரத்திற்கும் தமிழர்களின் பங்களிப்பு/**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	***3 Periods***
இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பு - இந்தியாவின் பிற பகுதிகளில் தமிழர்களின் கலாச்சார தாக்கம் - சுயமரியாதை இயக்கம் - சுதேச மருத்துவ முறைகளில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள் மற்றும் கையெழுத்துப் பிரதிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு. Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.		
		Total: 15 Periods

	Text Books	**References**
Learning Resources	1.தமிழக வரலாறு – மக்களும் பண்பாடும் – கே .கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). 2.கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). 3.கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு) 4.பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு) 5.Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 6.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.	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.) 3.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) 4. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author) 5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 6. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	
***** The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24GE111	Course Name	ENGINEERING PRACTICES LABORATORY	Course Category	P	Engineering Science Courses	L	T	P	C
							0	0	4	2

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mechanical Engineering	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To identify tools, work material and measuring instruments useful for welding, Machining, Plumbing and carpentry
- To provide exposure to the students with hands on experience on various wiring system
- To provide exposure to the students with hands on experience on various Electronic Components

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		***BL***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the concepts of welding safety protocols, equipment operation essential for successful welding practices in engineering applications.	U	3	2				1	1					2			
CO-2:	Make simple metal joints using welding equipment and wooden joints using carpentry tools	AP	3	2				1	1					2			
CO-3:	Apply the knowledge of pipeline connections to household fittings.	AP	3	2				1	1					2			
CO-4:	Demonstration on centrifugal pump and air conditioning working principles	U	3	2				1	1					2			
CO-5:	Apply the skills of basic electrical engineering for house wiring practice	AP	3	2				1	1					2	2		

List of Experiments **60 Periods**

1. 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 & delivery side of a pump
   d) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.
2. WOOD WORK:
   a) Sawing, b) Planning and c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.
3. Wood Work Study:
   a) Studying joints in door panels and wooden furniture b) Studying common industrial trusses using models.
4. WELDING WORK:
   a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. b) Practicing gas welding
5. BASIC MACHINING WORK:
   a) (simple)Turning. b) (simple)Drilling. c) (simple)Tapping.
6. ASSEMBLY WORK:
   a) Assembling a centrifugal pump. b) Assembling an air conditioner
7. SHEET METAL WORK:
   a) Making of a square tray

8. FOUNDRY WORK:
    a) Demonstrating basic foundry operations.
9. ELECTRICAL ENGINEERING PRACTICES
    a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin sockets
    b) Staircase wiring
    c) Fluorescent Lamp wiring with introduction to CFL and LED types.
    d) Energy meter wiring and related calculations/ calibration
    e) Study of Iron Box wiring and assembly
    f) Study of Fan Regulator (Resistor type and Electronic type using DIAC/TRIAC/QUADRAC)
    g) Study of emergency lamp wiring/Water heater
10. ELECTRONIC ENGINEERING PRACTICES- SOLDERING WORK:
    a) Soldering simple electronic circuits and checking continuity.
11. ELECTRONIC ASSEMBLY AND TESTING WORK:
    a) Assembling and testing electronic components on a small PCB.
12. ELECTRONIC EQUIPMENT STUDY:
    a) Study elements of smart phone.
    b) Assembly and dismantle of LED TV.
    c) Assembly and dismantle of computer/ laptop

Learning Assessment		
Continuous Learning Assessment (CLA) (60% weightage)		**End Semester Examination (40% weightage)**
Evaluation of Laboratory Observation, Record (45%)	**Model Lab Exam (15%)**	

* The expected levels for Bloom's Taxonomy should be:
  - Lower-order thinking skills: not more than 40%
  - Higher-order thinking skills: not less than 60%

Course Code	24MC111	Course Name	INDUCTION PROGRAMME	Course Category	P	Humanities and Management Courses	L	T	P	C
							0	0	4	2

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

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 a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfil 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.

Discussions would be conducted in small groups of about 20 students with a faculty

mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

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

(v) Proficiency Modules

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

(vi) Lectures by Eminent People

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

(vii) Visits to Local Area

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

(viii) Familiarization to Dept./Branch & Innovations

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

(ix) Department Specific Activities

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

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

References:

Guide to Induction program from AICTE

Course Code	24MA201	Course Name	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	Course Category	T	Basic Science Courses	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is:***

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in a wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand how to solve the given standard partial differential equations.	U	3	3	2											1	
CO-2:	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	AP	3	3	2	2	1									1	
CO-3:	Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations	AP	3	3	2	2											
CO-4:	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	U	3	3		3	2							1		1	
CO-5:	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	AN	3	3		2	3							2		1	

Unit-1 PARTIAL DIFFERENTIAL EQUATIONS ***12 Periods***

Formation of partial differential equations–Solutions of standard types of first order partial differential equations - First order partial differential equations reducible to standard types- Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous using MATLAB.

Unit-2 FOURIER SERIES ***12 Periods***

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series–Root mean square value–Parseval's identity–Practical Harmonic analysis in signal processing and Quantum mechanics.

Unit-3 APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS ***12 Periods***

Classification of PDE – Method of separation of variables - Fourier series solutions of one-dimensional wave equation – One dimensional equation of heat conduction– Steady state solution of two-dimensional equation of heat conduction (Cartesian coordinates only).

Unit-4 FOURIER TRANSFORMS ***12 Periods***

Statement of Fourier integral theorem– Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity- Application of Transform to boundary value Problems in Digital signals.

Unit-5	**Z-TRANSFORMS AND DIFFERENCE EQUATIONS**	***12 Periods***
Z-transforms - Elementary properties – Convergence of Z-transforms – Initial and final value theorems - Inverse Z-transform using partial fraction and convolution theorem - Applications: Formation of difference equations–Solution of difference equations using Z-transforms.		
		Total: 60 Periods

	Text Books	**References**
Learning Resources	1.Grewal B.S.,"Higher Engineering Mathematics" 44th Edition, Khanna Publishers, NewDelhi,2018. 2.Kreyszig E, "Advanced Engineering Mathematics", 10th Edition, John Wiley, New Delhi, India, 2016 3.Narayanan.S.,Manicavachagom Pillay.T.K and Ramanaiah.G" Advanced Mathematics for Engineering Students", Vol.II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai,1998. 4.Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd,NewDelhi,2018.	1.Andrews. L.C and Shivamoggi.B, "Integral Transforms for Engineers" SPIE Press,1999. 2.Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics",10th Edition, Laxmi Publications Pvt .Ltd,2015. 3.James.G.,"Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, NewDelhi,2016. 4.Wylie.R.C.and Barrett.L.C.,"Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt. Ltd, 6th Edition, NewDelhi,2012

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	
***** The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24GE201	Course Name	COMPUTER AIDED ENGINEERING GRAPHICS	Course Category	TP	Engineering Science Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mechanical Engineering	Databook /Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Understand universal technical drawing standards
- Provide training on drafting software to draw simple sketches
- Demonstrate the concepts of orthographic and isometric projections
- Use drawing skills for communicating concepts, ideas for engineering product design
- Use pictorial views to visualize and draw the isometric view of the objects

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Perform freehand sketching of basic geometrical constructions and multiple views of objects	R	3	2	2							2		2	3		
CO-2:	Understand the concept of orthographic projections of lines and plane surfaces.	U	3	2	2							2		2	3		
CO-3:	Apply the Projection concepts and drafting software to draw projection of solids.	AP	3	2	2		3					2		2	3		
CO-4:	Draw projections of the section of solids and development of surfaces using CAD software and basic manual tools.	AP	3	2	2		3					2		2	3		
CO-5:	Utilize modern drafting tools and software to visualize and project isometric and perspective sections of simple solids.	AP	3	2	2		3					2		2	3		

Unit-1 CONCEPTS, CONVENTIONS, PLANE CURVES AND FREEHAND SKETCHING **9 Periods**

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning. Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method - Visualization concepts and Free Hand sketching: Visualization principles -Representation of Three-Dimensional objects - Layout of views- Freehand sketching of multiple views from pictorial views of objects (Draw without using drawing instruments)

Unit-2 PROJECTION OF POINTS, LINES AND PLANE SURFACE **9 Periods**

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

Unit-3 PROJECTION OF SOLIDS **9 Periods**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes

Unit-4	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	9 Periods
Sectioning of simple solids like prisms, pyramids, cylinder, and cone in a simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other - obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids - Prisms, pyramids cylinders and cones		
Unit-5	**ISOMETRIC AND PERSPECTIVE PROJECTIONS**	**9 Periods**
Principles of isometric projection - isometric scale -Isometric projections and isometric views of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method		
		Total Theory: 45 Periods

List of Experiments	Total Practical: 30 Periods
1. Drawing of a Title Block with necessary text and projection symbol. 2. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning 3. Drawing front view, top view and side view of objects from the given pictorial views (eg. V- block, Base of a mixie, Simple stool, Objects with hole and curves 4. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.) 5. Drawing of a simple steel truss. 6. Drawing sectional views of prism, pyramid, cylinder, cone, etc, 7. Drawing isometric projection of simple objects. 8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.	

	Text Books	References
Learning Resources	1. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, Twenty ninth edition 2017 2. Dr. M.H Annaiah, Dr. B Sudheer Prem Kumar & Dr. C N Chandrappa, Computer Aided Engineering Drawing, New Age International (P) Limited, 7th Edition, 2023. 3. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.	1. S. Ramachandran and K. Pandian, “Engineering Graphics” Airwalk Publications; 8th edition 2014. 2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2018. 3. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2018. 4. 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

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				End Semester Examination (50% weightage)
Theory (25% weightage)		Practical (25% weightage)		
Average of Internal Test (15%)	Critical Thinking Assessment (10%)	Evaluation of Laboratory Observation, Record (15%)	Model Lab Exam (10%)	
* The expected levels for Bloom’s Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%				

Course Code	24PH201	Course Name	PHYSICS FOR ELECTRICAL ENGINEERING	Course Category	T	Basic Science Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Make the students understand the importance in studying electrical properties of materials.
- Enable the students to gain knowledge in semiconductor physics.
- Introduce the dielectric and magnetic properties of materials.
- Instil knowledge on optical properties and data storage techniques.
- Inculcate an idea of significance of nano structures, quantum confinement and ensuring nano device applications.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Analysing and predicting the electrical characteristics of materials based on their atomic and molecular structures.	AN	3	2	1									1	2		1
CO-2:	Understanding the semiconductor materials and their transport properties to design and optimize electronic devices and circuits.	U	3	2	1									1	3	1	1
CO-3:	Analyse and predict the dielectric and magnetic properties of materials, enabling the design of advanced electronic and magnetic devices.	AN	3	2	1									1	1		
CO-4:	Understanding the optical properties of materials for applications in photonics, imaging, and optical communication.	U	3	2	1									1	1		
CO-5:	Understanding the ability to design, fabricate, and analyse the performance of nanodevices for various applications in electronics, sensing, and nanotechnology.	U	3	2	1		1							2	1		

Unit-1 ELECTRICAL PROPERTIES OF MATERIALS ***9 Periods***

Classical free electron theory – Expression for electrical conductivity–Thermal conductivity, expression Wiedemann – Franz law – Quantum free electron theory – Degenerate energy states–Density of States – Fermi-Dirac statistics – Conduction electron density – Electron in a periodic potential – Energy bands in solids – Conductors – Semiconductors – Insulators – tight binding approximation of application in Energy Band Structures- Electron effective mass– the concept of hole.

Unit-2 SEMICONDUCTORS AND TRANSPORT PHYSICS ***9 Periods***

Intrinsic Semiconductors – Energy band diagram – direct and indirect bandgap semiconductors– Carrier concentration in intrinsic semiconductors – Determination of band gap – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility, diffusion and carrier lifetime – Hall effect –devices and sensors – Ohmic contacts – Peltier coolers – Schottky diode – Application of solar cell used in Renewable Energy.

Unit-3 DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS ***9 Periods***

Electric Dipole moment and polarization vector, Polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – dielectric constant and dielectric loss – dielectric strength and insulation – Applications of dielectric materials. Origin of Magnetism – atomic magnetic moments – Bohr magneton- magnetic materials: diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism – Ferromagnetism – origin and exchange interaction – Domain theory –saturation magnetization and curie temperature-domain walls and motion – Hysteresis – soft and hard magnetic materials – GMR effect - Application of GMR materials– Magnetic data storage.

Unit-4	**OPTICAL PROPERTIES OF MATERIALS**	***9 Periods***
Light waves in a homogeneous medium – refractive index – dispersion: refractive index-wavelength behaviour – group velocity and group index – Fresnel's equations: reflection and transmission coefficients, Absorption, emission and scattering of light – Luminescence – Phosphors LED's : Principle and working – white LED, Laser diode – optical Amplifiers - Organic LED and Plasma light emitting devices, LCD - Homojunction and Hetero junction laser diodes. Optical data storage techniques (CD, DVD and Blue-ray disc).		
Unit-5	**NANODEVICES**	***9 Periods***
Electron density in a conductor – Significance between Fermi energy and volume of the material–Quantum confinement – Quantum structures – Density of states for quantum wells, wires and dots –Band gap of nanomaterials –Tunnelling – Single electron phenomena – Single electron Transistor. The conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance –Carbon nanotubes: Properties and applications Transporters – Spintronic devices and its Application.		
		Total: 45 Periods

	Text Books	**References**
Learning Resources	1. R.F.Pierret. Semiconductor Device Fundamentals. Pearson, 2006. 2. D.Neamen and D.Biswas. Semiconductor physics and devices. McGraw Hill Education, 2017. 3. G.W. Hanson, Fundamentals of Nanoelectronics. Pearson Education, 2009. 4. J. Wilson and J.F.B. Hawkes. Optoelectronics. Pearson Education, 2018. 5. N. Gershenfeld. The Physics of Information Technology. Cambridge University Press, 2011.	1. W.D.Callitser and D.G. Rethwish. Materials Science and Engineering. John Wiley & Sons, 2014. 2. S.O.Kasap Principles of Electronic Materials and Devices. McGraw Hill Education, 2017. 3. N.Garcia, A. Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	
***** The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24CS202	Course Name	C PROGRAMMING AND DATA STRUCTURES	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

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

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Develop C programs for any real world/technical application.	AP	2	3	1	2	2	1	1		1	2	1	3			
CO-2:	Apply advanced features of C in solving problems.	AP	1	2	1	2	2				1	1	1	2			
CO-3:	Suggest and use appropriate linear data structure operations for solving a given problem	AN	2	3	1	2	3				1	1	1	2			
CO-4:	Suggest and use appropriate non–linear data structure operations and hashing function for solving a given problem	AN	2	1		1	1				2	1	1	2			
CO-5:	Appropriately use sort and search algorithms for a given application	AP	1	2	1	2	2	1	1		1	2	1	3			

Unit-1 C PROGRAMMING FUNDAMENTALS **9 Periods**

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

Unit-2 C PROGRAMMING - ADVANCED FEATURES **9 Periods**

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

Unit-3 LINEAR DATA STRUCTURES **9 Periods**

Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List – Doubly- Linked Lists – Circular Linked List – Stack ADT – Implementation of Stack – Applications – Queue ADT – Priority Queues – Queue Implementation – Applications.

Unit-4 NON-LINEAR DATA STRUCTURES **9 Periods**

Trees – Binary Trees – Tree Traversals – Expression Trees – Binary Search Tree – Hashing - Hash Functions – Separate Chaining – Open Addressing – Linear Probing– Quadratic Probing – Double Hashing – Rehashing.

Unit-5 SORTING AND SEARCHING TECHNIQUES **9 Periods**

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

Total Theory: 45 Periods

List of Experiments	Total Practical: 30 Periods

1. Practice of C programming using statements,expressions,decision making and iterative statements.
2. Practice of C programming using Functions and Arrays
3. Implement C programs using Pointers and Structures
4. Implement C programs using Files
5. Array implementation of Stack, Queue and List ADTs
6. Linked list implementation of Stack, Queue and List ADTs
7. Implementation of Binary Trees and operations of Binary Trees
8. Implementation of searching techniques
9. Implementation of sorting algorithms
10. Implementation of Hashing algorithms

	Text Books	References
Learning Resources	1.Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 1997. 2. ReemaThareja, “Programming in C”, Second Edition, Oxford University Press, 2016.	1. Brian W. Kernighan, Rob Pike, “The Practice of Programming”, Pearson Education, 1999. 2. Paul J. Deitel, Harvey Deitel, “C How to Program”, Seventh Edition, Pearson Education, 2013. 3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education,1983. 4. Ellis Horowitz, SartajSahni and Susan Anderson, “Fundamentals of Data Structures”, Galgotia, 2008. List of Open-Source Software/ Learning website: https://www.coursera.org/specializations/data-structures-algorithms https://nptel.ac.in/courses/112107243 https://nptel.ac.in/courses/112105598

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	

* The expected levels for Bloom’s Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24EE201	Course Name	ELECTRIC CIRCUIT ANALYSIS	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Understand the fundamentals of DC circuit analysis, Ohm's law, Kirchoff's laws and understand the techniques such as nodal and mesh analysis
- Learn network theorems, linearity concepts and source transformation
- Gain knowledge of transient analysis for source free and step response functions
- Develop proficiency in sinusoidal steady-state analysis, including phasor representation, impedance, nodal and mesh analysis for AC circuits, and power analysis in AC circuits and explore resonance and coupled circuits
- Understand the concepts of three phase power circuits and three phase power measurement.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Apply fundamental concepts of DC circuit analysis to solve complex circuit problems	AP	3	3	3	2	2		2	1				3	3	3	
CO-2:	Demonstrate proficiency in applying network theorems and duality concepts to analyze and design electrical circuits.	AP	3	3	3	3	2		2	1				3	3	3	
CO-3:	Evaluate transient response analysis RLC circuits to understand their behaviour and performance	E	3	3	3	3	2		2	1				3	3	3	
CO-4:	Analyse and interpret sinusoidal steady-state circuits and coupled circuits	AN	3	3	3	3	2		2	1				3	3	3	
CO-5:	Analyse the three phase circuits to design and optimize complex electrical networks	AN	3	3	3	3	2		2	1				3	3	3	

Unit-1 BASIC CIRCUITS ANALYSIS **9 Periods**

Fundamental concepts: charge and current – voltage – power and energy – Circuit elements: active and passive – Basic laws: Ohm’s law – Kirchhoff’s laws – Series resistors and voltage division – Parallel resistors and current division – Wye-Delta Transformations – Nodal analysis – Mesh analysis

Unit-2 NETWORK THEOREMS **9 Periods**

Linearity Property – Superposition Theorem – Source Transformation – Thevenin’s and Norton’s Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman’s Theorem and Tellegen’s Theorem – Statement

Unit-3 TRANSIENT RESPONSE ANALYSIS **9 Periods**

Capacitors and Inductors – Source free RC Circuit – Source free RL circuit – Step response of RC circuit – Step response of RL circuit – Source free RLC circuit – Step response of RLC circuit – Duality.

Unit-4 AC CIRCUITS AND COUPLED CIRCUITS **9 Periods**

Phasors - Impedance and Admittance - Nodal and Mesh Analysis - Superposition Theorem - Thevenin’s and Norton’s equivalent circuit - AC Power Analysis: Instantaneous power and Average power - Average and RMS value - Apparent Power and Power factor - Complex Power - Series and Parallel resonance - Coupled circuits

Unit-5 THREE PHASE CIRCUITS	**9 Periods**
Analysis of three phase 3-wire and 4-wire circuits with wye and delta connected loads - balanced and unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits using two wattmeter methods	
	Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**

1. Familiarization of various electrical components, sources and measuring instruments.
2. Simulation and experimental verification of series and parallel electrical circuit using fundamental laws
3. Simulation and experimental verification of electrical circuit problems using Thevenin's theorem
4. Simulation and experimental verification of electrical circuit problems using Norton's theorem
5. Simulation and experimental verification of electrical circuit problems using Superposition theorem
6. Simulation and experimental verification of Maximum Power transfer theorem
7. Simulation and Experimental validation of R-C, R-L and RLC electric circuit transients
8. Design and implementation of series and parallel resonance circuit
9. Simulation of three phase balanced and unbalanced star, delta networks circuit

	Text Books	**References**
Learning Resources	1.Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2019. 2.William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9thedition, New Delhi, 2020. 3.Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.	1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi, 2020. 2. Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019. 3. M E Van Valkenburg, "Network Analysis", Prentice-Hall of India Pvt Ltd, New Delhi, 2015. 4. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley Sons, Inc. 2018. 5. Sudhakar A and Shyam Mohan SP, "Circuits and Networks Analysis and Synthesis", McGra Hill, 2015.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24GE202	Course Name	தமிழரும் தொழில்நுட்பமும் / TAMILS AND TECHNOLOGY	Course Category	T	Humanities, Social Science and Management Courses	L	T	P	C
							1	0	0	1

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Provide a comprehensive understanding of the weaving industry and ceramic technology during the Sangam Age, with a particular focus on Black and Red Ware (BRW) Potteries and the graffiti found on these artifacts..
- Students will gain insight into the cultural, technological, and socio-political contexts that shaped temple constructions..
- Study of the iron and steel industries, coin minting, and bead making, alongside archaeological evidence and literary references Silappathikaram.
- Understand the ancient agricultural practices and irrigation technologies, focusing on various water management systems, animal husbandry, and agro-processing. It also explores ancient knowledge of the sea, including fisheries, pearl and conch diving, and oceanic knowledge.
- Learn the knowledge and skills to engage with modern technologies for the preservation and advancement of the Tamil language.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the technological and cultural developments of the Sangam Age, particularly in the areas of weaving and ceramics	U															
CO-2:	Appreciate the cultural and technological advancements reflected in the structural designs and materials used.	U															
CO-3:	Understand the technological and industrial advancements in ancient societies, particularly in the areas of metallurgy, shipbuilding, coin minting, and bead making.	U															
CO-4:	Gain the knowledge about the agricultural and irrigation technologies of ancient societies, as well as their maritime knowledge and practices,	U															
CO-5:	Understand the development and application of Scientific Tamil and Tamil computing.	U															

Unit-1 நெசவு மற்றும் பீங்கான் தொழில்நுட்பம் **/ WEAVING AND CERAMIC TECHNOLOGY** ***3 Periods***

சங்க காலத்தில் நெசவுத் தொழில் - பீங்கான் தொழில்நுட்பம் - கருப்பு மற்றும் சிவப்பு பாத்திரங்கள் (BRW) - மட்பாண்டங்கள் மீது கீறல் குறியீடுகள்.
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

Unit-2 வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம்**/ DESIGN AND CONSTRUCTION TECHNOLOGY** ***3 Periods***

சங்க காலத்தில் வீடு வடிவமைத்தல், கட்டுமானம் மற்றும் வீட்டு உபயோகப் பொருட்களின் வடிவமைப்புகள் - சங்க காலத்தில்கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை பற்றிய விவரங்கள்-மாமல்லபுரத்தின் சிற்பங்கள் மற்றும் கோவில்கள் - சோழர்களின் பெரிய கோவில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் -நாயக்கர் கால கோவில்கள் -மாதிரி கட்டமைப்புகள் பற்றி அறிதல்-மதுரை மீனாட்சி கோயில்- திருமலை நாயக்கர் மஹால் - செட்டி நாடு வீடுகள், இந்தோ - பிரிட்டிஷ் காலத்தில் மதராஸில் உள்ள சரசனிக் கட்டிடக்கலை.
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

Unit-3	உற்பத்தி தொழில்நுட்பம் **/MANUFACTURING TECHNOLOGY** ***3 Periods***
கப்பல் கட்டும் கலை - உலோகவியல் ஆய்வுகள் - இரும்புத் தொழில் - இரும்பு உருக்குதல், எஃகு - தாமிரம் மற்றும் தங்கம் - வரலாற்றின் ஆதாரமாக நாணயங்கள் - நாணயங்கள் - மணிகள் செய்யும் தொழில்கள் கல் மணிகள் - கண்ணாடி மணிகள் - டெரகோட்டா மணிகள் - ஷெல் மணிகள் / எலும்பு துடிப்புகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் விவரிக்கப்பட்டுள்ள ரத்தினக் கற்கள். 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-4	வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம்**/AGRICULTURE AND IRRIGATION TECHNOLOGY** ***3 Periods***
அணை, ஏரி, குளங்கள், மதகு-சோழர் கால குமிழித் தூம்பு முக்கியத்துவம், கால்நடை பராமரிப்பு - கால்நடை பயன்பாட்டுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - விவசாயம் மற்றும் வேளாண் செயலாக்கம் - கடல் அறிவு - மீன்வளம் - முத்து - முத்துக்குளித்தல் - கடல் பற்றிய பண்டைய அறிவு - அறிவு சார்ந்த சமூகம். Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.	
Unit-5	அறிவியல் தமிழ் **&** கணினித்தமிழ்**/ SCIENTIFIC TAMIL & TAMIL COMPUTING** ***3 Periods***
அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் வளர்ச்சி- தமிழ் நூல்கள் மின்பதிப்பு செய்தல்- தமிழ் மென்பொருள் உருவாக்கம் - தமிழ் இணைய கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணைய தமிழ் அகராதி - சொற்குவைத்திட்டம். Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	
	Total: 15 Periods

	Text Books	**References**
Learning Resources	1.தமிழக வரலாறு – மக்களும் பண்பாடும் – கே .கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). 2.கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு) 3.பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு) 4.Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 5.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.	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.) 3.. 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) 4. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author) 5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 6. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	

***** The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24MC201	Course Name	ENVIRONMENTAL SCIENCE	Course Category	T	Mandatory Course	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science and Humanities	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is :***

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of the global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human rights, value education and role of technology in monitoring human and environmental issues.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the functions of the environment, ecosystems and biodiversity and their conservation.	U						3	3					2			
CO-2:	Analyze the causes and effects of environmental pollution and contribute to the preventive measures in the immediate society.	AN						3	3	1							
CO-3:	Identify various natural resources and their contribution to mankind and apply sustainable measures to preserve them for future generations.	AP						3	3		2			2			
CO-4:	Identify the various sustainable measures for environmental protection against climatic changes and apply them for sustainable and societal development.	AP	3		2			3	3								
CO-5:	Demonstrate the knowledge of environmental issues and analyze the effect of population dynamics and role of technology in environmental issues.	U						3	3	2			2				

Unit-1 ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY ***6 Periods***

Definition, scope and importance of environment -concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem– Introduction to biodiversity definition: genetic, species and ecosystem diversity –value of biodiversity-hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Unit-2 ENVIRONMENTAL POLLUTION ***6 Periods***

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies.

Unit-3	**NATURAL RESOURCES**	***6 Periods***
Forest resources: Use and over-exploitation, deforestation, Water resources: Use and over-utilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.		
Unit-4	**SOCIAL ISSUES AND THE ENVIRONMENT**	***6 Periods***
From unsustainable to sustainable development, rain water harvesting, Environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products.		
Unit-5	**HUMAN POPULATION AND THE ENVIRONMENT**	***6 Periods***
Population growth, variation among nations – population explosion – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health.		
		Total: 30 Periods

	Text Books	**References**
Learning Resources	1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers (2018). 2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2016). 3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).	1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001. 3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007. 4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005). 5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. (2013).

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (50%)	***Critical Thinking Assessment (50%)***	
***** The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24HS301	Course Name	UNIVERSAL HUMAN VALUES	Course Category	T	Humanities, Social Sciences and Management Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Science & Humanities (First year)	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Become more aware of themselves, and their surroundings (family, society, nature)	U						1	1	1	3			3			
CO-2:	Have more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	U						1	1	1	3			3			
CO-3:	Have better critical ability.	AN						3	3	2	3		1	3			
CO-4:	Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	U						3	3	2	3		1	3			
CO-5:	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	U						3	3	2	3		2	3			

Unit-1 **INTRODUCTION** ***6 Periods***

Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self- Exploration– Its content and process; „Natural acceptance" and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Practical Session: Include sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit-2 **HARMONY IN THE HUMAN BEING** ***6 Periods***

Understanding human being as a co-existence of the sentient „I" and the material „Body", Understanding the needs of Self („I") and „Body" - happiness and physical facility, Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer), Understanding the characteristics and activities of „I" and harmony in „I", Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health. Practical Session: Include sessions to discuss the role others have played in making material goods available to me. Identifying from one"s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Unit-3 **HARMONY IN THE FAMILY AND SOCIETY** ***6 Periods***

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co- existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Practical Session: Include sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students" lives

Unit-4 **HARMONY IN THE NATURE AND EXISTENCE** ***6 Periods***

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co- existence of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence. Practical Session: Include sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit-5 **IMPLICATIONS OF HARMONY ON PROFESSIONAL ETHICS** ***6 Periods***

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations, Sum up. Practical Session: Include Exercises and Case Studies will be taken up in Sessions E.g. To discuss the conduct as an engineer or scientist etc.

Total: 30 Periods

	Text Books	**References**
Learning Resources	1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 3rd revised edition, 2023. 2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 4. The Story of Stuff (Book). 5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 6. Small is Beautiful - E. F Schumacher. 7. Slow is Beautiful - Cecile Andrews. 8. Economy of Permanence - J C Kumarappa 9. Bharat Mein Angreji Raj - PanditSunderlal 10. Rediscovering India - by Dharampal 11. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi 12. India Wins Freedom - Maulana Abdul Kalam Azad 13. Vivekananda - Romain Rolland (English)	1.Class preparations: https://fdp-si.aicte-india.org/UHV-II%20Class%20Note.php 2.Lecture presentations: https://fdp-si.aicte-india.org/UHV-II_Lectures_PPTs.php 3.Practice and Tutorial Sessions: https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MA303	Course Name	PROBABILITY AND COMPLEX FUNCTIONS	Course Category	T	Basic Science Courses	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes / Standards	STATISTICAL TABLE		

Course Objective: ***The purpose of learning this course is to:***

- This course aims at providing 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 students with Differential Equations which are significantly used in engineering problems.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon	U	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
CO-2:	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.	AP	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
CO-3:	To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property	U	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
CO-4:	To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.	AP	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
CO-5:	To acquaint the students with Differential Equations which are significantly used in engineering problems	AP	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-

Unit-1	**PROBABILITY AND RANDOM VARIABLES**	***9+3 Periods***
Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable		
Unit-2	**TWO-DIMENSIONAL RANDOM VARIABLES**	***9+3 Periods***
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).		
Unit-3	**ANALYTIC FUNCTIONS**	***9+3 Periods***
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions- W=z+c,cz,1/z,z^2 Bilinear transformation		
Unit-4	**COMPLEX INTEGRATION**	***9+3 Periods***
Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Applications of circular contour and semicircular contour (with poles NOT on real axis).		
Unit-5	**ORDINARY DIFFERENTIAL EQUATIONS**	***9+3 Periods***
Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type –		

System of simultaneous linear first order differential equations with constant coefficients - Method of undetermined coefficients.
Total 60 Periods

	Text Book	**Reference**
Learning Resources	1. Johnson. R.A., Miller. I and Freund. J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016. 2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007. 3. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018	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. Ross . S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Elsevier, 2014. 4. Spiegel. M.R., Schiller. J. and Srinivasan . R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012. 5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2010. 6. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

Learning Assessment

	Bloom's Level of Thinking	**Continuous Learning Assessment (CLA) (40% weightage)**		**End Semester Examination (60% weightage)**
		CLA-1 Average of Internal Test (20%)	***Critical Thinking Assessment (20%)***	
		Theory	**Theory**	**Theory**
Level 1	Remember	15%	15%	15%
Level 2	Understand	25%	20%	25%
Level 3	Apply	30%	25%	30%
Level 4	Analyze	30%	25%	30%
Level 5	Evaluate	-	10%	-
Level 6	Create	-	5%	-
	Total	**100%**	**100%**	**100%**

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
	Dr.R.Umadevi *Assistant Professor* *Department of Applied Mathematics* *Sri Venkateshwara College of Engineering,* *Kotturpuram, Chennai-85*	**1. Mr.L.Parthiban** Assistant Professor/Mathematics Department of Science and Humanities, Agni College of Technology, Thalambur, Chennai-126. *2.* **Ms.Umadevi** *Assistant Professor/Mathematics* *Department of Science and Humanities,* *Agni College of Technology, Thalambur, Chennai-126.*

Course Code	24EC305	Course Name	ELECTRON DEVICES AND CIRCUITS	Course Category	TP	Engineering Science Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Engineering Physics	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electronics & Communication Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To understand the structure of basic electronic devices.
- To be exposed to active and passive circuit elements.
- To familiarize the operation and applications of transistors like BJT and FET.
- To explore the characteristics of amplifier, gain and frequency response.
- To learn the required functionality of positive and negative feedback systems.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Explain the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)	U	3	2	2	1	1							1	2	1	1
CO-2:	Design clipper, clamper, half wave and full wave rectifier, regulator circuits using PN junction diodes	C	3	3	3	2	2							1	2	1	1
CO-3:	Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT	AN	3	3	3	2	2							1	2	1	1
CO-4:	Analyze the performance of various configurations of BJT and MOSFET based amplifier	AN	3	3	3	2	2							1	2	1	1
CO-5:	Explain the operation of various feedback amplifiers and oscillators	U	3	2	2	1	1							1	2	1	1

Unit-1 PN JUNCTION DEVICES **9 Periods**

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance –Clipping & Clamping circuits - Rectifiers – Half Wave and Full Wave Rectifier– Display devices- LED, Laser diodes, Zener diode characteristics- Zener diode Reverse characteristics – Zener diode as regulator.

Unit-2 TRANSISTORS AND THYRISTORS **9 Periods**

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

Unit-3 AMPLIFIERS **9 Periods**

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

Unit-4 MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER **9 Periods**

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

Unit-5 FEEDBACK AMPLIFIERS AND OSCILLATORS	9 Periods
Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.	
	Total Theory: 45 Periods

List of Experiments	Total Practical: 30 Periods
1. Characteristics of Semiconductor diode, Zener diode , photo diode , and photo transistor 2. Characteristics of NPN Transistor under common emitter , common collector and common base configurations 3. Characteristics of JFET and draw the equivalent circuit 4. Characteristics of UJT and generation of sawtooth waveforms 5. Design and frequency response characteristics of a Common Emitter amplifier 6. Characteristics of light activated relay circuit 7. Design and testing of RC phase shift and LC oscillators 8. Characteristics of Single-Phase half-wave and full wave rectifiers with inductive and capacitive filters 9. Design of Differential amplifiers using FET 10. Measurement of frequency and phase angle using CRO 11. Realization of passive filters	

	Text Books	References
Learning Resources	1. David A. Bell , ”Electronic devices and circuits”, Oxford University higher education, 5th edition 2008. 2. Sedra and smith, “Microelectronic circuits”, 7th Edition., Oxford University Press, 2017.	1.Balbir Kumar, Shail.B.Jain, “Electronic devices and circuits” PHI learning private limited, 2nd edition 2014. 2. Thomas L.Floyd, “Electronic devices” Conventional current version, Pearson prentice hall, 10th Edition, 2017. 3. Donald A Neamen, “Electronic Circuit Analysis and Design” Tata McGraw Hill, 3rd Edition, 2003. 4. Robert L.Boylestad, “Electronic devices and circuit theory”, 11th edition, Pearson prentice Hall 2013. 5. Robert B. Northrop, “Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation”, CRC Press, Second edition, 2012.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	

* The expected levels for Bloom’s Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24EE301	Course Name	ELECTROMAGNETIC THEORY	Course Category	T	Professional Core Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

To introduce the basic mathematical concepts related to electromagnetic vector fields.
To impart knowledge on the concepts of electrostatic fields, electric potential, energy density and their applications.
To impart knowledge on the concepts of magneto static fields, magnetic flux density, vector potential and its applications.
To impart knowledge on the concepts of different methods of emf generation and Maxwell's equations.
To impart knowledge on the concepts of electromagnetic waves and characterizing parameters.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Visualize and explain Gradient, Divergence, and Curl operations on electromagnetic vector fields and identify the electromagnetic sources and their effects.	U	3	2	-	-	-	-	3	1	-	-	-	1	3	2	1
CO-2:	Compute and analyse electrostatic fields, electric potential, energy density along with their applications	AP	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO-3:	Compute and analyse magneto static fields, magnetic flux density, vector potential along with their applications	AP	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO-4:	Explain different methods of emf generation and Maxwell's equations	AP	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO-5:	Explain the concept of electromagnetic waves and characterizing parameters	AP	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1

Unit-1 Introduction **9 Periods**

Sources and effects of electromagnetic fields – Scalars and Vectors - Coordinate Systems and Transformation - Gradient, Divergence, Curl – Divergence theorem and Stoke's Theorem - Classification of vector fields - Applications

Unit-2 Electrostatics **9 Periods**

Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications - Electric potential – Electric field and equipotential plots - Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions - Poisson's and Laplace's equations – Capacitance - Energy density - Applications

Unit-3 Magnetostatics **9 Periods**

Lorentz force, magnetic field intensity (H) – Biot Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current - Magnetic flux density (B) – B in free space, conductor- Magnetic materials – Magnetization - Magnetic field in multiple media – Boundary conditions - Scalar and vector potential - Poisson's Equation - Magnetic force, Torque – Inductance - Energy density – Applications

Unit-4	Electrodynamic Fields	9 Periods
Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current -Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.		
Unit-5	**Electromagnetic Waves**	**9 Periods**
Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors - skin depth - Poynting vector – Plane wave reflection and refraction		
		Total Theory: 45 Periods

	Text Books	References
Learning Resources	1. Mathew N. O. Sadiku, S.V. Kulkarni 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015. 2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014. 3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.	1. V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, Newage Publishers, 2018. 2. J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers 2013. 3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018. 4. S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2017. 5. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Edition Eighth Reprint :2015

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	**Critical Thinking Assessment (20%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24EE302	Course Name	DIGITAL LOGIC CIRCUITS	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Microprocessor and Microcontrollers
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To introduce various number systems, Boolean Algebra and combinational circuits, and apply minimization techniques for efficient logic design.
- To design various combinational logic circuits such as adders, subtractors, multiplexers, and code converters for digital system applications.
- To study and design various synchronous sequential circuits.
- To study and design various asynchronous sequential circuits.
- To implement digital circuits using various logic families and to develop VHDL models for combinational and sequential logic designs.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Apply Boolean algebra and logic minimization techniques to simplify and optimize combinational logic circuits.	AP	3	3	3	1	1			2				1	3	3	
CO-2:	Design and implement combinational logic circuits such as adders, multiplexers, and code converters using digital ICs.	C	3	3	3	1	2			2				1	3	3	
CO-3:	Construct synchronous sequential circuits using flip-flops and state machine models for real-time applications.	C	3	3	3	2	2			2				1	3	3	
CO-4:	Analyze the characteristics of asynchronous circuits, identify hazards, and evaluate the suitability of programmable logic devices.	AN	3	3	3	2	2			1				1	3	3	
CO-5:	Understand characteristics of various digital logic families and develop digital circuits using VHDL programming and simulate combinational and sequential circuits for verification.	AP	3	3	3	1	3			1				1	3	3	

Unit-1 NUMBER SYSTEMS, BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS **9 Periods**

Number system, error detection, corrections & codes conversions, Boolean algebra: De- Morgan's theorem, switching functions - Combinational logic - representation of logic functions-SOP and POS forms- minimization using K maps & Quine McCluskey method

Unit-2 DESIGN OF COMBINATIONAL LOGIC CIRCUITS **9 Periods**

Design of Adder, Subtractors, Binary 4-bit parallel adder, Code converters, Multiplexers and De multiplexers, Encoders and Decoders, Parity Generator &Checker

Unit-3 SYNCHRONOUS SEQUENTIAL CIRCUITS **9 Periods**

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Mealy models- Counters, state diagram; state reduction; state assignment.

Unit-4	ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES	9 Periods
Asynchronous sequential logic Circuits-Transition stability, flow stability-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.		
Unit-5	**DIGITAL LOGIC FAMILIES AND VHDL**	**9 Periods**
Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family-RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & De multiplexers).		
		Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Implementation of Boolean Functions, Adder and Subtractor circuits. 2. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa. 3. Parity generator and parity checking. 4. Encoders and Decoders. 5. Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC. 6. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's. 7. Study of multiplexer and de multiplexer	

	Text Books	**References**
Learning Resources	1.Morris Mano.M, 'Digital Logic and Computer Design', Prentice Hall of India, 3rdEdition, 2005. 2.Donald D.Givone, 'Digital Principles and Design', Tata McGraw Hill,1st Edition, 2003 3.Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 2018	**1.**Tocci R.J., Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 12th Edition, 2017. 2.Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications', Tata McGraw Hill, 7th Edition, 2010.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%				

Course Code	24EE303	Course Name	DC MACHINES AND TRANSFORMERS	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To develop the concept of electromechanical energy conversion system.
- To Understand the working principle and characteristics of DC machines.
- To identify the appropriate test to determine the performance parameters of a DC machine.
- To acquire knowledge on working principle and various parameters of transformers.
- To deliberate the working of auto transformer and three phase transformers.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Apply the concept of rotating machines and the principle of electromechanical energy conversion in singly and multiple excited systems.	AP	3	3	1	1	1	-	-	1	-	-	-	1	3	2	2
CO-2:	Understand the constructional details and operating characteristics of DC generator.	U	3	3	1	1	1	-	-	1	-	-	-	1	3	1	1
CO-3:	Analyse the constructional details and performance parameters of the DC motor under various operating conditions through proper testing.	AN	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
CO-4:	Determine the efficiency and regulation of a single-phase transformer by analyzing its constructional factors and testing along with phasor diagrams and equivalent circuits.	AN	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
CO-5:	Understand the working principle of auto transformer and three phase transformer with different types of connections.	U	3	3	1	1	1	-	-	1	-	-	-	1	3	3	3

Unit-1 ELECTROMECHANICAL ENERGY CONVERSION **9 Periods**

Principles of electromechanical energy conversion forces and torque in magnetic field systems; energy balance in magnetic circuits; magnetic force-co-energy in singly excited and multi-excited magnetic field systems; mmf of distributed windings; winding inductances; statistically and dynamically induced electromagnetic fields-introduction to magnetic fields in rotating machines- magnetic saturation and leakage fluxes- Introduction to Indian Standard Specifications (ISS). Role and significance of testing.

Unit-2 DC GENERATORS **9 Periods**

Principle of operation- constructional details- armature windings and its types- EMF equation-armature reaction-demagnetizing and cross magnetizing Ampere turns-compensating winding-commutation-methods to improve commutation-OCC and load characteristics of different types of DC Generators. Parallel operation of DC Generators- applications of DC Generators.

Unit-3 DC MOTORS **9 Periods**

Principle of operation-significance of back emf- torque equations and power developed by armature-speed control of DC motors-starting methods of DC motors-load characteristics of DC motors- losses and efficiency in DC machine-condition for maximum efficiency-testing of DC Machines-Brake test-Swinburne’s test-Hopkinson's test, Field test, Retardation test -applications of DC motors.

Unit-4	**SINGLE PHASE TRANSFORMER**	**9 Periods**
Construction and principle of operation- equivalent circuit- phasor diagrams-testing - polarity test- open circuit and short circuit tests- voltage regulation- losses and efficiency-all day efficiency-back-to back test- separation of core losses-parallel operation of single-phase transformers- applications of single-phase transformer.		
Unit-5	**AUTOTRANSFORMER AND THREE PHASE TRANSFORMER**	**9 Periods**
Construction and working of auto transformer - comparison with two winding transformers – Copper saving and power transfer in auto transformer- applications of autotransformer- Three Phase Transformer- Construction - types of connections and their comparative features- Scott connection- applications of Scott connection.		
		Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Open circuit and load characteristics of DC shunt generator- calculation of critical resistance and critical speed. 2. Load test on DC shunt motor. 3. Speed control of DC shunt motor 4. Load test on DC series motor 5. Load test of DC compound motor 6. Load characteristics of DC compound generator with differential and cumulative connections. 7. Swinburne's test 8. Hopkinson's Test. 9. Load test on single-phase transformer 10. Load test on Three-phase transformer 11. Open circuit and short circuit tests on single phase transformer. 12. Sumpner's test 13. Study of starters and 3-phase transformers connections.	

	Text Books	**References**
Learning Resources	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 5th Edition, 2017. 2. P. S. Bimbhra, "Electric Machinery", Khanna Publishers, 2nd Edition, 2021.	1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6th Edition 2017. 2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2018. 3. M. G. Say, "Performance and design of AC machines", CBS Publishers, First Edition 2008. 4. Sahdev S. K. "Electrical Machines", Cambridge University Press, 2018.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24SD311	Course Name	APTITUDE AND CODING SKILLS -1	Course Category	P	Employability Enhancement Courses	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering (Common to all Branches)	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Provide logical reasoning abilities through scenario-based problems
- Enhance problem solving skills related to divisibility decimal fractions, profit, loss and compound interest
- Augment fundamentals related to probabilities, number system, ages, speed, time and distance
- Supplement the foundational coding concepts
- Develop the C-programming skills in searching and sorting problems

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		***BL***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Apply their logical reasoning and analytical abilities to solve scenario-based problems, namely deductive reasoning, objective reasoning, inductive reasoning and abductive reasoning.	AP															
CO-2:	Solve problems related to divisibility decimal fractions, profit, loss and compound interest	AP															
CO-3:	Apply quantitative reasoning ability to solve problems in logarithms, permutation, combinations, number system, ages, speed, time and distance	AP															
CO-4:	Code for simple programming examples using foundational concepts	AP															
CO-5:	Design and develop algorithm, pseudo code and codes for searching and sorting problems	AN															

List of Exercises **30 Periods**

1. **Logical Reasoning**
   Deductive Reasoning: Coding deductive logic, Directional sense, Blood relations, Objective Reasoning, Selection decision tables, Puzzles, Inductive reasoning: Coding pattern and Number series pattern recognition, Analogy and Classification pattern recognition, Abductive Reasoning: Logical word sequence, Data sufficiency

2. **Quantitative Aptitude – Foundational Problems**
   Basic Mathematics: Divisibility, HCF and LCM, Numbers, decimal fractions and power, Applied Mathematics: Profit and Loss, Simple and Compound Interest

3. **Quantitative Aptitude – Moderate Problems**
   Engineering Mathematics: Logarithms, Permutation and Combinations, Probability, Number system, percentage

4. **Programming – Foundational Concepts**
   Data Types/Operators, managing input& output/if else statement, Logical, Unary, ternary operators/Constants MACROS /goto, continue statements, Loops(for/while/do while), switch break

5. **Programming – Problems for Logical Thinking**
   Algorithms and Pseudo codes for problems using Arrays, Arrays- Multi Dimensional, String – Data search and sort problems – linear search, binary search and interpolation search, Insertion sort, heap sort and merge sort

Learning Assessment	
Continuous Learning Assessment (CLA) (100% weightage)	
Evaluation of Laboratory Observation, Record (60%)	**Model Lab Exam (40%)**

Course Code	24EL311	Course Name	INNOVATION AND PRODUCT DEVELOPMENT-1 (Idea Generation)	Course Category	EL	Employability Enhancement Courses	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	24EL411
Course Offering Department		Data Book/Codes/ Standards	Nil		

Course Objective: ***The purpose of learning this course is:***

- The students will understand the concepts of idea generation to develop the market driven product by generating, assessing, and refining creative ideas using structured brainstorming, feedback integration, and feasibility evaluation.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		***BL***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Generate creative ideas to address specific problems through structured brainstorming sessions.	C	3	3	3	3		2			3			2			
CO-2:	Assess and refine initial ideas by integrating feedback and evaluating feasibility.	E	3	3	3	3		2			3			2			
CO-3:	Analyze problems and articulate solutions using the Problem Statement and Value Proposition Canvas.	AN	3	3	3	3		2			3			2			
CO-4:	Conduct SWOT analyses to evaluate strengths, weaknesses, opportunities and threats of their ideas, effectively assessing viability and potential impact.	AN	3	3	3	3		2			3			2			
CO-5:	Construct comprehensive documentation detailing key features, functionalities, and target audience of refined concepts.	U	3	3	3	3		2			3			2			

List of Activity

Team of three to five members preferably from a multi-disciplinary department initiates the innovative Product development journey by fostering creative idea generation and Strategic planning. They shall follow the below activities but not limited to;

Week1-2: Engage in brainstorming sessions with a focus on addressing specific problems or fulfilling particular needs.

Week 3-4: Iterate on the initial ideas by incorporating feedback and assessing their feasibility.

Week 5-6: Make the Problem Statement Canvas and the Value Proposition Canvas to articulate and refine the problem being addressed and the unique value proposition offered by the concept.

Week 7-8: Conduct the SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of each idea to assess its viability and potential impact.

Week 9-10: Document the refined concept comprehensively, outlining its key features, functionalities, and target audience.

Key Deliverables: Problem Statement Canvas, Value Proposition Canvas and SWOT analysis reports.

Learning Assessment		
Continuous Learning Assessment (CLA) (100 % weightage)		
Report **40%**	**Presentation** **40%**	**Viva-Voce** **20%**

Course Code	24EE401	Course Name	TRANSMISSION AND DISTRIBUTION	Course Category	T	Professional Core Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To introduce various electric power generation principle along with computation of electric power tariff.
- To calculate the transmission line parameters for various conductor configurations.
- To compute electrical performance of overhead transmission line
- To understand about different Insulators and Underground cables.
- To study about DC and AC distribution systems

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the principles of power generation and various power tariff.	U	2	1	2	-	-	-	-	1	-	-	-	-	3	2	1
CO-2:	Determine the various transmission line parameters.	E	2	1						1					3	1	1
CO-3:	Analyse the performance of overhead transmission line.	AN	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
CO-4:	Compute the voltage distribution, string efficiency, and dielectric stress for OHTL and Cables.	AN	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
CO-5:	Analyse the performance of DC and AC distribution systems	AN	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1

Unit-1 STRUCTURE OF POWER SYSTEM **9 Periods**

Structure of Electric Power System– Conventional, Deregulated Structure, Micro-grid and Smart Grid Structure – Methods of electric power generations – Conventional (Thermal and Hydro Power Plants) – Renewable Energy based generation – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS – Indian Electricity (IE) Rules and Acts – Tariff – Types – Electrical Safety.

Unit-2 TRANSMISSION LINE PARAMETER **9 Periods**

Resistance, Inductance and Capacitance calculations – Single-phase and three phase lines symmetrical and unsymmetrical spacing – Transposition of Conductors – double circuit lines – effect of earth on transmission line capacitance - Skin & proximity effect

Unit-3 MODELLING AND PERFORMANCE OF TRANSMISSION LINE **9 Periods**

Modelling of Transmission Line - short, medium and long transmission lines - Regulation and efficiency – ABCD constants - Power flow through a transmission line - surge impedance loading –Formation of Corona – Critical Voltages – Effect on line Performance Ferranti effect

Unit-4 MECHANICAL DESIGN OF TRANSMISSION LINE AND CABLES	9 Periods
Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers Insulators, Voltage distribution in suspension insulators – string efficiency – improving string efficiency - testing of insulators Underground cables – Types of cables – insulation resistance – dielectric stress – grading of cables - capacitance grading – intersheath grading.	
Unit-5 DISTRIBUTION SYSTEMS	**9 Periods**
General aspects – Kelvin's law - DC distribution systems - concentrated and distributed loads - radial and ring main systems – A.C. distribution – Single-phase - Three phase and its types	
	Total Theory: 45 Periods

	Text Books	References
Learning Resources	1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Third Edition, 2019. 2. C.L.Wadhwa, 'Electrical Power Systems', New Age International Ltd, seventh edition 2022. 3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India, Pvt. Ltd, New Delhi, Second Edition, 2008.	1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Sixth Edition, 2011. 2. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013. 3. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013 4. R.K.Rajput, 'A Text Book of Power System Engineering' 2nd edition, Laxmi Publications (P) Ltd, New Delhi, 2016. 5. S. Sivanagaraju and S. Sathyanarayana, 'Electric Power Transmission and Distribution', Pearson, 2009.

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	**Critical Thinking Assessment (20%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%		

Course Code	24EE402	Course Name	LINEAR INTEGRATED CIRCUITS	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Signal analysis using Op-amp based circuits.
- Applications of Op-amp.
- Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.
- IC fabrication procedure.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Explain monolithic IC fabrication process, fabrication of diodes, capacitance, resistance, FETs and PV Cell	U	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO-2:	Analyse the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp	U	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO-3:	Explain circuit and applications of op-amp based instrumentation amplifier, log/antilog amplifier, analog multiplier /divider, active filters, comparators, waveform generators, A/D and D/A converters	AN	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO-4:	Explain Functional blocks, characteristics and applications of Timer, PLL, analog multiplier ICs	AN	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO-5:	Explain the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulator, SMPS and function generator	U	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1

Unit-1 IC FABRICATION **9 Periods**

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

Unit-2 CHARACTERISTICS OF OPAMP **9 Periods**

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Voltage-shunt feedback and inverting amplifier - Voltage series feedback: and Non-Inverting Amplifier - Basic applications of op-amp –, summer, differentiator and Integrator-.

Unit-3 APPLICATION OF OPAMPS **9 Periods**

Instrumentation amplifier and its applications for transducer Bridge, First and second order active filters, V/I & I/V converters, comparators, multi vibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters (Flash type, Dual slope type, Successive Approximation types and Sigma-Delta type)

Unit-4 SPECIAL ICs	9 Periods
Functional block, characteristics of 555 Timer and its PWM application - Astable and monostable multivibrator- IC-566 voltage-controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs	
Unit-5 APPLICATION ICs	**9 Periods**
AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator- SMPS - ICL 8038 function generator IC.	
	Total Theory: 45 Periods

List of Experiments	Total Practical: 30 Periods
1. Op-Amp based amplifier circuits Differential amplifier/Instrumentation amplifier. 2. Design of Adder-subtractor circuits using Op-Amp 3. Op-Amp based Square wave oscillator 4. Op-Amp based Tri-angular wave oscillator. 5. Op-Amp based Wien bridge oscillator. 6. Op-Amp based RC shift oscillator. 7. 555 – timer IC based astable multi-vibrator	

	Text Books	References
Learning Resources	1. David A. Bell, 'Op-amp & Linear ICs', Oxford, Third Edition, 2011 2. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', , New Age, Fourth Edition, 2018. 3. Ramakant Gaikwad, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, PHI 2021.	1. Fiore, "Pumps & Linear Integrated Circuits Concepts & applications", Cengage, 2010. 2. Floyd ,Buchla, "Fundamentals of Analog Circuits, Pearson, 2013. 3. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2nd Edition, 2017. 4. Robert Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition,2012. 5. Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', McGraw Hill, 2016 – Fourth Edition. 6. Muhammad H. Rashid,' Microelectronic Circuits Analysis and Design' Cengage Learning, 2nd Edition, 2012.

Learning Assessment				
Continuous Learning Assessment (CLA) (50% weightage)				End Semester Examination (50% weightage)
Theory (25% weightage)		Practical (25% weightage)		
Average of Internal Test (15%)	Critical Thinking Assessment (10%)	Evaluation of Laboratory Observation, Record (15%)	Model Lab Exam (10%)	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24EE403	Course Name	MEASUREMENTS AND INSTRUMENTATION	Course Category	T	Professional Core Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

To educate the fundamental concepts and characteristics of measurement and errors.
To impart the knowledge on the functional aspects of measuring instruments.
To infer the importance of various bridge circuits used with measuring instruments.
To educate the fundamental working of sensors and transducers and their applications.
To summarize the overall measurement and instrumentation with the knowledge on digital instrumentation principles.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Ability to understand the fundamental art of measurement in engineering.	U	3	2	3	-	3	2	-	2	-	-	-	3	3	3	3
CO-2:	Ability to understand the structural elements of various instruments.	AP	3	2	3	2	-	-	-	-	-	3	-	3	3	3	3
CO-3:	Ability to understand the importance of bridge circuits.	AP	3	2	3	-	3	2	-	-	-	-	-	3	3	3	3
CO-4:	Ability to understand about various transducers and their characteristics by experiments.	AP	3	2	3	-	-	-	-	2	-	-	-	-	3	3	3
CO-5:	Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.	AP	3	2	3	2	3	-	-	-	-	3	-	3	3	3	3

Unit-1 CONCEPTS OF MEASUREMENTS **9 Periods**

Instruments: classification, applications – Elements of a generalized measurement system - Static and dynamic characteristics - Errors in measurement -Statistical evaluation of measurement data, Standards-Types

Unit-2 MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS **9 Periods**

Classification of instruments – moving coil and moving iron meters – Induction type, dynamometer type watt meters – Energy meter – Megger – Instrument transformers (CT & PT).

Unit-3 AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS **9 Periods**

Wheatstone bridge, Kelvin double bridge - Maxwell, Hay, Wien and Schering bridges – Errors and compensation in A.C. bridges - Instrumentation Amplifiers.

Unit-4 TRANSDUCERS AND ACTUATORS **9 Periods**

Classification of transducers – Measurement of pressure, temperature, displacement, flow, angular velocity – Digital transducers – Smart Sensors. Actuators: Principle – Classification: Pneumatic, mechanical, electrical.

Unit-5	DIGITAL INSTRUMENTATION	9 Periods
A/D converters: types and characteristics – Sampling, Errors- Measurement of voltage, Current, frequency and phase - D/A converters: types and characteristics- DSO- Data Loggers – Basics of PLC programming, Timer and Counter, Introduction to Virtual Instrumentation- Architecture – Programming – Front Panel and Block diagram		
		Total Theory: 45 Periods

	Text Books	References
Learning Resources	1. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, Edition 2011. 2. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010	1. M.M.S. Anand, 'Electronics Instruments and Instrumentation Technology', Prentice Hall India, New Delhi, 2009 2. J.J. Carr, 'Elements of Electronic Instrumentation and Measurement', Pearson Education India, New Delhi, 2011 3. W.Bolton, Programmable Logic Controllers, 6th Edition, Elseiver, 2015. 4. R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi, 3rd Edition 2014. 5. E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017. 6. R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016.

Learning Assessment		
Continuous Learning Assessment (CLA) (40% weightage)		**End Semester Examination (60% weightage)**
Average of Internal Test (20%)	**Critical Thinking Assessment (20%)**	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24EE404	Course Name	POWER SYSTEM ANALYSIS	Course Category	T	Professional Core Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Circuit Theory, Electromagnetic Theory, Electrical Machines	Co- requisite Courses	Transmission and Distribution	Progressive Courses	Protection and Switchgear, Power System Operation and Control
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Impact knowledge on need for operational studies, and to model the power system under steady state operating condition.
- To understand and apply iterative techniques for power flow analysis.
- To model and carry out short circuit studies for power system during symmetrical fault.
- To model of carry out short circuit – studies during unsymmetrical faults
- To study and understand about the various methods for analyzing power system stability

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9-**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Ability to model the power system under steady state operating condition	AN	3	2	2	1	1	-	1	-	1	-	-	-	3	1	2
CO-2:	Ability to carry out power flow analysis using iterative methods	AP	3	3	3	2	1	-	-	-	1	-	-	-	3	2	2
CO-3:	Ability to infer the significance of short circuit studies in designing circuit breakers.	AN	3	3	3	2	1	-	-	-	1	-	-	1	3	2	3
CO-4:	Ability to analyze the state of the power system for various unsymmetrical faults	AN	3	2	2	2	2	-	-	-	1	-	-	1	3	3	3
CO-5:	Ability to analyze the stability of power system using different methods	AN	3	3	2	2	2	-	1	-	1	-	-	1	3	3	3

Unit-1 POWER SYSTEM NETWORK MODELLING **9 Periods**

Need for system planning and operational studies with real time case studies - Power scenario in India with latest data on Renewable energy mix grid integration challenges - Power systemcomponents, Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram, Network graph Theory - Bus incidence matrices, Primitive parameters, Formation of bus admittance matrix — Direct inspection method — Singular Transformation method.

Unit-2 POWER FLOW ANALYSIS **9 Periods**

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method – Fast Decoupled Load Flow Analysis **-** Flow charts — Comparison of methods – Introduction to AI/ML based power flow solutions

Unit-3 SYMMETRICAL FAULT ANALYSIS **9 Periods**

Assumptions in short circuit analysis - Symmetrical short circuit analysis using Thevenin's theorem - Bus Impedance matrix building algorithm (without mutual coupling) - Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level - Current limiting reactors.

Unit-4 UNSYMMETRICAL FAULT ANALYSIS **9 Periods**

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system.

Unit-5 STABILITY ANALYSIS	9 Periods
Classification of power system stability – Rotor angle stability - Power-Angle equation – Steady state stability - Swing equation — Solution of swing equation by step by step method - Swingcurve, Equal area criterion - Critical clearing angle and time, Multi-machine stability analysis – modified Euler method - Renewable Energy Impact on Stability	
	Total Theory: 45 Periods

	Text Books	References
Learning Resources	1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw HillEducation (India) Private Limited, New Delhi, 2017. 2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-HillEducation, 3rd edition 2019. 3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., NewDelhi, 21st reprint, 2010.	1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-HillPublishing Company Ltd., New Delhi, Second Edition, 2007. 2. J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis &Design', Cengage Learning, Fifth Edition, 2012. 3. P. Venkatesh, B. V. Manikandan, A. Srinivasan, S. Charles Raja, "Electrical PowerSystems: Analysis, Security and Deregulation" Prentice Hall India (PHI), second edition, 2017 4. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, Reissueedition 2005. 5. Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt. Ltd.,New Delhi, 2013

Learning Assessment

Continuous Learning Assessment (CLA) (50% weightage)				End Semester Examination (50% weightage)
Theory (25% weightage)		Practical (25% weightage)		
Average of Internal Test (15%)	Critical Thinking Assessment (10%)	Evaluation of Laboratory Observation, Record (15%)	Model Lab Exam (10%)	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24EE405	Course Name	AC MACHINES	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes Standards	Nil		

CourseObjective: ***Thepurposeoflearningthiscourseisto:***

- Impart knowledge on the construction and performance of salient and non – salient type synchronous generators.
- Impart knowledge on the principle of operation and performance of synchronous motor.
- Impart knowledge on the construction, principle of operation and performance of induction machines.
- Impart knowledge on the starting and speed control of three-phase induction motors.
- Impart knowledge on the construction, principle of operation and performance of single phase induction motors and special machines

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
CourseOutcomes(CO): ***Attheendofthiscourse,learnerswillbeableto:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9-**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Ability to understand the construction and working principle of Synchronous generator	AP	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO-2:	Ability to understand the construction and working principle of Synchronous Motor	AP	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO-3:	Ability to understand the construction and working principle of Three Phase Induction Motor	AP	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO-4:	Acquire knowledge about the starting and speed control of induction motors	AP	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO-5:	To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines	AP	3	3	1	1	2	-	-	1	-	-	-	-	3	3	2

Unit-1 Synchronous Generator **9 Periods**

Constructional details – Types of rotors –winding factors- EMF equation – Synchronous reactance – Armature reaction – Phasor diagrams of non-salient pole synchronous generator connected to infinite bus - Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A method – steady state power- angle characteristics– Two reaction theory –slip test -short circuit transients - Capability Curves

Unit-2 Synchronous Motor **9 Periods**

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power Developed - Hunting – natural frequency of oscillations - damper windings - synchronous condenser.

Unit-3 Three Phase Induction Motor **9 Periods**

Constructional details – Types of rotors –- Principle of operation – Slip – cogging and crawling- Equivalent circuit – Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors –Induction generators.

Unit-4 Starting and Speed Control of Three Phase Induction Motor **9 Periods**

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded Connection-V/f control – Slip power recovery Scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

Unit-5 Single Phase Induction Motor and Special Machines	**9 Periods**
Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor- Servo motors- Stepper motors - introduction to magnetic levitation systems.	
	Total Theory: 45 Periods

List of Experiments	**Total Practical: 30 Periods**
1. Regulation of three phase alternator by EMF and MMF methods. 2. Regulation of three phase alternator by ZPF and ASA methods. 3. Measurements of negative sequence and zero sequence impedance of alternators. 4. V and Inverted V curves of Three Phase Synchronous Motor. 5. Load test on three-phase induction motor. 6. No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters). 7. Load test on single-phase induction motor. 8. No load and blocked rotor test on single-phase induction motor. 9. Study of Induction Motor Starters.	

	Text Books	**References**
Learning Resources	1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 6th Education 2017. 2. Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 4th Edition 2017. 3. D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 5th Edition 2017 4. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, edition 2, 2021.	1. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016. 2. M.N. Bandyo padhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2011. 3. B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015. 4. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, First edition 2010. 5. Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001

LearningAssessment				
Continuous Learning Assessment (CLA) (50% weightage)				**End Semester Examination (50% weightage)**
Theory (25% weightage)		**Practical (25% weightage)**		
Average of Internal Test (15%)	**Critical Thinking Assessment (10%)**	**Evaluation of Laboratory Observation, Record (15%)**	**Model Lab Exam (10%)**	
* The expected levels for Bloom's Taxonomy should be: - Lower-order thinking skills: not more than 40% - Higher-order thinking skills: not less than 60%				

Course Code	24EE406	Course Name	MICROPROCESSOR AND MICROCONTROLLER	Course Category	TP	Professional Core Courses	L	T	P	C
							3	0	2	4

Pre-requisite Courses	DIGITAL LOGIC CIRCUITS	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical And Electronics Engineering	Data Book / Codes Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To study the architecture and functional components of the 8085 microprocessors, including its memory and I/O interfacing, timing diagrams, and interrupt structures.
- To develop skills in simple program writing in assembly languages.
- To introduce commonly used peripheral/interfacing ICs.
- To study and understand architecture and programming of 8051 microcontroller.
- To impart knowledge about ARM processors and its instruction set.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9-**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Analyze the architecture and functional blocks of the 8085 microprocessor, including memory interfacing, I/O ports, and interrupt structure, to evaluate its role in embedded systems.	AN	2	1	2	3				1				3	3	1	3
CO-2:	Design optimized assembly language programs for the 8085-microprocessor using various addressing modes, instruction sets, and programming techniques such as looping, indexing, and subroutines.	C	2	1	2	3				1				3	3	1	3
CO-3:	Apply the interfacing techniques of peripheral ICs (8255, 8259, 8251, 8279, 8254) with the 8085 microprocessor and demonstrate their applications in real-time data acquisition and control.	AP	2	1	2	3				1				3	3	1	3
CO-4:	Develop embedded system applications using the 8051 microcontroller by implementing serial communication, timer operations, and peripheral interfacing for real-world control systems.	C	2	1	2	3				1				3	3	1	3
CO-5:	Ability to understand and compare advanced architecture evolving microprocessor field formulate efficient programming techniques for embedded applications.	AN	2	1	2	3				1				3	3	1	3

Unit-1	**INTRODUCTION TO 8085 ARCHITECTURE**	**9 Periods**
Functional block diagram – Memory interfacing–I/O ports and data transfer concepts – Timing Diagram – Interrupt structure.		
Unit-2	**8085 INSTRUCTIONS SET AND PROGRAMMING**	**9 Periods**
Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions, stack.		
Unit-3	**INTERFACING BASICS AND ICS**	**9 Periods**
Study of Architecture and programming of ICs: 8255 PPI, 8259PIC, 8251USART, 8279 Keyboard display controller and 8254 Timer/Counter – Interfacing with 8085 -A/D and D/A converter interfacing.		

Unit-4	INTRODUCTION TO 8051 MICROCONTROLLER	9 Periods
Functional block diagram - Instruction format and addressing modes – Interrupt structure – Timer – I/O ports – Serial communication, Simple programming –keyboard and display interface – Temperature control system –stepper motor control - Usage of IDE for assembly language programming.		
Unit-5	**INTRODUCTION TO ARM PROCESSOR**	**9 Periods**
RISC concept- Comaparison between RISC and CISC architecture- Overview of 32-bit ARM Architecture –ARM programmer's model–ARM Development tools- Memory organization –ARM Assembly Language Programming–Simple Examples		
		Total Theory: 45 Periods

List of Experiments **Total Practical: 30 Periods**

PROGRAMMING EXERCISES / EXPERIMENTS WITH µP8085:

1. Simple arithmetic operations: Multi precision addition / subtraction /multiplication / division.
2. Programming with control instructions: Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, Rotate instructions, Hex / ASCII / BCD code conversions.
3. Interface Experiments: A/D Interfacing. D/A Interfacing. Traffic light controller
4. Stepper motor controller interface.
5. Displaying a moving/ rolling message in the student trainer kit's output device.

PROGRAMMING EXERCISES / EXPERIMENTS WITH µC8051:

6. Simple arithmetic operations with 8051: Multi precision addition / subtraction / multiplication/ division.
7. Programming with control instructions: Increment / Decrement, Ascending / Descending. order, Maximum / Minimum of numbers, Rotate instructions, Hex / ASCII / BCD code conversions.
8. Interface Experiments: A/D Interfacing. D/A Interfacing. Traffic light controller
9. Stepper motor controller interface.
10. Displaying a moving/ rolling message in the student trainer kit's output device.
11. Study of ARM Processor

	Text Books	References
Learning Resources	1. Ramesh S. Gaonkar, 'Microprocessor Architecture Programming and Application', Pen ram International (P)ltd., Mumbai, 6th Education, 2013. 2. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, Second Edition 2011. 3. Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt. Ltd, 2016. 4. Furber,S., "ARM System on Chip Architecture" Addison Wesley trade Computer Publication,2000.	1.Douglas V. Hall, "Micro-processors & Interfacing", Tata McGraw Hill 3rd Edition, 2017. 2. Krishna Kant, "Micro-processors & Micro-controllers", Prentice Hall of India, 2007. 3. Mike Predko, "8051 Micro-controllers", McGraw Hill, 2009 4. Kenneth Ayala, 'The 8051 Microcontroller', Thomson, 3rd Edition 2004. 5. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.

Learning Assessment

Continuous Learning Assessment (CLA) (50% weightage)				End Semester Examination (50% weightage)
Theory (25% weightage)		Practical (25% weightage)		
Average of Internal Test (15%)	Critical Thinking Assessment (10%)	Evaluation of Laboratory Observation, Record (15%)	Model Lab Exam (10%)	

* The expected levels for Bloom's Taxonomy should be:
- Lower-order thinking skills: not more than 40%
- Higher-order thinking skills: not less than 60%

Course Code	24SD411	Course Name	APTITUDE AND CODING SKILLS -2	Course Category	P	Employability Enhancement Courses	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering (Common to all Branches)	Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Build quantitative skills in ages, speed, time and distance
- Enhance analytical reasoning skills to solve problems in surds, indices, boats, streams, pipes, cisterns, allegation and mixtures
- Supplement foundational data structure concepts in programming
- Provide problem solving skills in data structures and algorithms
- Develop advanced level coding skills

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		***BL***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Solve aptitude problems in Ages, Speed, Time and Distance, Ratio and proportion, Arithmetic progression	AP															
CO-2:	Apply analytical reasoning skills to solve problems in surds, indices, boats, streams, pipes, cisterns, allegation and mixtures	AP															
CO-3:	Code for foundational data structure concepts	AP															
CO-4:	Apply data structures and algorithms in problem solving.	AP															
CO-5:	Design algorithms and code for advanced level problems	AN															

List of Exercises **30 periods**

1. **Quantitative Aptitude – Advanced Problems-I**
   Ages, Speed, Time and Distance, Ratio and proportion, Arithmetic progression
2. **Quantitative Aptitude – Advanced Problems-II**
   Surds-and-Indices, Boats-and-Streams, Pipes-Cisterns, allegation and mixtures
3. **Coding – Data Structure Foundational Concepts**
   Linked List – Singly and Doubly linked list, Stack and Queue, Array implementation of stack and queue
4. **Coding – Data Structure Moderate Problems**
   Linked list implementation of stack and queue, Problems using Trees and Graphs
5. **Coding – Data Structure Advanced-level problems**
   Hashing, Minimum path problems, Pattern search problems and problems using Greedy algorithms

Learning Assessment	
Continuous Learning Assessment (CLA) (100% weightage)	
Evaluation of Laboratory Observation, Record (60%)	**Model Lab Exam (40%)**

Course Code	24EL411	Course Name	INNOVATION AND PRODUCT DEVELOPMENT - 2 (CONCEPTUALIZATION)	Course Category	EL	Employability Enhancement Courses	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	24EL511
Course Offering Department		Data Book/Codes/ Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- The students will learn to transform conceptual ideas into tangible designs and viable product concepts with focusing on customer needs and aspirations.
- This course focuses on the early stages of the product development process, emphasizing ideation, market analysis, conceptual design, and feasibility assessment

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		***BL***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Enumerate detailed product specifications, including dimensions, materials, software, and technical requirements	C	3	3	3	3	3	2			3			2			
CO-2:	Create sketches or digital renderings to visualize and refine the product design.	C	3	3	3	3	3	2			3			2			
CO-3:	Integrate insights from the Business Model Canvas to align the product concept with the business strategy.	AP	3	3	3	3	3	2			3			2			
CO-4:	Outline prototype development steps and resources with the Prototype Planning Canvas.	AP	3	3	3	3	3	2			3			2			
CO-5:	Determine the key features and functionalities of the MVP with the MVP Canvas, focusing on delivering maximum value to early adopters	AP	3	3	3	3	3	2			3			2			

List of Experiments

Students shall continue their semester 1 ideation to conceptualization focusing on shaping the product concept into a tangible design aligned with customer needs. They shall follow the below activities but not limited to;

Week 1-2: Defining detailed product specifications, covering aspects such as dimensions, materials, Software specifications and technical requirements

Week 3-4: Sketching or digital rendering/wireframe to visualize the design of a product, facilitating communication and idea refinement

Week 5-6: Incorporate insights from the Business Model Canvas to align the product concept with the overall business strategy, considering aspects such as revenue streams, cost structure, and customer segments.

Week 7-8: Utilize the Prototype Planning Canvas to outline the steps and resources required for prototype development, ensuring a systematic and efficient approach.

Week 9-10: Define the key features and functionalities of the Minimum Viable Product (MVP) using the MVP Canvas, focusing on delivering maximum value to early adopters with minimal resources.

Key Deliverables: Detailed product specifications, Initial sketches or digital renderings, Aligned Business Model Canvas, and a Structured Prototype Planning Canvas.

Learning Assessment		
Continuous Learning Assessment (CLA) (100 % weightage)		
Report **40%**	**Presentation** **40%**	**Viva Voce** **20%**

Course Code	24MC301	Course Name	INTRODUCTION TO WOMEN AND GENDER STUDIES	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Introduce students with foundational concepts in Women and Gender Studies.
- Familiarize students with the key feminist theories to understanding gender inequality.
- Explore the historical and contemporary women's movements globally and in the Indian context.
- Study the intersection of gender with language, representation, and media.
- Equip students with critical tools to challenge gender norms and engage in informed gender discourse.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand and differentiate core concepts of gender and analyze its societal structures.	U			2			1									
CO-2:	Critically evaluate various feminist theoretical frameworks and eco feminist perspectives.	E			2			1									
CO-3:	Recognize the development and impact of women's movements both globally and in India.	U			2			1									
CO-4:	Comprehend and assess the role of discourse in perpetuating gender norms through language.	U			2			1				3					
CO-5:	Critically assess gender representation in mainstream, alternative and social media platforms.	E			2		2	1									

Unit-1 **CONCEPTS**	***6 Periods***
Sex vs. Gender, masculinity, femininity, socialization, patriarchy, public/ private, essentialism, binaryism, power, hegemony, hierarchy, stereotype, gender roles, gender relation, deconstruction, resistance, sexual division of labour.	
Unit-2 **FEMINIST THEORY**	***6 Periods***
Liberal, Marxist, Socialist, Radical, Psychoanalytic, postmodernist, ecofeminist.	
Unit-3 **WOMEN'S MOVEMENTS: GLOBAL, NATIONAL AND LOCAL**	***6 Periods***
Rise of Feminism in Europe and America. Women's Movement in India.	
Unit-4 **GENDER AND LANGUAGE**	***6 Periods***
Linguistic Forms and Gender. Gender and narratives.	
Unit-5 **GENDER AND REPRESENTATION**	***6 Periods***
Advertising and popular visual media. Gender and Representation in Alternative Media. Gender and social media.	
Total:	**30 Periods**

	Text Books	References
Learning Resources	1. Colleen Lutz Clemens, "Introduction to Women's & Gender Studies" 1st Edition, The Pennsylvania Alliance, 2023. 2. Madhu Nagla "Women and Gender Studies" 1st Edition, Rawat Publications, 2025.	1. Melissa J. Gillis , Andrew T. Jacobs " Introduction to Women's and Gender Studies : An Interdisciplinary Approach" 3rd Edition, 2024. 2. L. Ayu Saraswati, Barbara L. Shaw, and Heather Rellihan, "Introduction to Women's, Gender and Sexuality Studies: Interdisciplinary and Intersectional Approaches" 3rd Edition, Oxford University Press, 2025.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC302	Course Name	ELEMENTS OF LITERATURE	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To make the students aware about the finer sensibilities of human existence through an art form.
- The students will learn to appreciate different forms of literature as suitable modes of expressing human experience.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.	U						3	2	2	2	2		3			
CO-2:	Differentiate between fiction, fact, and literary truth, and explain how fiction constructs meaning.	U						1	0	2	2	3		1			
CO-3:	Interpret the emotional and imaginative elements that define poetic expression.	U										3		2			
CO-4:	Students will understand the basic elements of drama and how it is performed on stage.	U										3		1			
CO-5:	Students will identify different types of drama like tragedy, comedy and satire.	U						2	2	0		3		1			

Unit-1	**RELEVANCE OF LITERATURE**	***6 Periods***
Enhances Reading, thinking, discussing and writing skills-Develops finer sensibility for better human relationship-Increases understanding of the problem of humanity without bias-Providing space to reconcile and get a cathartic effect.		
Unit-2	**ELEMENTS OF FICTION**	***6 Periods***
Fiction, fact and literary truth-Fictional modes and patterns-Plot character and perspective.		
Unit-3	**ELEMENTS OF POETRY**	***6 Periods***
Emotions and imaginations-Figurative language-Simile, metaphor, conceit, symbol, pun and irony-Personification and animation-Rhetoric and trend.		
Unit-4	**FUNDAMENTALS OF DRAMA**	***6 Periods***
Elements of drama. Drama as a representational act. Content mode and elements. Theatrical performance.		
Unit-5	**FORMS AND FUNCTIONS OF DRAMA**	***6 Periods***
Drama as narration, mediation and persuasion. Features of comedy. Features of satire.		
	Total:	**30 Periods**

	Text Books	References
Learning Resources	1.An Introduction to the Study of English Literature, W.H. Hudson, Atlantic, 2007. 2.An Introduction to Literary Studies, Mario Klarer, Routledge, 2013. 3.The Experience of Poetry, Graham Mode, Open college of Arts with Open Unv Press, 1991. 4.The Elements of Fiction: A Survey, Ulf Wolf (ed), Wolfstuff, 2114. 5.The Elements of Drama, J.L.Styan, Literary Licensing, 2011.	To be decided by the teacher and student, on the basis of individual students so as to enable him or her to write the term paper.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC303	Course Name	FILM APPRECIATION	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- In this course on film appreciation, the students will be introduced broadly to the development of film as an art and entertainment form. It will also discuss the language of cinema as it evolved over a century. The students will be taught as to how to read a film and appreciate the various nuances of a film as a text. The students will be guided to study film joyfully.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Students will understand the basic elements involved in making a film, including equipment, script, crew and production process.	U						1	1	1	2	3	2	2			
CO-2:	Students will learn how film language developed from early silent films to talkies, and understand key milestones in film history.	U						2	3	1		2		3			
CO-3:	Students will be able to recognize major film theories and apply them to analyze and appreciate films	U						2	2	3		2		2			
CO-4:	Students will explore the development of cinema in different countries like the Soviet Union, Japan, Italy and the U.S	U						2	2	2		2		2			
CO-5:	Students will gain knowledge about the history of Indian Cinema, important directors, regional films and documentaries.	U						2	2	2		2		2			

Unit-1 **THE COMPONENT OF FILMS**	***6 Periods***
A-1:The material and equipment A-2: The story, screenplay and script A-3: The actors, crew members, and the director A-4: The process of film making… structure of a film	
Unit-2 **EVOLUTION OF FILM LANGUAGE**	***6 Periods***
B-1: Film language, form, movement etc. B-2: Early cinema… silent film (Particularly French) B-3: The emergence of feature films: Birth of a Nation B-4: Talkies	
Unit-3 **FILM THEORIES AND CRITICISM/APPRECIATION**	***6 Periods***
C-1: Realist theory; Auteurists C-2: Psychoanalytic, Ideological, Feminists C-3: How to read films? C-4: Film Criticism / Appreciation	

Unit-4 **DEVELOPMENT OF FILMS**	*6 Periods*
D-1: Representative Soviet films D-2: Representative Japanese films D-3: Representative Italian films D-4: Representative Hollywood film and the studio system	
Unit-5 **INDIAN FILMS**	*6 Periods*
E-1: The early era E-2: The important films made by the directors E-3: The regional films E-4: The documentaries in India	
Total:	**30 Periods**

	Text Books	**References**
Learning Resources	A Reader containing important articles on films will be prepared and given to the students. The students must read them and present in the class and have discussion on these.	To be decided by the course handling faculty and student, on the basis of individual students.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC304	Course Name	WELL – BEING WITH TRADITIONAL PRACTICES – YOGA, AYURVEDA, SIDDHA	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To enjoy life happily with fun filled new style activities that help to maintain health also
- To adapt a few life style changes that will prevent many health disorders
- To be cool and handle every emotion very smoothly in every walk of life
- To learn to eat cost effective but healthy foods that are rich in essential nutrients
- To develop immunity naturally that will improve resistance against many health disorders

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Learn about holistic health and lifestyle habits to prevent disease and stay healthy.	U	2	1	3			2	2	3	3	2		3			
CO-2:	Understand the importance of a balanced diet, nutrients, and healthy cooking for good nutrition and weight management.	U	2	1	3				1	3	3	2		3			
CO-3:	Explore Ayurveda and Siddha for their preventive health practices and lifestyle approaches.	U	2	1	3			2	1	3	3	2		3			
CO-4:	Learn how to manage stress, improve sleep, boost immunity, and support mental well-being.	U	2	1	3			2	1	3	3	2		3			
CO-5:	Understand and practice yoga for physical health, mental clarity, and overall well-being.	U	1	1	3			2	1	3	3	2		3			

Unit-1 **HEALTH AND ITS IMPORTANCE** ***6 Periods***

Health: Definition-Importance of maintaining health- More importance on prevention than treatment Ten types of health one has to maintain - Physical health - Mental health - Social health - Financial health - Emotional health - Spiritual health - Intellectual health - Relationship health - Environmental health - Occupational/Professional heath. Present health status- The life expectancy-present status - mortality rate - dreadful diseases - Non-communicable diseases (NCDs) the leading cause of death - 60% - heart disease – cancer – diabetes - chronic pulmonary diseases - risk factors – tobacco – alcohol - unhealthy diet - lack of physical activities. Types of diseases and disorders- Lifestyle disorders – Obesity – Diabetes - Cardiovascular diseases – Cancer – Strokes – COPD - Arthritis - Mental health issues. Causes of the above diseases /disorders -Importance of prevention of illness- Takes care of health - Improves quality of life - Reduces absenteeism - Increase satisfaction - Saves time

Unit-2 **DIET** ***6 Periods***

Role of diet in maintaining health- energy one needs to keep active throughout the day - nutrients one needs for growth and repair - helps one to stay strong and healthy - helps to prevent diet-related illness, such as some cancers - keeps active and - helps one to maintain a healthy weight - helps to reduce risk of developing lifestyle disorders like diabetes – arthritis – hypertension – PCOD – infertility – ADHD – sleeplessness -helps to reduce the risk of heart diseases - keeps the teeth and bones strong.
Balanced Diet and its 7 Components- Carbohydrates – Proteins – Fats – Vitamins – Minerals - Fibre and Water. Food additives and their merits & demerits- Effects of food additives - Types of food additives - Food additives and processed foods - Food additives and their reactions

Definition of BMI and maintaining it with diet: Importance - Consequences of not maintaining BMI - different steps to maintain optimal BM	
Unit-3 **ROLE OF AYURVEDA & SIDDHA SYSTEMS IN MAINTAINING HEALTH**	***6 Periods***
AYUSH systems and their role in maintaining health- preventive aspect of AYUSH - AYUSH as a soft therapy. Secrets of traditional healthy living- Traditional Diet and Nutrition - Regimen of Personal and Social Hygiene - Daily routine (Dinacharya) - Seasonal regimens (Ritucharya) - basic sanitation and healthy living environment - Sadvritta (good conduct) - for conducive social life. Principles of Siddha & Ayurveda systems- Macrocosm and Microcosm theory - Pancheekarana Theory / (Five Element Theory) 96 fundamental Principles – Uyir Thathukkal(Tri-Dosha Theory) – Udal Thathukkal	
Unit-4 **MENTAL WELLNESS**	***6 Periods***
Emotional health- Definition and types - Three key elements: the subjective experience - the physiological response - the behavioral response - Importance of maintaining emotional health - Role of emotions in daily life -Short term and long term effects of emotional disturbances - Leading a healthy life with emotions - Practices for emotional health - Recognize how thoughts influence emotions - Cultivate positive thoughts - Practice self-compassion - Expressing a full range of emotions. Stress management- Stress definition - Stress in daily life - How stress affects one's life - Identifying the cause of stress - Symptoms of stress - Managing stress (habits, tools, training, professional help) - Complications of stress mismanagement. Sleep- Sleep and its importance for mental wellness - Sleep and digestion.	
Unit-5 **YOGA**	***6 Periods***
Definition and importance of yoga- Types of yoga - How to Choose the Right Kind for individuals according to their age - The Eight Limbs of Yoga - Simple yogasanas for cure and prevention of health disorders - What yoga can bring to our life.	
	Total: 30 Periods

	Text Books	**References**
Learning Resources	1. Nutrition and Dietetics - Ashley Martin, Published by White Word Publications, New York, NY 10001, USA 2. Yoga for Beginners_ 35 Simple Yoga Poses to Calm Your Mind and Strengthen Your Body, by Cory Martin, Copyright © 2015 by Althea Press, Berkeley, California	To be decided by the teacher and student, on the basis of individual students so as to enable him or her to write the term paper.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC305	Course Name	HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To help students understand the basic ideas and methods used in writing history, especially about science and technology.
- To introduce students to important Indian thinkers who studied the history of science and technology.
- To learn about how science and technology developed in ancient India.
- To study the growth and exchange of scientific knowledge in medieval India.
- To understand how British rule affected science and technology in India.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Students will be able to explain basic historical ideas and how they relate to science and technology.	U						2	2	2		2		3			
CO-2:	Students will know about key Indian scholars and their work on science and technology history.	U						2	2	2		2		2			
CO-3:	Students will describe important scientific and technological progress in ancient India.	U						2	3	2		2		2			
CO-4:	Students will understand the scientific developments and cultural exchanges in medieval India.	U						3	3	2		2		2			
CO-5:	Students will explain how colonialism changed science and technology in India.	U						3	3	3		3		2			

Unit-1 **CONCEPTS AND PERSPECTIVES** ***6 Periods***

Meaning of History, Objectivity, Determinism, Relativism, Causation, Generalization in History; Moral judgment in history Extent of subjectivity, contrast with physical sciences, interpretation and speculation, causation verses evidence, concept of historical inevitability, Historical Positivism. Science and Technology-Meaning, Scope and Importance, Interaction of science, technology & society, Sources of history on science and technology in India.

Unit-2 **HISTORIOGRAPHY OF SCIENCE AND TECHNOLOGY IN INDIA** ***6 Periods***

Introduction to the works of D.D. Kosambi, Dharmpal, Debiprasad Chattopadhyay, Rehman, S. Irfan Habib, Deepak Kumar, Dhruv Raina, and others.

Unit-3 **SCIENCE AND TECHNOLOGY IN ANCIENT INDIA** ***6 Periods***

Technology in pre-historic period, Beginning of agriculture and its impact on technology, Science and Technology during Vedic and Later Vedic times Science and technology from 1st century AD to C-1200.

Unit-4 **SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA** ***6 Periods***

Legacy of technology in Medieval India, Interactions with Arabs, Development in medical knowledge, interaction between Unani and Ayurveda and alchemy Astronomy and Mathematics: interaction with Arabic Sciences, Science and Technology on the eve of British conquest

Unit-5	**SCIENCE AND TECHNOLOGY IN COLONIAL INDIA**	***6 Periods***
Science and the Empire, Indian response to Western Science Growth of techno-scientific institutions		
		Total: 30 Periods

	Text Books	**References**
Learning Resources	1.History of Indian Science, Technology and Culture (Vol. III, Part I), A. Rahman,1999, Oxford University Press.	1.History of Science, Philosophy and Culture in Indian Civilization: Science, Technology and Medicine in Colonial India (Vol. XV, Part 1), Deepak Kumar, 1999, Pearson Education India

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC306	Course Name	POLITICAL AND ECONOMIC THOUGHT FOR A HUMANE SOCIETY	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- This course will begin with a short overview of human needs and desires and how different political-economic systems try to fulfil them. In the process, we will end with a critique of different systems and their implementations in the past, with possible future directions.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Understand the principles of a humane society and the importance of harmony within individuals, communities, and nature.	U						3	3	3	1	2		3			
CO-2:	Analyze the characteristics and impacts of capitalism, liberal democracy, fascism, and totalitarian regimes in modern history.	AN						3	2	2	1	2		2			
CO-3:	Explain the fundamental concepts of communism and welfare states and their influence on society and human empowerment.	U						3	2	3	1	2		2			
CO-4:	Appreciate Gandhian philosophy and its relevance to Indian civilization, community governance, and ecological balance.	U						3	3	3							
CO-5:	Evaluate the role of technology and education in societal development and envision future directions for social progress.	E						3	1	1							

Unit-1	**CONCEPTS OF HUMANE SOCIETY AND SOCIETAL HARMONY**	***6 Periods***
Considerations for humane society, holistic thought. Human desires, harmony in self, relationships, society, and nature. Societal systems		
Unit-2	**ECONOMIC AND POLITICAL SYSTEMS – CAPITALISM, FASCISM, AND TOTALITARIANISM**	***6 Periods***
Capitalism: free markets, demand-supply, competition, laissez-faire, monopolies, imperialism. Liberal democracy. Fascism, totalitarianism, World War I & II, Cold War		
Unit-3	**COMMUNISM AND WELFARE STATE**	***6 Periods***
Communism: mode of production, theory of labour, surplus value, class struggle, dialectical & historical materialism. Russian and Chinese models . Welfare state, relation with human desires, empowerment		
Unit-4	**GANDHIAN THOUGHT AND INDIAN CIVILIZATION**	***6 Periods***
Gandhian philosophy: Swaraj, decentralized economy and polity, community, control over lives. Relationship with nature. Essential elements of Indian civilization		
Unit-5	**TECHNOLOGY, EDUCATION, AND FUTURE DIRECTIONS**	***6 Periods***
Technology as a driver of society. Role of education in shaping society. Future societal directions.		
	Total:	**30 Periods**

	Text Books	References
Learning Resources	1. Social and Political Philosophy: Readings from Plato to Gandhi. John G. Gunnell, Robert B. Talisse. Wadsworth Publishing	1. Political Philosophy: A Very Short Introduction, David Miller, Oxford University Press.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC307	Course Name	INDIAN CONSTITUTION	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- Understand the historical background and philosophical foundations of the Indian Constitution.
- Explore the structure and functions of both Union and State Governments under the Constitution.
- Gain knowledge of the Fundamental Rights and Directive Principles of State Policy.
- Study the roles of various political institutions and judicial bodies in the governance of India.
- Develop an understanding of the process of constitutional amendments and the dynamic nature of the Constitution.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Demonstrate an understanding of the evolution and key philosophical principles of the Indian Constitution.	U						1		1							
CO-2:	Analyze the structure, functions, and powers of the Union and State Governments.	AN						1		1							
CO-3:	Assess the relationship between Fundamental Rights and Directive Principles of State Policy.	E						1		1							
CO-4:	Critically examine the role of the Judiciary in interpreting the Constitution.	E						1		1							
CO-5:	Understand and explain the processes involved in the amendment of the Constitution.	U						1		1							

Unit-1	**INTRODUCTION TO THE INDIAN CONSTITUTION**	***6 Periods***
Historical Background - Constituent Assembly of India - Philosophical Foundations of the Indian Constitution - Preamble of the Constitution- Fundamental Rights -Directive Principles of State Policy (DPSP)- Fundamental Duties – Citizenship - Constitutional Remedies for Citizens		
Unit-2	**UNION GOVERNMENT**	***6 Periods***
Structure of Union Government - President of India - Vice President of India - Prime Minister and Cabinet - Parliament of India - Supreme Court of India		
Unit-3	**STATE GOVERNMENT**	***6 Periods***
Structure of State Government - Governor of the State - Chief Minister and Cabinet - State Legislature - Judicial System in States (High Courts and Subordinate Courts)		
Unit-4	**LOCAL GOVERNMENT AND PANCHAYATS**	***6 Periods***
Structure and Functions of Local Government - Panchayati Raj System - Municipalities and Local Administration		
Unit-5	**AMENDMENT PROCESS AND SPECIAL PROVISIONS**	***6 Periods***
Constitutional Amendment Process - Special Provisions for States -Recent Amendments to the Constitution		
	Total:	**30 Periods**

	Text Books	References
Learning Resources	1. "Introduction to the Constitution of India" by D.D. Basu 2. "Indian Polity" by M. Laxmikanth 3. "The Constitution of India" by P.M. Bakshi	1."Indian Constitution: A Comprehensive Commentary" by H.M.Seervai 2."The Indian Constitution" by V. N. Shukla 3."Constitutional Law of India" by J.N. Pandey 4."Indian Political System" by Rajni Kothari 5."Constitution of India: Text and Commentary" by S. C. Kashyap

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	

Course Code	24MC308	Course Name	BUREAU OF INDIAN STANDARDS	Course Category	T	Mandatory Courses	L	T	P	C
							2	0	0	0

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department		Data Book / Codes / Standards	Nil		

Course Objective: ***The purpose of learning this course is to:***

- To provide an understanding of the history, evolution, and role of the Bureau of Indian Standards (BIS) in national and international standardization processes.
- To familiarize students with the BIS Act, rules, and regulations, and the legal framework governing the certification and quality control processes.
- To explore the various types of Indian Standards (IS), codes of practice, and their application across different sectors.
- To introduce the services and activities provided by BIS, including product certification, quality control, and consumer protection.
- To highlight the international cooperation of BIS, its role in global standardization forums, and its contributions to global trade and sustainable development.

			Program Outcomes (PO)												Program Specific Outcome (PSO)		
Course Outcomes (CO): ***At the end of this course, learners will be able to:***		**BL**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1:	Demonstrate a clear understanding of the Bureau of Indian Standards, its functions, history, and importance in the standardization process.	U						2	2	1		2		2			
CO-2:	Analyze the BIS Act and its legal framework, understanding the processes of certification, compliance, and the legal consequences of non-adherence.	AN						3	2	3		2		2			
CO-3:	Identify various Indian Standards (IS) and their relevance in ensuring quality, safety, and uniformity in products and services.	AP						3	2	2				1			
CO-4:	Understand the services offered by BIS, including product certification and quality control, and how they benefit industries, consumers, and the economy.	U						1		1		1		1			
CO-5:	Evaluate the role of BIS in international cooperation, particularly in aligning Indian standards with global standards, and its contribution to international trade and sustainable development goals.	E							1	1		1		1			

Unit-1	**INTRODUCTION TO BUREAU OF INDIAN STANDARDS (BIS)**	***6 Periods***
Overview of BIS - History and Evolution of BIS - Role and Functions of BIS -BIS Organizational Structure - Importance of Standardization in India - BIS and its relationship with International Standardization Bodies (ISO, IEC, etc.)		
Unit-2	**BIS ACTS, RULES, AND REGULATIONS**	***6 Periods***
BIS Act, 2016: Objectives and Provisions - Legal Framework and Powers of BIS - Certification Marks (ISI Mark) - BIS Certification Process for Products and Services = Legal Consequences of Non-Compliance.		
Unit-3	**STANDARDS AND CODES OF PRACTICE**	***6 Periods***
Types of Standards: Product Standards, Process Standards, etc. - National Standards and their Importance - IS (Indian Standard) Codes and their Application - Adoption of International Standards in India - Role of BIS in Developing Standards for Various Sectors.		
Unit-4	**BIS SERVICES AND ACTIVITIES**	***6 Periods***
Product Certification and Quality Control - Training and Awareness Programs by BIS - BIS and Consumer Protection - Role of BIS in Ensuring Safety and Quality of Products - Research and Development Activities by BIS.		

Unit-5	**BIS AND INTERNATIONAL COOPERATION**	***6 Periods***
BIS's Role in International Standardization Forums - BIS's Membership in ISO, IEC, and Other Global Bodies - Harmonization of Indian Standards with International Standards - BIS's Contributions to Sustainable Development Goals (SDGs) - BIS and Global Trade: Ensuring Export Quality and Compliance.		
	Total:	**30 Periods**

	Text Books	**References**
Learning Resources	1."Bureau of Indian Standards (BIS) Handbook" Bureau of Indian Standards. 2."Indian Standards and Quality Control" M. P. P. K. Nair. 3."Standardization and Quality Control" S. K. Gupta.	1."The Bureau of Indian Standards Act, 2016" Indian Government. 2."Fundamentals of Quality Control and Improvement". Amitava Mitra. 3."International Standards and Certification" C. B. Gupta. 4."Standardization in Global Supply Chains: Opportunities and Challenges". Rajesh Kumar.

Learning Assessment		
Continuous Learning Assessment (CLA) (100% weightage)		**End Semester Examination (0% weightage)**
Average of Internal Test (0%)	***Critical Thinking Assessment (100%)***	