



MRK INSTITUTE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
KATTUMANNARKOIL-608 301, CUDDALORE DISTRICT, TAMILNADU, INDIA

CHOICE BASED CREDIT SYSTEM

Programme: B.E., Electrical and Electronics Engineering

Regulations: 2026

Abbreviations:

HUM – Humanities (Languages, Management, Heritage, and others)
BS – Basic Science (Mathematics, Physics, Chemistry)
ES – Engineering Science (General (**GE**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))
SD – Skill Development
SL – Self-Learning
CDP – Capstone Design Project
OE – Open Elective

L – Laboratory Course

T – Theory Course

LIT – Laboratory Integrated Theory

MC – Mandatory Course

PW – Project Work

IPW – Internship cum Project Work

DIC – Department Introductory Course

TCP – Total Contact Period(s)

Program Outcomes

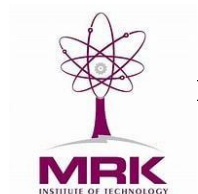
1. **Engineering Knowledge:** Apply math, science, and engineering fundamentals to complex problems.
2. **Problem Analysis:** Identify and analyze complex problems using research and sustainability principles.
3. **Design Solutions:** Design systems and processes considering health, safety, cost, culture, and environment.
4. **Investigations:** Use experiments, modelling, and data analysis to reach valid conclusions.
5. **Engineering Tools:** Apply modern tools for modelling and problem-solving, recognizing their limits.
6. **Society & Environment:** Assess societal, legal, and environmental impacts of engineering solutions.
7. **Ethics:** Commit to ethics, human values, diversity, and legal compliance.
8. **Teamwork:** Work effectively as an individual and in multidisciplinary teams.
9. **Communication:** Communicate clearly in reports, presentations and documentation across diverse groups.
10. **Management & Finance:** Apply management and economic principles in projects and teamwork.
11. **Lifelong Learning:** Engage in continuous learning, adapt to new technologies, and think critically.

Programme Specific Outcomes

- PSO1** Analyze, design, and develop electrical circuits and systems for various industrial and societal requirements.
- PSO2** Utilize modern tools and techniques for solving complex problems in electrical and electronic systems and provide sustainable solutions.
- PSO3** Upskill with rapid advancements in the field of Electrical Engineering and exhibit research aptitude, work effectively as team and uphold ethical practices.




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MRK INSTITUTE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
B.E ELECTRICAL AND ELECTRONICS ENGINEERING
REGULATIONS 2026
CHOICE BASED CREDIT SYSTEM (CBCS)
CURRICULUM AND SYLLABUS

Semester I									
S. No	Course Code	Course Name	Course Type	Periods/Week				Credits	Category
				L	T	P	TCP		
1	26HSC01	தமிழர் மரபும் தொழில் நுட்பமும் /Tamils Heritage and Technologies	T	1	0	0	1	1	HUM
2	26ENC01	English for Engineers	T	3	0	0	3	3	HUM
3	26MAC01	Applied Calculus and Matrices	T	3	1	0	4	4	BS
4	26PHC01	Engineering Physics	LIT	3	0	2	5	4	BS
5	26CYC01	Engineering Chemistry	LIT	3	0	2	5	4	BS
6	26MEC01	Engineering Graphics	T	3	1	0	4	4	ES(GE)
7	26CSC01	Programming Language : C	T	3	0	0	3	3	ES(PC)
8	26MEC02	Maker Space Laboratory	L	0	0	4	4	2	SD
9	26CSC02	Programming in C laboratory	L	0	0	4	4	2	ES(PC)
10	26HSC02	Physical Education	---	-	-	-	-	-	HUM
Total							33	27	
Semester II									
S. No	Course Code	Course Name	Course Type	Periods/Week				Credits	Category
				L	T	P	TCP		
1	26MAC02	Linear Algebra	T	3	1	0	4	4	BS
2	26PHC06	Physics for Electrical Engineering	T	3	0	0	3	3	BS
3	26GEC01	Environmental Science and Sustainability	T	2	0	0	2	2	ES(GE)
4	26CSC03	Problem Solving using Python Programming	LIT	3	0	2	5	4	ES(PC)
5	26EE201	Electric circuit Analysis	LIT	3	0	2	5	4	ES (PC)
6	26GEC02	Basic Civil and Mechanical Engineering	T	3	0	0	3	3	ES(GE)
7	26ENC02	Communicative English Laboratory	L	0	0	4	4	2	HUM
8		NCC / NSS / NSO/ YRC #1	---	-	-	-	-	-	HUM
Total							26	22	

#1 NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.



Semester III									
S. No	Course Code	Course Name	Course Type	Periods /Week				Credit	Category
				L	T	P	TCP		
1	26MAC06	Transforms and its Applications	T	3	1	0	4	4	BS
2	26EE301	Electromagnetic Theory	T	3	1	0	4	4	ES (PC)
3	26EE302	Electrical Machines - I	T	3	0	0	3	3	ES (PC)
4	26EE303	Linear Integrated Circuits	LIT	3	0	2	5	4	ES (PC)
5	26EE304	Electronic Devices and Circuits	LIT	3	0	2	5	4	ES (PC)
6	26EE305	Power plant Engineering	T	3	0	0	3	3	ES (PC)
7	26EE306	Electrical Machines Laboratory-I	L	0	0	4	4	2	ES (PC)
8	26SDC01	Foundation Aptitude and Verbal ability Skills	---	0	0	2	2	1	SD
9		Mandatory Course - I \$	---	1	0	0	1	-	MC
Total							31	25	

\$ Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC- I)

Semester IV									
S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26MAC03	Probability and Statistics	T	3	1	0	4	4	BS
2	26EE401	Transmission and Distribution	T	3	0	0	3	3	ES (PC)
3	26EE402	Electrical Machines - II	T	3	0	0	3	3	ES (PC)
4	26EE403	Measurement and Instrumentation	T	3	0	0	3	3	ES (PC)
5	26EE404	Control Systems	LIT	3	0	2	5	4	ES (PC)
6	26EE405	Digital Logic Circuits	LIT	3	0	2	5	4	ES (PC)
7	26EE406	Electrical Machines Laboratory– II	L	0	0	4	4	2	ES (PC)
8	26SDC02	Professional and Corporate Communication Skills	L	0	0	2	2	1	SD
9		Mandatory Course - II \$	---	1	0	0	1	-	MC
10		NCC / NSS / NSO/ YRC #2	---	-	-	-	-	-	-
Total							30	24	

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

\$ Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)



Semester V									
S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE501	Power System Analysis	T	3	0	0	3	3	ES (PC)
2	26EE502	Power Electronics	T	3	0	0	3	3	ES (PC)
3	26EE503	Renewable Energy Systems	LIT	3	0	2	5	4	ES (PC)
4		Programme Elective-1	T	3	0	0	3	3	ES (PE)
5		Programme Elective-2	LIT	3	0	2	5	3	ES (PE)
6	26EE504	Applied Data Science	T	3	0	0	3	3	ES (ET)
7	26EE505	Power Electronics Laboratory	L	0	0	4	4	2	ES (PC)
8	26IP501	Summer Internship*	---	-	-	-	-	1	IPW
9	26SDC03	Advanced Aptitude and Logical Reasoning Skills	---	0	0	2	2	1	SD
10		Mandatory Course-III \$	---	1	0	0	1	-	MC
Total							29	23	

*Two weeks Summer Internship carries one credit and it will be done during IV semester summer vacation and same will be evaluated in V semester.

\$ Mandatory Course-III is a Non-credit Course (Student shall select one course from the list given under MC- III)

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
For Honours Degree									
		Capstone Design Project – Level I	CDP	0	0	12	12	6	SD
OR									
		Honours Elective – I	T	3	0	0	3	3	Honours
		Honours Elective – II	T	3	0	0	3	3	Honours
For Minor Degree									
		Minor Elective – I	T	3	0	0	3	3	Minor
		Minor Elective – II	T	3	0	0	3	3	Minor



Semester VI									
S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE601	Power system Protection and Switchgear	T	3	0	0	3	3	ES (PC)
2	26EE602	Power System Operation and Control	T	3	0	0	3	3	ES (PC)
3	26EE603	High Voltage Engineering	T	3	0	0	3	3	ES (PC)
4		Programme Elective-3	LIT	3	0	2	5	3	ES (PE)
5		Programme Elective-4	LIT	3	0	2	5	3	ES (PE)
6		Open Elective-1	T	3	0	0	3	3	OE
7	26EE604	Power system Laboratory	L	0	0	4	4	2	ES (PC)
8	26SDC04	Technical Interview and Advanced Competitive Examination Skills	-	0	0	2	2	1	SD
9		Mandatory Course-IV \$	---	1	0	0	1	-	MC
10		Self-Learning Course	---	-	-	-	-	-	SL
11		NCC / NSS / NSO/ YRC #3	---	--	--	--	--	--	--
Total							29	21	

#3 NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

\$ Mandatory Course-IV is a Non-credit Course (Student shall select one course from the list given under MC- IV)

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
For Honours Degree									
		Capstone Design Project – Level II	CDP	0	0	12	12	6	SD
OR									
		Honours Elective – III	T	3	0	0	3	3	Honours
		Honours Elective – IV	T	3	0	0	3	3	Honours
For Minor Degree									
		Minor Elective – III	T	3	0	0	3	3	Minor
		Minor Elective – IV	T	3	0	0	3	3	Minor



Semester VII

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1		Programme Elective-5	LIT	3	0	0	3	3	ES (PE)
2		Programme Elective-6	LIT	3	0	0	3	3	ES (PE)
3		Open Elective-2	T	3	0	0	3	3	OE
4	26HSC03	Engineering Entrepreneurship Development	T	3	0	0	3	3	HUM
5	26HSC05	Professional Ethics and Human Values	T	2	0	0	2	2	HUM
6	26EE701	Mini Project	PW	0	0	4	4	2	SD
7	26SDC05	Professional Employability and Technical Communication Skills	---	0	0	2	2	1	SD
8		Mandatory Course - V \$	T	1	0	0	1	0	MC
9	26IP701	Summer Internship*	-	-	-	-	-	1	IPW
Total							21	18	

*Two weeks Summer Internship carries one credit and it will be done during VI semester summer vacation and same will be evaluated in VII semester.

\$ Mandatory Course-V is a Non-credit Course (Student shall select one course from the list given under MC- V).

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
For Honours Degree									
		Capstone Design Project – Level III	CDP	0	0	12	12	6	SD
OR									
		Honours Elective – V	T	3	0	0	3	3	Honours
		Honours Elective – VI	T	3	0	0	3	3	Honours
For Minor Degree									
		Minor Elective – V	T	3	0	0	3	3	Minor
		Minor Elective – VI	T	3	0	0	3	3	Minor

Semester VIII

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE801	Project Work	PW	0	0	16	16	8	SD
Total credits								168	



PROGRAMME ELECTIVE COURSES – STREAMS

Power Engineering	Power Electronic Converters and Drives	Embedded Systems	Electric Vehicle Technology	Advanced Control	Diversified Courses
SCADA and Energy Management Systems	Special Electrical Machines	Digital Signal Processing	e-Mobility	Process modelling and Simulation	Hybrid Energy Technology
Substation Engineering and Automation	Electrical drives	Smart System Automation	Electric Vehicle Architecture	Computer Control of Processes	Design and Modelling of Renewable Energy Systems
Restructured Power Market	Analysis of Electrical Machines	MEMS and NEMS	Design of Motor and Power Converters for Electric Vehicles	Model based Control	Energy Management and Auditing
Smart Grid	Modern Power Converters	Embedded Communication Protocols	Battery Management Systems	Non Linear Control	VLSI Design
HVDC and FACTS	SMPS and UPS	Embedded System Design	EV Charging infrastructure	Optimal Control	Substation Erection
Power system Transients	Power Electronics for Renewable Energy Systems	Embedded Processors	Safety and Testing of Electric Vehicles	Adaptive Control	EMI and EMC
Grid Integration Techniques	Control of Power Electronic systems	Signals and Systems	Connected Vehicles	Process Control	Machine Learning
Condition Monitoring and Testing of Electrical Equipment	Power Quality	Microprocessor And Microcontroller	--	System Identification Techniques	Energy Storage System
--	--	--	--	Factory Automation	Drone Technologies



PROGRAMME ELECTIVE COURSES**POWER ENGINEERING**

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE001	SCADA and Energy Management Systems	T	3	0	0	3	3	ES(PE)
2	26EE002	Substation Engineering and Automation	T	3	0	0	3	3	ES(PE)
3	26EE003	Restructured Power Market	T	3	0	0	3	3	ES(PE)
4	26EE004	Smart Grid	T	3	0	0	3	3	ES(PE)
5	26EE005	HVDC and FACTS	T	3	0	0	3	3	ES(PE)
6	26EE006	Power system Transients	T	3	0	0	3	3	ES(PE)
7	26EE007	Grid Integration Techniques	LIT	2	0	2	4	3	ES(PE)
8	26EE008	Condition Monitoring and Testing of Electrical Equipment	LIT	2	0	2	4	3	ES(PE)

POWER ELECTRONIC CONVERTERS AND DRIVES

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE009	Special Electrical Machines	T	3	0	0	3	3	ES(PE)
2	26EE010	Electrical drives	LIT	3	0	0	3	3	ES(PE)
3	26EE011	Analysis of Electrical Machines	T	3	0	0	3	3	ES(PE)
4	26EE012	Modern Power Converters	LIT	2	0	2	4	3	ES(PE)
5	26EE013	SMPS and UPS	LIT	2	0	2	4	3	ES(PE)
6	26EE014	Power Electronics for Renewable Energy Systems	LIT	2	0	2	4	3	ES(PE)
7	26EE015	Control of Power Electronic systems	LIT	2	0	2	4	3	ES(PE)
8	26EE016	Power Quality	T	3	0	0	3	3	ES(PE)



EMBEDDED SYSTEMS

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE017	Digital Signal Processing	LIT	2	0	2	4	3	ES(PE)
2	26EE018	Smart System Automation	LIT	2	0	2	4	3	ES(PE)
3	26EE019	MEMS and NEMS	LIT	2	0	2	4	3	ES(PE)
4	26EE020	Embedded Communication Protocols	LIT	2	0	2	4	3	ES(PE)
5	26EE021	Embedded System Design	LIT	2	0	2	4	3	ES(PE)
6	26EE022	Embedded Processors	LIT	2	0	2	4	3	ES(PE)
7	26EE023	Signals and Systems	T	3	0	0	3	3	ES(PE)
8	26EE024	Microprocessor and Microcontroller	LIT	2	0	2	4	3	ES(PE)

ELECTRIC VEHICLE TECHNOLOGY

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE025	e-Mobility	T	3	0	0	3	3	ES(PE)
2	26EE026	Electric Vehicle Architecture	T	3	0	0	3	3	ES(PE)
3	26EE027	Design of Motor and Power Converters for Electric Vehicles	LIT	2	0	2	4	3	ES(PE)
4	26EE028	Battery Management Systems	T	3	0	0	3	3	ES(PE)
5	26EE029	EV Charging infrastructure	T	3	0	0	3	3	ES(PE)
6	26EE030	Safety and Testing of Electric Vehicles	T	3	0	0	3	3	ES(PE)
7	26EE031	Connected Vehicles	T	3	0	0	3	3	ES(PE)



ADVANCED CONTROL

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE032	Process modeling and Simulation	T	3	0	0	3	3	ES(PE)
2	26EE033	Computer Control of Processes	T	3	0	0	3	3	ES(PE)
3	26EE034	Model based Control	T	3	0	0	3	3	ES(PE)
4	26EE035	Non Linear Control	T	3	0	0	3	3	ES(PE)
5	26EE036	Optimal Control	T	3	0	0	3	3	ES(PE)
6	26EE037	Adaptive Control	T	3	0	0	3	3	ES(PE)
7	26EE038	Process Control	T	3	0	0	3	3	ES(PE)
8	26EE039	System Identification Techniques	T	3	0	0	3	3	ES(PE)
9	26EE040	Factory Automation	T	3	0	0	3	3	ES(PE)

DIVERSIFIED COURSES

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26EE041	Hybrid Energy Technology	T	3	0	0	3	3	ES(PE)
2	26EE042	Design and Modelling of Renewable Energy Systems	LIT	2	0	2	4	3	ES(PE)
3	26EE043	Energy Management and Auditing	T	3	0	0	3	3	ES(PE)
4	26EE044	VLSI Design	T	3	0	0	3	3	ES(PE)
5	26EE045	Substation Erection	T	3	0	0	3	3	ES(PE)
6	26EE046	EMI and EMC	T	3	0	0	3	3	ES(PE)
7	26EE047	Machine Learning	T	3	0	0	3	3	ES(PE)
8	26EE048	Energy Storage System	T	3	0	0	3	3	ES(PE)
9	26EE049	Drone Technologies	T	3	0	0	3	3	ES(PE)

MANDATORY COURSES

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26MCC01	Disaster Management and Safety Awareness	T	3	0	0	3	-	MC
2	26MCC02	Gender Sensitization and Inclusive Society	T	3	0	0	3	-	MC
3	26MCC03	Constitution of India	T	3	0	0	3	-	MC
4	26MCC04	Digital Literacy and Cyber Awareness	T	3	0	0	3	-	MC
5	26MCC05	Research Methodology and Intellectual Property Rights	T	3	0	0	3	-	MC



LIST OF OPEN ELECTIVES

S. No	Course Code	Course Name	Course Type	Periods/Week				Credit	Category
				L	T	P	TCP		
1	26OE901	AI-Driven Decision Support Systems	T	3	0	0	3	3	OE
2	26OE902	Emerging Technologies for Digital Transformation	T	3	0	0	3	3	OE
3	26OE903	Future Technologies for Intelligent Industries	T	3	0	0	3	3	OE
4	26OE904	Climate Change and Infrastructure Resilience	T	3	0	0	3	3	OE
5	26OE905	Environmental Sustainability and Resource Management	T	3	0	0	3	3	OE
6	26OE906	Green Building Technologies	T	3	0	0	3	3	OE
7	26OE907	Battery Technologies and Management Systems	T	3	0	0	3	3	OE
8	26OE908	Energy Management and Conservation	T	3	0	0	3	3	OE
9	26OE909	Renewable Energy Technologies	T	3	0	0	3	3	OE
10	26OE910	Smart Grid Technologies	T	3	0	0	3	3	OE
11	26OE911	IoT-Enabled Healthcare Technologies	T	3	0	0	3	3	OE
12	26OE912	Wearable Health Technologies	T	3	0	0	3	3	OE
13	26OE913	Biomedical Signal & Image Processing	T	3	0	0	3	3	OE
14	26OE914	Mobile Communication	T	3	0	0	3	3	OE
15	26OE915	Systems on Chip with IoT applications	T	3	0	0	3	3	OE
16	26OE916	Opto Nano Electronics	T	3	0	0	3	3	OE
17	26OE917	Mechatronics and Smart Systems	T	3	0	0	3	3	OE
18	26OE918	Finite Element Analysis for Engineers	T	3	0	0	3	3	OE
19	26OE919	Energy Audit and Energy Management	T	3	0	0	3	3	OE
20	26OE920	Industrial Safety	T	3	0	0	3	3	OE



Semester wise Credit Distribution

Course Category	Code	I	II	III	IV	V	VI	VII	VIII	Total Credits	% Share
Basic Science	BS	12	7	4	4	—	—	—	—	27	16.07
Humanities	HUM	4	2	—	—	—	—	5	—	11	6.55
Engineering Science (General)	ES(GE)	4	5	—	—	—	—	—	—	9	5.36
Programme Core	PC	5	8	20	19	12	11	—	—	75	44.64
Programme Elective	PE	—	—	—	—	6	6	6	—	18	10.71
Emerging Technology	ET	—	—	—	—	3	—	—	—	3	1.79
Open Elective	OE	—	—	—	—	—	3	3	—	6	3.57
Skill Development	SD	2	—	1	1	1	1	3	8	17	10.12
Internship cum Project Work	IPW	—	—	—	—	1	—	1	—	2	1.19
Self-Learning / Industry Oriented Course	SL	—	—	—	—	—	—	—	—	—	—
Total Credits	—	27	22	25	24	23	21	18	8	168	100



Semester - I



26HSC01	தமிழர் மரபும் தொழில் நுட்பமும் / Tamils Heritage and Technologies	L	T	P	C
		1	0	0	1

Course Objectives:					
- தமிழ்மொழி, திராவிட மொழிகள், சங்க இலக்கியம் மற்றும் தமிழர்களின் பண்பாட்டு மரபுகளை அறிந்து விளக்குதல். தமிழர்களின் நாட்டுப்புறக் கலைகள், விளையாட்டுகள், தெய்வ வழிபாடு மற்றும் கைவினை மரபுகளை அறிந்து அவற்றின் முக்கியத்துவத்தை விளக்குதல். - தமிழர்களின் பாரம்பரிய கட்டடக்கலை, சிற்பக்கலை மற்றும் கட்டுமானத் தொழில்நுட்பங்களை அறிந்து அவற்றின் சிறப்புகளை விளக்குதல். பண்டைய தமிழர்களின் கப்பல் கட்டுதல், உலோகத் தொழில்நுட்பம், மணிகள் தயாரித்தல் மற்றும் வாணிபத் தொழில்நுட்பங்களை அறிந்து விளக்குதல். - தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள், கால்நடைப் பராமரிப்பு மற்றும் கடல்சார் அறிவியல் தொழில்நுட்பங்களை அறிந்து அவற்றின் முக்கியத்துவத்தை விளக்குதல்.					
அலகு I	மொழி மற்றும் இலக்கிய மரபுகள்				3
இந்திய மொழிக் குடும்பங்கள், திராவிட மொழி வகைகள், முச்சங்க வரலாறு, சங்க இலக்கியத்தில் அறச்சிந்தனைகள், சங்க இலக்கியமும் பண்பாட்டு மரபுகளும், தமிழ் ஒரு செம்மொழி, திருக்குறளில் மேலாண்மைக் கருத்துகள், சங்ககாலத்தில் கல்வி, சங்ககால நகரங்களும் துறைமுகங்களும், பெரியபுராணம், நாயன்மார்கள் மற்றும் ஆழ்வார்களின் பக்திநெறி.					
அலகு II	நாட்டுப்புறக் கலைகளின் மரபுகள்				3
நாட்டுப்புறக் கலையின் தோற்றம் மற்றும் வளர்ச்சி, தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், புலியாட்டம், தமிழர்களின் விளையாட்டுகள், நாட்டுப்புறத் தெய்வங்களின் வகைகள், சிற்பக்கலை, நடுகல் வழிபாடு, கைவினைப் பொருட்கள், இசைக்கருவிகளின் வகைகள்					
அலகு III	தமிழர்களின் கட்டிடத் தொழில்நுட்பம்				3
சங்க காலத்தில் நெசவு மற்றும் பானைத் தொழில்நுட்பம், சங்ககாலத்தில் கட்டுமானங்கள், வீட்டு பொருட்களின் வடிவமைப்பு, சங்ககாலத்தில் கட்டுமான பொருட்கள், சிலப்பதிகாரத்தில் மேடை அமைப்பு, மாமல்லபுரம் சிற்பங்களும் கோவில்களும் சோழர் கால பெருங்கோயில்கள், வழிபாட்டுத்தலங்கள், மீனாட்சி அம்மன் ஆலயம், செட்டிநாட்டு கட்டிடக் கலை, திருமலை நாயக்கர் மஹால்.					
அலகு IV	உற்பத்தித் தொழில்நுட்பம்				3
கப்பல் கட்டும் கலை, இரும்பு தொழிற்சாலை, செம்பு மற்றும் தங்க நாணயங்கள் அச்சடித்தல், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், கல்மணிகள் சிலப்பதிகாரத்தில் மணிகளின் வகைகள், தொல்லியல் சான்றுகள், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி.					
அலகு V	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்				3
அணை ஏரி குளங்கள் மதகு அமைப்பு சோழர் கால குழுழி தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, வேளாண்மை சார்ந்த செயல்பாடுகள், பெருங்கடல் குறித்த பண்டைய அறிவு, மூத்துக்குளித்தல், அறிவுசார் சமூகம், கடல் கடந்த நாடுகளில் சோழர்களை நெறி. அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி.					
TOTAL: 15 PERIODS					



Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.	
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).	
Text Books 1. மாராசமாணிக்கனார் ., தமிழர் நாகரிகமும் பண்பாடும், சைவ சித்தாந்த நூற்பதிப்புக் கழகம், சென்னை. 2. கே .கே .பிள்ளை, தமிழக வரலாறு – மக்களும் பண்பாடும், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை. References 1. ந .சுப்பிரமணியன், தமிழக வரலாறு, தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், சென்னை. 2. இரா .நாகசாமி, தமிழகத் தொல்லியல், தமிழ்நாடு அரசு தொல்லியல் துறை, சென்னை. 3. டாக்டர் பாலசுப்பிரமணியன், தமிழர் கட்டடக்கலை, தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர். 4. கா .சிவத்தம்பி, தமிழ்ச் சமூக வரலாறு, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. 5. தமிழ்ப் பல்கலைக்கழகம், தமிழர் தொழில்நுட்பம், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்	
E-resources: 1. https://www.tamilvu.org/ 2. https://www.projectmadurai.org/ 3. https://www.tnarch.gov.in/	

CO	CO Description	PO	PSO
CO1	தமிழ்மொழி, திராவிட மொழிகள், சங்க இலக்கியம் மற்றும் தமிழர்களின் பண்பாட்டு மரபுகளை அறிந்து விளக்குதல்.	PO1 (2), PO9 (2)	PSO3 (2)
CO2	தமிழர்களின் நாட்டுப்புறக் கலைகள், விளையாட்டுகள், தெய்வ வழிபாடு மற்றும் கைவினை மரபுகளை அறிந்து அவற்றின் முக்கியத்துவத்தை விளக்குதல்.	PO6 (2), PO7 (3), PO8 (3)	PSO3 (2)
CO3	தமிழர்களின் பாரம்பரிய கட்டிடக்கலை, சிற்பக்கலை மற்றும் கட்டுமானத் தொழில்நுட்பங்களை அறிந்து அவற்றின் சிறப்புகளை விளக்குதல்.	PO1 (2), PO2 (2), PO3 (2)	PSO2 (2), PSO3 (2)
CO4	பண்டைய தமிழர்களின் கப்பல் கட்டுதல், உலோகத் தொழில்நுட்பம், மணிகள் தயாரித்தல் மற்றும் வாணிபத் தொழில்நுட்பங்களை அறிந்து விளக்குதல்.	PO1 (2), PO2 (2), PO3 (2), PO5 (2)	PSO2 (2), PSO3 (2)
CO5	தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள், கால்நடைப் பராமரிப்பு மற்றும் கடல்சார் அறிவியல் தொழில்நுட்பங்களை அறிந்து அவற்றின் முக்கியத்துவத்தை விளக்குதல்.	PO2 (2), PO5 (2), PO6 (3), PO11(2)	PSO2 (2), PSO3 (3)

(1) = Low; (2) = Medium; (3) = High



26HSC01	Tamils Heritage and Technologies	L	T	P	C
		1	0	0	1
Course Objectives: - Identify and explain the Tamil language, Dravidian languages, Sangam literature, and cultural heritage of the Tamils. - Identify and explain the importance of folk arts, traditional games, folk deities, and handicraft traditions of the Tamils. - Study and explain the significance of traditional architecture, sculpture, and construction technologies of the Tamils. - Explain the shipbuilding, metallurgical, bead-making, and trade technologies practiced by the ancient Tamils. - Explain the importance of agriculture, irrigation systems, animal husbandry, and maritime knowledge and technologies of the Tamils.					
Unit I	Language and Literary Heritage				3
Indian language families, varieties of Dravidian languages, history of Muthamizh, ethical thoughts in Sangam literature, Sangam literature and cultural traditions, Tamil as a classical language, management concepts in Thirukkural, education during the Sangam period, Sangam-age cities and ports, Periyapuram, and the devotional traditions of Nayanmars and Alvars.					
Unit II	Traditions of Folk Arts				3
Origin and development of folk arts, Therukoothu, Karagattam, Villupattu, Kaniyan Koothu, Oyilattam, Tholpavai Koothu, Silambattam, Puliyattam, traditional games of the Tamils, types of folk deities, sculpture, hero-stone worship, handicrafts, and types of musical instruments.					
Unit III	Architectural Technology of The Tamils				3
Weaving and pottery technology during the Sangam period, construction practices during the Sangam period, design of household articles, construction materials used during the Sangam period, stage arrangement described in Silappathikaram, sculptures and temples of Mamallapuram, great temples of the Chola period, places of worship, Meenakshi Amman Temple, Chettinad architecture, and Thirumalai Nayak Palace.					
Unit IV	Manufacturing Technology				3
Shipbuilding technology, iron industry, production and minting of copper and gold coins, glass beads, terracotta beads, conch-shell beads, stone beads, varieties of beads mentioned in Silappathikaram, archaeological evidences, and export and import during the Sangam period					
Unit V	Agriculture and Irrigation Technology				3
Dams, lakes and ponds, sluice structures, significance of the <i>Kumizhi Thoompu</i> during the Chola period, animal husbandry, agriculture-related activities, ancient knowledge of the ocean, pearl diving, knowledge-based society, achievements of the Cholas in overseas countries, development of scientific Tamil, and development of computational Tamil.					
TOTAL : 15 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text book: K. K. Pillay, A Social History of the Tamils, University of Madras, Chennai. R. Nagaswamy, Tamil Nadu: An Archaeological Perspective, Tamil Nadu State Department of Archaeology, Chennai.					
References: K. A. Nilakanta Sastri, A History of South India from Prehistoric Times to the Fall of Vijayanagar, Oxford University Press, New Delhi. N. Subrahmanian, Social and Cultural History of Tamil Nadu. Koodal Publishers, Madurai.					



3. S. R. Balasubrahmanyam, Early Chola Art, Asia Publishing House, Bombay.
4. C. Sivaramamurti, South Indian Bronzes, Lalit Kala Akademi, New Delhi.
5. Noboru Karashima, A Concise History of South India: Issues and Interpretations, Oxford University Press, New Delhi.

E-resources:

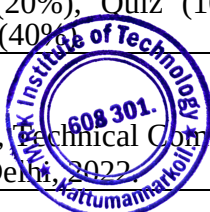
1. <https://www.tamilvu.org/>
2. <https://www.projectmadurai.org/>
3. <https://www.tnarch.gov.in/>

CO	Description of CO	PO	PSO
CO1	Identify and explain the Tamil language, Dravidian languages, Sangam literature, and cultural heritage of the Tamils.	PO1 (2), PO9 (2)	PSO3 (2)
CO2	Identify and explain the importance of folk arts, traditional games, folk deities, and handicraft traditions of the Tamils.	PO6 (2), PO7 (3), PO8 (3)	PSO3 (2)
CO3	Study and explain the significance of traditional architecture, Sculpture, and construction technologies of the Tamils.	PO1 (2), PO2 (2), PO3 (2)	PSO2 (2), PSO3 (2)
CO4	Explain the shipbuilding, metallurgical, bead-making, and trade technologies practiced by the ancient Tamils.	PO1 (2), PO2 (2), PO3 (2), PO5 (2)	PSO2 (2), PSO3 (2)
CO5	Explain the importance of agriculture, irrigation systems, animal husbandry, and maritime knowledge and technologies of the Tamils.	PO2 (2), PO5 (2), PO6 (3), PO11 (2)	PSO2 (2), PSO3 (3)

(1) = Low; (2) = Medium; (3) = High



26ENC01	English for Engineers	L	T	P	C
		3	0	0	3
Course Objectives • Develop vocabulary and grammatical competence by strengthening students ‘knowledge and appropriate usage in different contexts. • Facilitate reading and comprehension skills through the effective use in academic and professional texts. • Improve oral communication and presentation skills to strengthen content and context • Enhance effective listening skills by familiarizing students with different accents, dialects, varieties of English • Enable students to write professional correspondence and ethical writing practices.					
Unit I	Vocabulary and Grammar				9
Academic Word List (AWL) - Foreign Words - Semantics - synonyms, antonyms, one-word substitution - Phrasal verbs - Phrases and idioms - Misspelt words; Parts of Speech - Subject-verb agreement - Tenses - Articles - Voices - Reported speech – Modals- Sentence structure Suggested Activities: Gap fills exercises, Cloze Test, Error Detection and Spell Bee.					
Unit II	Reading and Comprehension				9
4 Types of Reading Techniques - Scanning, Skimming, Intensive reading, Extensive reading - Fiction and Non-fiction texts - Difference, features, strategies, comprehension - Strategies for reading general and professional content - Identifying transitions in a text - Note making - Interpreting charts and data; Academic reading - PQRS, SQ3R - Critical reading - Effective use of resources - Index, table of contents and glossary Suggested Activities: Reading - newspaper and digital articles, Reading comprehension, note making and summarizing.					
Unit III	Speaking				9
Importance of oral communication - Phonetics - Pronunciation, Stress and Intonation; Speaking in different contexts - verbal and non-verbal behavior; Presentation Skills - Types of Presentations - informative, persuasive, business - effective slide presentation - delivering a presentation; Classroom participation – Group Discussions, Debates, Group activities Suggested Activities: Just a Minute (JAM) Video recording, Situational role plays, Usage of Apps.					
Unit IV	Listening				9
Listening - Types - Purpose - Barriers - Strategies for effective listening in various contexts - Note-taking as a tool for effective listening - Dialects, accents, and slang - Dialectical Varieties - English in India, Suggested Activities: Listening and Repeating, Note-taking					
Unit V	Writing				9
Importance of written communication - Letter writing and e-mail - Reporting/Reports - Introduction to abstracts and articles - Difference between abstract and executive summary; Summarizing - Paraphrasing - Synthesizing - Editing and Proofreading - Plagiarism - Referencing online and offline resources. Suggested Activities: Picture and poster description, Brainstorming and Mind Mapping.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%)					
Text book: 1. Meenakshi Raman and Sangeeta Sharma, Technical Communication: Principles and Practice, 4th Edition, Oxford University Press, New Delhi, 2022.					



2. M. Ashraf Rizvi, Effective Technical Communication, 2nd Edition, McGraw Hill Education, New Delhi, 2018.

References:

1. Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists (Combined edition, Vol. 1 and 2), Orient Blackswan, Chennai, 2006.
2. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals,
3. Pearson Education, 2010. Board of Editors, Vibrant English, Orient Blackswan, Chennai, 2013.
4. William Strunk Jr. & E.B. White, The Elements of Style, 4th Edition, Pearson, 1999.
5. David F. Beer and David McMurrey, Guide to Writing as an Engineer, 5th Edition, John Wiley, New York, 2021.

E-resources:

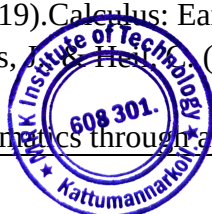
1. <https://learnenglish.britishcouncil.org/>
2. <https://www.bbc.co.uk/learningenglish>
3. <https://learnenglish.britishcouncil.org/skills/speaking>

CO	CO Description	PO	PSO
CO1	Apply appropriate vocabulary and grammatical structures accurately and effectively in academic, professional, and everyday communication.	PO9 (3), PO11 (2)	PSO3 (2)
CO2	Employ suitable reading strategies to comprehend, analyze, interpret, and critically evaluate general, academic, and professional texts.	PO2 (3), PO9 (2), PO11 (2)	PSO3 (2)
CO3	Demonstrate effective speaking and presentation skills with appropriate pronunciation, stress intonation in individual and group settings.	PO8 (3), PO9 (3)	PSO3 (3)
CO4	Demonstrate effective listening skills by identifying key information, understanding different accents and varieties of English.	PO2 (2), PO9 (3)	PSO3 (2)
CO5	Produce clear, coherent, and professionally appropriate written documents.	PO9 (3), PO10 (2), PO11 (2)	PSO3 (2)

(1) = Low; (2) = Medium; (3) = High



26MAC01	Applied Calculus and Matrices	L	T	P	C
		3	1	0	4
Course Objectives: - To provide technical competence of modelling engineering problems using calculus. - To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.					
Unit I	Differential Calculus	12			
Functions, graph of functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem. Suggested Activities: Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).					
Unit II	Functions of Several Variables	12			
Partial derivatives, Total derivative, Taylor's series formula for functions of two variables, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers. Suggested Activities: Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).					
Unit III	Integral Calculus	12			
Fundamental theorem of Calculus, Indefinite integrals and Improper integrals, Evaluation of double integrals, Change of order of integration, Evaluation of triple integrals. Suggested Activities: Definite and Indefinite Integrals, Determination of double and triple integrals, Solving of Competitive Examination questions (Ex. GATE).					
Unit IV	Matrices	12			
Eigen values and Eigen vectors of a real matrix, Characteristic equation, Properties of Eigen values and Eigen vectors (without proof) Cayley–Hamilton Theorem, Applications of Cayley–Hamilton Theorem. Suggested Activities: Compute Eigen values and Eigen vectors, verify the Cayley–Hamilton theorem, and perform matrix computations using open-source software					
Unit V	Orthogonal Transformations and Quadratic Forms	12			
Diagonalization of matrices by orthogonal transformation – Quadratic forms – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Suggested Activities: Perform orthogonal diagonalization, reduce quadratic forms to canonical form, determine the nature of quadratic forms, and visualize quadratic forms using open-source software.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text book: - Grewal, B.S. (2012).Higher engineering mathematics. Khanna Publishers. - Ramana, B. V. (2008). <i>Higher Engineering Mathematics</i>. Tata McGraw-Hill Publishing Company.					
References: - Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcend dentals. John Wiley & Sons. - Ron Larson and David C. Falvo, (2013), Calculus: an Applied Approach. Cengage Learning. - Stewart, J.,Clegg,D.,& Watson,S.(2019).Calculus: Early transcend dentals. - Thomas, G. B., Jr., Weir, M. D., Hass, J. (2018). Thomas' calculus: Early transcendentals. Pearson. - Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing.					



E-resources:

1. https://onlinecourses.nptel.ac.in/noc17_hs04
2. [https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_\(Stewart\)/](https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/)
3. <https://openstax.org/books/calculus-volume-1/>

CO	Description of Course Outcome	PO	PSO
CO1	Apply the concepts of limits, continuity and derivatives to analyze functions and solve optimization problems.	PO1 (3), PO2 (2)	PSO1 (2), PSO2 (1)
CO2	Analyze functions of several variables using partial derivatives, Taylor's formula and optimization techniques.	PO1 (3), PO2 (3)	PSO1 (2), PSO2 (2)
CO3	Apply integration techniques to evaluate single, double and triple integrals.	PO1 (3), PO2 (2)	PSO1 (2), PSO2 (1)
CO4	Determine Eigen values and Eigen vectors of matrices and apply the Cayley–Hamilton theorem to solve matrix problems.	PO1 (3), PO2 (2)	PSO1 (2), PSO2 (2)
CO5	Analyze matrices and quadratic forms using orthogonal transformations and determine the nature of quadratic forms.	PO1 (3), PO2 (3), PO5 (2)	PSO1 (2), PSO2 (2), PSO3 (1)

(1) = Low; (2) = Medium; (3) = High



26PHC01	Engineering Physics	L	T	P	C
		3	0	2	4
Course Objective: To impart essential physics concepts and demonstrate their relevance to diverse engineering applications.					
Unit I	Fundamental & Properties of Matter				9
Concept – Force, Mass & Weight, Velocity & Acceleration, Momentum & Impulse, Elasticity – Cantilever-Young’s modulus (non-uniform bending), Viscosity- Stokes method - Surface tension - Drop weight method –bimetallic Strip-Thermal Stress-Expansion joints and examples					
Suggested Activities: Virtual demonstration of thermal stress.					
Unit II	Thermodynamics				9
Thermal conductivity – Modes of heat transfer- Conductivity of bad conductor Lee’s disc method – Conductivity of good conductor Forb’s Method - Conductivity of semiconductor - laws of Thermodynamics – Entropy- Carnot’s cycle as heat engine and refrigerator.					
Suggested Activities: Virtual demonstration of four stoke engine					
Unit III	Optics				9
Fiber Optics: Structure of fiber, fiber optics, communication fiber sensor, Displacement sensor, and pressure sensor & temperature sensor- Interference: constructive and destructive interference -Air Wedge-Determination of thin wire. Michelson’s Interferometer - Determination of thin film.					
Suggested Activities: Demonstration of optical fiber communication and study of fiber optic sensors.					
Unit IV	Quantum Physics				9
Concept – DE Broglie wave equation – Dual nature of mater waves - Properties of mater waves, Schrodinger. Time dependent wave equation and Time independent wave equation, Particle in one dimensional box, Photo electric effect. -Experimental verification of photo electric effect.					
Suggested Activities: Demonstration and analysis of the photoelectric effect and quantum phenomena					
Unit V	Laser and Its Application				9
Properties- Einstein Co-Efficient A and B, Ratio of stimulated and spontaneous emission construction, working. Solid laser (Nd-YAG Laser), Gas laser (CO ₂), Dye laser, Diode laser (hetero junction and homo junction laser)- Advantage industrial and medical application.					
Suggested Activities: Demonstration of laser characteristics and study of industrial and medical applications of lasers.					
TOTAL (Theory): 45 PERIODS					
List of Experiments: - Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular - Non-uniform bending -Determination of Young’s modulus - Uniform bending–Determination of young’s modulus - Determination of band gap of semiconductor using post office box - Air wedge-Determination of thickness of a thin sheet/wire - Photoelectric effect-verification of electron flow - Laser- Determination of the wavelength of the laser using grating					
TOTAL (Lab): 30 PERIODS					
TOTAL : 45+30 = 75 PERIODS					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.					
Assessment Methodology: Assignments (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).					
Text Books: M. N. Avadhanulu and P. G. Kshirsagar, A Textbook of Engineering Physics, S. Chand Publishing, New Delhi. R. K. Gaur and S. L. Gupta, Engineering Physics, Dhanpat Rai Publications, New Delhi.					

References:

1. A. K. Sawhney and Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation, Dhanpat Rai & Co., New Delhi.
2. A. Ghatak and K. Thyagarajan, Optical Electronics and Fibre Optics, Cambridge University Press, Cambridge.
3. Arthur Beiser, Concepts of Modern Physics, 6th Edition, McGraw-Hill Education, New Delhi.
4. S. O. Pillai, Solid State Physics, New Age International Publishers, New Delhi.
5. K. R. Nambiar, Lasers: Principles, Types and Applications, New Age International Publishers, New Delhi.

E-resources:

1. Barrier penetration problem and Quantum tunnelling:
<https://archive.nptel.ac.in/courses/115/104/115104096/>
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. Bimetallic Strips _ <https://www.youtube.com/watch?v=WZQ8lvxdzDk>

CO	CO Description	PO	PSO
CO1	Explain the fundamental principles of mechanics and the physical properties of materials.	PO1 (3), PO2 (2)	PSO1 (1), PSO2 (1)
CO2	Describe the basic concepts of thermodynamics, thermal conductivity and the Carnot cycle.	PO1 (3), PO2 (2)	PSO1 (1), PSO2 (1)
CO3	Apply the concepts of fiber optics and optical sensors in engineering applications and analyze interference phenomena.	PO1 (3), PO2 (3), PO4 (2)	PSO1 (2), PSO2 (2)
CO4	Understand the basic principles of quantum mechanics and relate them to modern technological applications.	PO1 (3), PO2 (2)	PSO1 (1), PSO2 (1)
CO5	Analyze the operating principles of lasers and identify their applications in science and engineering.	PO1 (3), PO2 (2), PO4 (2)	PSO1 (1), PSO2 (2)

(1) = Low; (2) = Medium; (3) = High



26CYC01	Engineering Chemistry	L	T	P	C
		3	0	2	4
Course Objectives:					
- Understand the fundamental principles and technological requirements of water treatment. - Acquire knowledge of the basics of polymers, including their preparation, properties, and applications. - Gain familiarity with renewable and non-renewable energy resources and various energy storage devices used in engineering applications. - Understand the mechanisms of metal corrosion and the methods used for its prevention and protection in engineering applications. - Develop an understanding of nanomaterials, their properties, and their applications.					
Unit I	Water Technology				9
Introduction-sources and impurities in water-soft and hard water- water quality parameters. Types of hardness. Determination of hardness by EDTA method. Domestic water treatment. Boiler feed water –requisites, scale and sludge formation in boilers-caustic embrittlement- boiler corrosion- treatment of boiler feed water. Internal conditioning (carbonate, phosphate, and calgon conditioning), external conditioning – ion exchange process, zeolite process Brackish water –water purification by reverse osmosis. Suggested Activities: Coagulation of water sample using Alum.					
Unit II	Polymer Chemistry				9
Introduction - occurrence, definitions – functionality - degree of polymerization-, molecular weight - number and weight average method. Types of polymerizations - addition, condensation and copolymerization. Mechanism of polymerization (Free radical). Preparation, properties and applications of nylon 66, Poly Urethane, poly isoprene and Vulcanization of rubber, TEFLON, PET. Suggested Activities: Preparation of Biodegradable Polymer/Polymer Demonstration.					
Unit III	Energy Resources and Storage Devices				9
Nonrenewable energy - nuclear energy, nuclear reaction and its types; Nuclear power plant and its working (light water nuclear power plant & breeder reactor).Renewable energy and its sources - photo voltaic cells-working of photovoltaic cell, recent advances in solar cell materials; Geothermal Energy and Different type of geothermal power plants Batteries and fuel cells: types of batteries - lead storage battery, lithium battery, fuel cell - H ₂ -O ₂ fuel cell-applications. Suggested Activities: Performance Study of a Solar Cell.					
Unit IV	Corrosion and its Control				9
Introduction, types of corrosion - chemical and electrochemical corrosion, mechanism, pilling - bedworth rule, types of electrochemical corrosion – galvanic corrosion, pitting corrosion, crevice corrosion, corrosion on wire fence and pipeline corrosion, factors influencing rate of corrosion. Corrosion control methods – sacrificial anode and impressed cathodic current. Protective coatings – paints: constituents and functions. Suggested Activities: Demonstration of Corrosion and Its Prevention					
Unit V	Nano Chemistry				9
Basics- distinction between molecules, nanoparticles and bulk materials; size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires. Synthesis: Top down process-chemical vapour deposition, electro deposition. Electro spinning method. Bottom up process-precipitation, sol-gel, solvothermal - properties and applications of nanomaterials in various fields. Suggested Activities: Synthesis/Demonstration of Nanomaterials					
TOTAL (Theory): 45 PERIODS					
LIST OF EXPERIMENTS:					
- Determination of Total, Temporary and Permanent hardness of water by EDTA Method. - Estimation of Alkalinity in water sample by titrimetric method. - Determination of HCl using NaOH by pH method. - Estimation of Ferrous iron by Potentiometric titration. - Estimation of HCl using NaOH by Conductometric titration					



6. Estimation of Dissolved Oxygen content in water by Winkler's method
7. Determination of Chloride in water by Argentometric method.
8. Estimation of copper content of the given solution by Iodometry.
9. Estimation of TDS of a water sample by gravimeter
10. Determination of strength of acids in a mixture of acids using conductivity meter

TOTAL (LAB): 30 PERIODS**TOTAL : 45+30 = 75 PERIODS****Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%.**Assessment Methodology:** Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).**Text Books**

1. Dr.S.Mageswari, Dr. K. Balachandran, Dr.G. Vijayakumar, —Engineering Chemistry Tata Mc Graw Hill Pvt. Ltd., First Edition-2024.
2. O.G.Palanna, —Engineering Chemistry Tata Mc Graw Hill Pvt. Ltd., Second Edition -2017

References

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).
2. P. C. Jain and Monica Jain, —Engineering Chemistry, 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., 2018.
3. Arun Bahl, B.S. Bahl, G.D. Tuli, —Essentials of Physical Chemistry" Published by S. Chand & Company Ltd., 2014
4. Sashi Chawla, Dhanpat Rai & Co. Pvt. Ltd., —Engineering Chemistry Fifth Edition - 2017.
5. Dr.S.Vairam, Dr.Suba Ramesh, —Engineering Chemistry First Edition, Wiley Publication, Reprint-2016.

E-resources:

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Text book of Quantitative Chemical Analysis, 6th Edition (2000).
2. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., 2025.
3. Arun Bahl, B.S. Bahl, G.D. Tuli, "Essentials of Physical Chemistry" Published by S. Chand & Company Ltd., 2014

CO	Course Outcome	PO	PSO
CO1	Explain the principles of water technology, water treatment methods, and boiler feed water conditioning for industrial applications.	PO1 (3), PO2 (2), PO6 (2)	PSO2 (1)
CO2	Apply the concepts of polymer chemistry to classify polymers and relate their preparation, properties, and engineering applications.	PO1 (3), PO2 (2), PO3 (2)	PSO2 (2)
CO3	Analyze renewable and non-renewable energy resources, energy storage devices, and fuel cells for sustainable energy applications.	PO1 (3), PO2 (2), PO6 (3)	PSO1 (2), PSO2 (2)
CO4	Analyze the mechanisms of corrosion and recommend suitable corrosion prevention and protective coating techniques for engineering systems.	PO2 (3), PO3 (2), PO6 (2)	PSO2 (3)
CO5	Evaluate the synthesis methods, properties, and applications of nanomaterials in medical and electronic devices.	PO1 (3), PO2 (3), PO5 (2)	PSO1 (2), PSO2 (2)

(1) = Low; (2) = Medium ;(3)=High



26MEC01	Engineering Graphics	L	T	P	C
		3	1	0	4
Course Objectives: The learning objectives of this course is to develop in students, the engineering graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings					
Unit I	Plane Curves				12
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves. Suggested Activities: Virtual Demonstration of Conics and Cycloids.					
Unit II	Projection of Points, Lines And Plane Surface				12
Orthographic projection- 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. Suggested Activities: Virtual Demonstration of lines and Planes.					
Unit III	Projection of Solids and Freehand Sketching				12
Projection of simple solids like prisms, pyramids, cylinder, and cone when the axis is inclined to both the principal planes by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three-Dimensional objects — Layout of Views -Freehand sketching of multiple views from pictorial views of objects. Suggested Activities: Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.					
Unit IV	Projection of Sectioned Solids and Development of S Surfaces				12
Sectioning of simple solids like prisms, pyramids, cylinder, and cone in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes. Suggested Activities: Virtual Demonstration of Sectioned Solid Objects and Development of Surface.					
Unit V	Isometric and Perspective Projections				12
Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple Solids-Prisms, pyramids, cone and cylinders by visual ray method. Suggested Activities: Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: - Bhatt N.D. and Panchal V.M., —Engineering Drawing, Charotar Publishing House, 53rd Edition, 2019. K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International Publishers, New Delhi, 2018.					
References: K. B. Yogeshwaran, Dr. V. Ramasamy, Dr. K. Anandavelu, B. Veluchamy and Dr. C. K. Dhinakarraj, Engineering Graphics, Vision Prints Media, Edition 2022 - Natrajan K.V., A Text Book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2018. - Parthasarathy, N. S. and Vela Murali, —Engineering Drawing, Oxford University Press, 2015.					

4. Basant Agarwal and Agarwal C.M.,—Engineering Drawing, McGraw Hill, 2nd Edition, 2019.
5. Gopalakrishna K.R., —Engineering Drawing (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.

E-Resources:

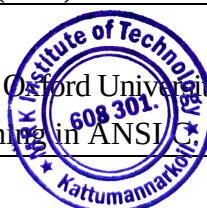
1. NPTEL. <https://nptel.ac.in/courses/105104148>
2. SWAYAM. <https://swayam.gov.in/>
3. Autodesk Education/AutoCAD Learning Resources. <https://www.autodesk.com/education/>

CO	Description of CO	PO	PSO
CO1	Draw conic curves, cycloids and involutes	PO (1), PO (2),PO (3), PO (8), PO(9), PO(10), PO(12)	PSO1, PSO3
CO2	Draw orthographic projections of points, lines and planes	PO (1), PO (2),PO(3), PO(8),PO(9), PO(10), PO(12)	PSO1, PSO3
CO3	Draw orthographic projections and free hand sketches of solids	PO (1), PO (2),PO (3), PO (5), PO(8), PO(9),PO(10), PO(12)	PSO1, PSO2, PSO3
CO4	Draw sectional views of the objects and development of surfaces	PO (1), PO (2),PO (3), PO (5), PO (8), PO (9),PO(10),PO(12)	PSO1, PSO2, PSO3
CO5	Draw isometric and perspective views of simple solids	PO (1), PO (2),PO (3), PO (5), PO (8), PO (9),PO(10), PO(12)	PSO1, PSO2, PSO3

(1) = Low; (2) = Medium; (3) = High



26CSC01	Programming Language: C	L	T	P	C
		3	0	0	3
Course Objectives: - To equip engineering students with the foundational knowledge and practical skills in ‘C’ programming to analyses and solve computational problems effectively. - To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.					
Unit I	Introduction to C & Problem Solving				9
Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flow chart and Pseudo code, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Operators, Input/output Functions, Built-in Functions. Suggested Activities: Solve GATE-style MCQs on algorithms, flowcharts, pseudocode, Interactive and Script mode, Comments, Indentation.					
Unit II	Control Structures & Functions				9
If, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements. Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming. Suggested Activities: Solve GATE-style MCQs on if, if-else, nested if, switch-case, loops, nested loops, and jump statements with output prediction.					
Unit III	Arrays, Strings & Pointers				9
One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation. Suggested Activities: Solve GATE-style MCQs on one-dimensional and multi-dimensional arrays, array operations, traversals, and string handling with output prediction. Practice GATE-style questions on pointer arithmetic, pointers and arrays function pointers, and dynamic memory allocation.					
Unit IV	Structures & Unions				9
Defining and using structures, Array of structures, Sorting an array of structures, Difference between structures and unions, Pointers to structures, Unions and their uses, Unions with pointers, Enumerations. Suggested Activities: Analyze GATE-style MCQs on structures, arrays of structures, sorting, and pointers to structures.					
Unit V	File operations & Standard Libraries				9
Open, read, write, close file operations, Binary vs Text files ,File pointers, Error handling in file operations Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries. Suggested Activities: Interpret GATE-style MCQs on file operations, text and binary files, file pointers, and error handling.					
TOTAL: 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Books:  - Thareja, R. (2021). Programming in C. Oxford University Press. - Balagurusamy, E. (2019). Programming in ANSI C. Tata McGraw Hill Education.					



References:

1. Kanetkar, Y. (2020). Let us C. BPB Publications.
2. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. A press.
3. Forouzan, B.A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

E-resources:

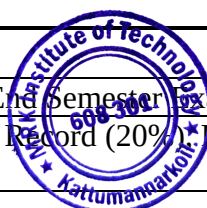
1. Learn-C.org-<https://www.learn-c.org/>
2. GeeksforGeeks-CProgramming-<https://www.geeksforgeeks.org/c-programming-language/>
3. GNUCLibraryDocumentation-<https://www.gnu.org/software/libc/manual/>

CO	CO Description	PO	PSO
CO1	Develop algorithms, flow charts, and basic C programs For problem solving.	PO1 (3), PO2(3), PO5 (2)	PSO2 (2), PSO3 (1)
CO2	Implement control structures, functions, and modular Programming in C.	PO1 (2), PO2(3), PO5 (3)	PSO2 (2)
CO3	Apply arrays, strings, pointers, and dynamic memory allocation in C programming.	PO2 (3), PO3(2), PO5 (3)	PSO2 (3)
CO4	Construct C programs using structures and unions.	PO2 (2), PO3(3), PO5 (3)	PSO2 (3)
CO5	Develop C applications using file handling techniques, standard libraries, user-defined libraries and mini projects.	PO2 (3), PO3(3), PO5 (3), PO8(2), PO9 (2), PO11(2)	PSO2 (3), PSO3 (2)

(1) = Low; (2) = Medium; (3) = High



26MEC02	Makerspace Laboratory	L	T	P	C
		0	0	4	2
Course Objectives:					
- To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques. - To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.					
List of Experiments					
(A). Dis-assembly & Assembly Practices					
- Tools and its handling techniques. - Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine. - Dis-assembly and assembly of Air-Conditioners & Refrigerators. - Dis-assembly and assembly of a Bicycle.					
(B). Welding Practices					
- Welding Procedure, Selection & Safety Measures. - Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes. - Hands-on session of preparing base material & Joint groove for welding. - Hands-on session of MAW, GMAW, GTAW on Carbon Steel & Stainless Steel plates / pipes for fabrication of a simple part.					
(C). Electrical Wiring Practices					
- Electrical Installation tools, equipment & safety measures. - Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box. - Hands-on session of electrical connections for Lightings, Fans, Calling Bells. - Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.					
(D). Electronics Components / Equipment Practices					
- Electronic components, equipment & safety measures. - Dis-assembly and assembly of Computers. - Hands-on session of Soldering Practices in a Printed Circuit Board. - Hands-on session of Bridge Rectifier, Op-Amp and Trans impedance amplifier. - Hands-on session of integration of sensors and actuators with a Microcontroller. - Demonstration of Programmable Logic Control Circuit.					
(E). Contemporary Systems					
- Demonstration of Solid Modelling of components. - Demonstration of Assembly Modelling of components. - Fabrication of simple components / parts using 3D Printers. - Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.					
					TOTAL: 60 PERIODS
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					



Text Books:

1. S. K. Hajra Choudhury, A. K. Hajra Choudhury and S. K. Bhattacharya, Elements of Workshop Technology – Volume I: Manufacturing Processes, Media Promoters & Publishers, Mumbai.
2. R. S. Khurmi and J. K. Gupta, A Textbook of Workshop Technology – Manufacturing Processes, S. Chand Publishing, New Delhi.

References:

1. P. N. Rao, Manufacturing Technology: Foundry, Forming and Welding, 4th Edition, McGraw Hill Education, New Delhi.
2. S. Kalpakjian and S. R. Schmid, Manufacturing Engineering and Technology, 7th Edition, Pearson Education, New Delhi.
3. B. L. Theraja and A. K. Theraja, A Textbook of Electrical Technology – Volume I, S. Chand Publishing, New Delhi.
4. David P. Leach, Electrical and Electronic Technology, McGraw Hill Education, New Delhi.
5. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 7th Edition, Wiley, New Delhi.

CO	Description of CO	PO	PSO
CO1	Demonstrate proper use and handling of basic hand and power tools.	PO1 (2), PO5 (3), PO7 (2)	PSO2 (2)
CO2	Carry out electrical wiring installations and repairs, applying safety measures in domestic applications.	PO1 (3), PO3 (3), PO6 (2), PO7 (3)	PSO1 (3), PSO2 (2)
CO3	Develop solid innovative models through software.	PO3 (3), PO5 (3)	PSO2 (3)
CO4	Adapt and follow safety protocols in the work environment.	PO6 (3), PO7 (3), PO11 (2)	PSO3 (2)
CO5	Demonstrate the application of contemporary manufacturing technologies through solid modelling, assembly modelling, 3D printing, and laser cutting.	PO3 (3), PO5 (3), PO11 (2)	PSO2 (3), PSO3 (2).

(1) = Low; (2) = Medium; (3) = High



26CSC02	Programming in C laboratory	L	T	P	C
		0	0	4	2
Course Objectives: • To familiarize with C programming constructs. • To develop programs in C using basic constructs. • To develop programs in C using arrays. • To develop applications in C using strings, pointers, functions. • To develop applications in C using structures. • To develop applications in C using file processing.					
Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.					
List of Experiments 1. Create Problem Analysis Charts, Flow charts and Pseudo code for simple C programs 2. I/O statements, operators, expressions. 3. Decision-making constructs: if-else, go to, switch-case, break-continue. 4. Loops: for, while, do-while. 5. Arrays: 1D and 2D, Multi-dimensional arrays, traversal. 6. Strings: operations. 7. Functions: call, return, passing parameters by (value, reference), passing arrays to function. 8. Recursion. 9. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers 10. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions. 11. Files: reading and writing data in text and binary files, File pointers, file operations, random access and processor directives. 12. Use of standard and user-defined libraries in solving problems.					
TOTAL: 60 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					
Text book: 1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition, Prentice Hall. 2. E. Balagurusamy, Programming in ANSI C, 8th Edition, McGraw Hill Education, New Delhi.					
References: 1. Thareja, R. (2021). Programming in C. Oxford University Press. 2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education. 3. Kanetkar, Y. (2020). Let us C. BPB Publications. 4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress. 5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.					
E-resources: 1. Learn-C.org-https://www.learn-c.org/ 2. Geeks for Geeks-CProgramming-https://www.geeksforgeeks.org/c-programming-language/ 3. GNUC Library Documentation -https://www.gnu.org/software/libc/manual/					



CO	CO Description	PO	PSO
CO1	Develop algorithms, flowcharts and basic C programs using input/output statements, operators and expressions.	PO1(3), PO2(3), PO5(2)	PSO2(2)
CO2	Implement decision-making and looping constructs in C to solve computational problems.	PO1(3), PO2(3), PO5(3)	PSO2(2)
CO3	Develop C programs using arrays, strings, functions and recursion.	PO1(3), PO2(3), PO5(3)	PSO2(3)
CO4	Develop C applications using pointers, structures and unions.	PO1(3), PO2(3), PO5(3)	PSO2(3)
CO5	Develop C applications using file handling techniques, standard libraries, user-defined libraries and mini projects.	PO1(3), PO2(3), PO5(3)	PSO2(3)

(1) = Low; (2) = Medium; (3) = High



26HSC02	Physical Education	L	T	P	C
		-	-	-	-
Course Objectives: - To impart the fundamentals of physical education for the development of students’ physical, mental, and social well-being. - To instill a lifelong appreciation for physical activity, develop a positive attitude, and foster the values of teamwork and sportsmanship.					
Introduction to physical education: Exercise for good posture – conditioning and calisthenics before starting physical activities – jogging, bending, twisting, standing, sitting, and relaxation exercises – training in basic first-aid practices.					
Participation of athletic events: Rules and regulations of important athletic events – sprints, jump, throws, and hurdles.					
Skill development in any one of the following outdoor games: Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.					
Skill development in any one of the following indoor games: Shuttle Badminton, Chess and Table Tennis.					
TOTAL: 30 PERIODS					
References: - Singh,A.(2008). Essentials of physical education. Kalyani Publishers. - Kamlesh,M.L.(2006).Psychology in physical education and sport (3rded.). Metropolitan Book Co. - Mangal,S.K.(2009).Psychology of sports performance Sports Publication.					
E-resources: https://www.who.int/health-topics/physical-activity					

CO	CO Description	PO	PSO
CO1	Demonstrate appropriate physical exercises, conditioning, calisthenics, posture, relaxation techniques and basic first-aid practices for maintaining physical fitness and safety.	PO1(2), PO4(2), PO7(3)	PSO3(2)
CO2	Demonstrate knowledge of rules and regulations and apply fundamental skills in athletic events including sprints, jumps, throws and hurdles.	PO7(2), PO8(3)	PSO3(2)
CO3	Develop and demonstrate fundamental skills, techniques and game strategies in a selected outdoor game through regular practice and teamwork.	PO2(2), PO3(2), PO5(2), PO7(2), PO8(3)	PSO3(3)
CO4	Develop and demonstrate fundamental skills, techniques and strategies in a selected indoor game with emphasis on concentration, discipline and fair play.	PO2(2) PO7(3), PO9(2)	PSO3(2)
CO5	Apply physical fitness, sports skills, teamwork, discipline, ethical values and safety practices to promote a healthy and active lifestyle.	PO6(3), PO7(3), PO8(3) PO11(3)	PSO3(3)

(1) = Low; (2) = Medium; (3) = High



Semester – II



26MAC02	Linear Algebra	L	T	P	C
		3	1	0	4
Course Objectives: - To impart foundational knowledge in linear algebra essential for analyzing and solving problems in engineering applications. - The Objectives of the course are to equip students with the ability to formulate and solve various types of Ordinary Differential Equations for solving differential equations encountered in engineering problems.					
Unit I	Vector Spaces	12			
Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension.					
Suggested Activities: Open-Source software, exercises to test linear dependence and independence using rank, solving Competitive Examination questions.					
Unit II	Inner Product Spaces	12			
Inner product, Norms, Cauchy, Schwarz inequality, Gram Schmidt orthogonalization, Simple problems (up to R^3).					
Suggested Activities: Open-Source software, exercises to compute inner products and vector norms, solving Competitive Examination questions.					
Unit III	Matrix Decomposition	12			
QR decomposition (Gram- Schmidt method and House holder method), Singular Value Decomposition (SVD), Least squares solutions, simple problems (up to 3×3 matrices).					
Suggested Activities: Open-Source software, exercises to check if a matrix is positive definite, solving Competitive Examination questions.					
Unit IV	First Order Ordinary Differential Equations	12			
Basic concepts of ordinary differential equations, Formation of first order differential equations from physical problems, First order and first-degree ODE: Variables separable, Exact equations, Leibnitz's equation, Bernoulli's equation.					
Suggested Activities: Application and Visualization of the first order ODE using open-source software and solving Competitive Examination questions.					
Unit V	Higher Order Ordinary Differential Equations	12			
Formation of second order differential equations from physical problems Linear equations of second and higher order with constant coefficients, Euler's linear equations, Method of variation of parameters.					
Suggested Activities: solving ordinary differential equations using open-source software and solving of Competitive Examination questions.					
TOTAL: 60 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Textbooks: - Friedberg, S.H., Insel, A.J.,& Spence, L.E.(2022).Linear algebra. Pearson. - Boyce, W. E., DiPrima, R. C., & Meade, D. B. (2022). Elementary differential equations and boundary value problems (12th ed.). Wiley.					
References: - Anton, H., & Rorres, C. (2014). Elementary Linear Algebra: Applications Version (11th ed.). Wiley. - Lay, D. C., Lay, S. R., & McDonald, J. J. (2010). Linear algebra and its applications with MATLAB. Pearson. - Bronson, R. (2011). Schaum's outline of matrix operations. McGraw-Hill Education. - Strang, G., & Thomson, R. (2005). "Linear Algebra and Its Applications" (4th ed.).					

Brooks/Cole.

5. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 45th Edition, 2026.

E-resources:

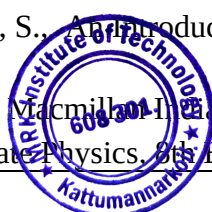
1. [https://math.libretexts.org/Bookshelves/Linear_Algebra/Book%3A_Linear_Algebra_\(Schilling_Nachtergaele_and_Lankham\)/09%3A_Inner_product_spaces](https://math.libretexts.org/Bookshelves/Linear_Algebra/Book%3A_Linear_Algebra_(Schilling_Nachtergaele_and_Lankham)/09%3A_Inner_product_spaces)
2. <https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/>
3. https://archive.nptel.ac.in/content/syllabus_pdf/111107063.pdf

CO	CO Description	PO	PSO
CO1	Explain the fundamental concepts of Linear Algebra.	PO1(3)	PSO1(1)
CO2	Compute inner products and vector norms, validate the Cauchy-Schwarz inequality	PO1(3), PO2(2)	PSO1(1)
CO3	Factorize matrices using QR decomposition to solve physical least-squares approximation problems.	PO1(3), PO2(3)	PSO1(2), PSO2(1)
CO4	Explain first and higher- order ODEs using appropriate analytical and numerical techniques.	PO1(3), PO2(2), PO5(2)	PSO2(1)
CO5	Solve higher-order ODEs using classical and finite Difference methods.	PO1(3), PO2(3), PO5(3)	PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26PHC06	Physics for Electrical Engineering	L	T	P	C
		3	0	0	3
Course Objectives: To impart knowledge on physics concepts and explore the potential applications in the field of electrical engineering					
Unit I	Dielectric Material	9			
Concept – Polarization – types – Langevin - Debye equation. Internal field- Clausius Mosotti equation – Dielectric loss – Piezo electricity, Ferro electricity and pyro electricity, properties and Application- Capacitor- Types - Application-Application of dielectrics in transformers. Suggested Activities: Create a concept map linking dielectric properties with capacitors, piezoelectric devices and transformer applications					
Unit II	Properties of Magnetic Material	9			
Classification –Dia, para, and Ferro. Bohr magnetron – origin of ferromagnetism – Domain theory – Antiferro – Ferrimagnetism – Properties, Hard and soft magnetic material-principles of magnetic recording- Magnetic hard disc (GMR Sensor). Quantum interference device. Suggested Activities: Prepare a comparative chart of magnetic materials and discuss their applications in electrical and data-storage devices					
Unit III	Semiconductor Physics	9			
Semiconductors - Intrinsic and Extrinsic –Energy level diagram- Carrier Concentration Intrinsic and Extrinsic Semiconductors. (N type – P type). Variation of Carrier Concentration with temperature. Drift and diffusion current – Hall effect- experiment to find hall effect- Schottky diode. Suggested Activities: Analyze the variation of carrier concentration with temperature and discuss semiconductor applications through a group activity.					
Unit IV	Optical Material	9			
Classification of Optical material, - Optical process in semiconductor, Optical absorption and emission- Scattering, effect- Optical process in conductor and insulator –LED-Solar cell –Optical process in organic semiconductor (OLED)-laser diode (Hetero and homo)- excitonic states. Suggested Activities: Conduct a case-study activity on the working and applications of LEDs, solar cells, OLEDs and laser diodes.					
Unit V	Advanced Material	9			
Thermocouple, bimetals, leads advantages and application, Soldering and fuse materials, and their applications. Suggested Activities: Prepare and present a material-selection chart for thermocouples, bimetals, soldering and fuse materials based on their electrical and thermal properties.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Books - Kasap, S. O., Principles of Electronic Materials and Devices, 3rd Edition, McGraw-Hill Education, 2006. - Callister, W. D., & Rethwisch, D. G., Materials Science and Engineering: An Introduction, 9th Edition, John Wiley & Sons, 2014.					
References - Indulkar, C. S., & Thiruvengadam, S., An Introduction to Electrical Engineering Materials, S. Chand Publishing. - Dekker, A. J., Solid State Physics, Macmillan India Limited. - Kittel, C., Introduction to Solid State Physics, 8th Edition, John Wiley & Sons, 2005.					



4. Pillai, S. O., Solid State Physics, 8th Edition, New Age International Publishers.
5. Wahab, M. A., Solid State Physics: Structure and Properties of Materials, Narosa Publishing House.

E-resources:

1. The emergence of spin electronics in data storage -Claude Chappert, Albert Fert and Frédéric Nguyen Van Dau, Nature Publishing Group 2007
2. Hall Effect - <https://ssp-amrt.vlabs.ac.in/exp/hall-effect-charge-carrier/simulation.html>
3. Magnetic Susceptibility – <https://em-amrt.vlabs.ac.in/exp/quinckes-method> .

CO	CO Description	PO	PSO
CO1	Explain the concepts of dielectric Materials and their applications in electrical engineering.	PO1(3), PO2(2), PO6(2)	PSO1(3)
CO2	Describe the properties, classification and applications of magnetic materials.	PO1(3), PO2(2)	PSO1(3)
CO3	Analyze semiconductor properties and carrier concentration with temperature variation.	PO1(3), PO2(3), PO5(2)	PSO1(3), PSO2(2)
CO4	Explain the working principles and applications of optical materials, LED, solar cells and OLEDs.	PO1(3), PO2(3), PO5(2), PO6(2)	PSO1(3), PSO2(2)
CO5	Explain the properties and applications of advanced electrical materials such as thermocouples, bimetals, soldering and Fuse materials.	PO1(3), PO2(2), PO6(2)	PSO1(3)

(1) = Low; (2) = Medium; (3) = High



26GEC01	Environmental science and sustainability	L	T	P	C
		2	0	0	2
Course Objectives: - To understand environment, ecosystems, biodiversity, and conservation. - To understand sustainability, SDGs, and environmental issues. - To learn sustainable practices, circular economy, and green engineering. - To understand pollution, prevention, control, and waste management. - To learn energy conservation and renewable energy sources.					
Unit I	Environment and Biodiversity				6
Nature and scope of environmental education, natural resources, Ecosystem Structure, characteristics and functions of ecosystem. Biodiversity, definition, conservation of biodiversity (in-situ and Ex-situ).					
Suggested Activities: Know Your Campus Biodiversity & Campus Biodiversity Survey.					
Unit II	Social Issues and Sustainability				6
Sustainability, Definition, Sustainable development Goals, Environmental issues - global warming and Ozone depletion ,Climate change, Acid rain, Carbon foot print-Possible solutions to Environmental Issues					
Suggested Activities: Sustainability Action Challenge & Sustainability Action Plan.					
Unit III	Sustainability Practices				6
Zero waste and R-concept-circular economy, material life cycle assessment, Sustainable habitat - Sustainable transports, Sustainable urbanization, Green Engineering, Green buildings, Green materials.					
Suggested Activities: Unsustainable Campus Challenge – “From Waste to Resource Green Campus” solution.					
Unit IV	Environmental Pollution and Its Control				6
Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Environmental protection, Environmental protection acts.					
Suggested Activities: Environmental Pollution Audit and Control Plan, Prepare a Pollution Control Chart.					
Unit V	Renewable Sources of Energy				6
Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources. Concept, origin and power plants of geothermal energy.					
Suggested Activities: Comparative Study of Renewable Energy Sources, Design a Renewable Energy Syllabus.					
TOTAL : 30 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Books - Anubha Kaushik and C. P. Kaushik’s “Perspectives in Environmental Studies”, 6th Edition, New Age International Publishers, 2018. - Benny Joseph, „Environmental Science and Engineering“, Tata McGraw-Hill, New Delhi, 2016.					
References: - Benny Joseph, ‘Environmental Science and Engineering’, Tata McGraw-Hill, New Delhi, 2016. - Gilbert M.Masters, ‘Introduction to Environmental Engineering and Science’, 2nd edition, Pearson Education, 2004. - R.K. Trivedi, ‘Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards’, Vol. I and II, Enviro Media. 38, London 2010. - Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India PVT. LTD, New Delhi, 2007.					

5. Cunningham and cooper-“Environmental Science”- Jaico Publ, House Edition-4-2007

E-resources:

1. <https://nptel.ac.in/courses/103107215>
2. <https://www.unep.org/>
3. <https://www.epa.gov>

CO	CO Description	PO	PSO
CO1	Explain environmental concepts, ecosystems, Bio diversity and conservation.	PO6(3)	PSO3(2)
CO2	Describe sustainability, SDGs, environmental issues, And solutions.	PO2(2), PO6(3)	PSO3(2)
CO3	Apply sustainable practices, circular economy, green engineering, and green buildings.	PO3(2), PO6(3)	PSO2(2)
CO4	Identify pollution causes, effects, control measures, and waste management practices.	PO2(3), PO3(2), PO6(3)	PSO2(2)
CO5	Explain energy conservation and emerging renewable energy sources.	PO1(3), PO6(3), PO11(2)	PSO2(3), PSO3(2)

(1) = Low; (2) = Medium; (3) = High



26CSC03	Problem Solving using Python Programming	L	T	P	C
		3	0	2	4
Course Objectives: - To equip engineering students with the foundational knowledge and practical skills in Python programming to analyses and solve computational problems effectively. - To faster problem-solving, critical thinking, and modular programming skills essential for engineering domains.					
Unit I	Introduction to Python Programming	9			
Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudo code, Interactive and Script Mode, Indentation, Comments, Error Messages, Variables, Reserved Words, Data Types, Arithmetic Operators and Expressions, Built-in Functions, Importing from Packages. Suggested Activities: Interpret GATE-style MCQs on pseudocode, interactive/script mode, indentation, comments, errors, variables, reserved words, and data types. Evaluate GATE-style questions on arithmetic operators, expressions and importing functions from packages					
Unit II	Control Structures and Functions	9			
if, if-else, Nested if, Multi-way if-elif Statements, while Loop, for Loop, Nested Loops, pass Statements. Functions: Hiding Redundancy and Complexity, Parameters, Arguments and Return Values, Formal and Actual Arguments, Named Arguments, Recursive Functions, Lambda Functions. Suggested Activities: Practice GATE-style MCQs on Control Statements, while, for, nested loops, and pass statements. Analyze GATE-style questions on parameters, arguments, return values, formal/actual and named arguments, recursion, and lambda functions.					
Unit III	Strings and Collections	9			
String Comparison, Formatting, Slicing, Splitting, Stripping. Collections: Lists, Tuples, Sets and Dictionaries, Basic List Operators, Searching and Sorting Lists, Dictionary Literals, Adding and Removing Keys, Accessing and Replacing Values. Suggested Activities: Evaluate GATE-style MCQs on string comparison, formatting, slicing, splitting, stripping, lists, tuples, sets, and dictionaries. Interpret GATE-style questions on list operators, searching, sorting, dictionary operations, keys, and value manipulation.					
Unit IV	File Operations and Data Processing	9			
Creating, Opening, Reading, Writing, Appending and Closing Files, Manipulating Directories, OS and Sys Modules, Reading and Writing Text and Numbers, Creating and Reading Formatted Files such as CSV and Tab-Separated Files. Suggested Activities: Examine GATE-style MCQs on creating, opening, reading, writing, appending, closing files, directories, and OS/Sys modules. Interpret GATE-style questions on reading/writing text, numbers, CSV files, and tab-separated files.					
Unit V	Python Modules, Packages and Project	9			
Built-in Modules, User-Defined Modules, NumPy, SciPy, Pandas and Scikit-learn. Development of Python-based applications using appropriate programming concepts, modules and packages. (Minimum Two Projects) Suggested Activities: Assess GATE-style MCQs on built-in modules, user-defined modules, and their applications. Examine GATE-style questions on NumPy, SciPy, Pandas, and Scikit-learn.					
TOTAL(Theory) : 45 PERIODS					
List of Experiments: Problem Analysis Chart, Flowchart and Pseudo Code Practices. 1. Usage of Conditional Logics in Programs. (Minimum Three) 2. Usage of Functions in Programs. (Minimum Three) 3. String Manipulation and Operations on Lists, Tuples, Sets and Dictionaries. (Minimum Three)					

4. Opening, Closing, Reading and Writing Formatted Files and Sorting Data. (Minimum Three)
 5. Usage of Modules and Packages to Solve Engineering Problems. (Minimum Three)
- Project:** Development of Python-based applications using appropriate programming concepts, modules and packages. (Minimum Two Projects)

TOTAL(Lab) : 30 PERIODS

TOTAL : 45+30 = 75 PERIODS

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.

Assessment Methodology: Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).

Textbooks:

1. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming (2nd ed.). No Starch Press.
2. Brown, M. C. (2018). Python: The complete reference (4th ed.). McGraw Hill Publishers.

References:

1. Guttag, J.V. (2016). Introduction to computation and programming using Python: With applications to understanding data (2nd ed.). MIT Press.
2. McKinney, W. (2017). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. Shroff/O'Reilly.
3. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming (2nd ed.). No Starch Press.
4. Downey, A. B. (2015). Think Python: How to Think Like a Computer Scientist (2nd ed.). O'Reilly Media.
5. Lutz, M. (2013). Learning Python (5th ed.). O'Reilly Media.

E-resources:

1. Official Python Documentation – <https://docs.python.org/3/>
2. Python Tutorials – <https://www.w3schools.com/python/>
3. NumPy Documentation – <https://numpy.org/doc/>

CO	CO Description	PO	PSO
CO1	Apply problem-solving techniques, algorithms, flowcharts, and Python programming fundamentals to develop simple programs.	PO1(3), PO2(3), PO5(2)	PSO2(2)
CO2	Implement conditional, looping, and function construct to develop modular Python programs.	PO1(3), PO2(3), PO5(3)	PSO2(2)
CO3	Develop Python programs using strings, lists, tuples, sets, and dictionaries for data manipulation.	PO1(3), PO2(3), PO5(3)	PSO2(3)
CO4	Implement file and directory operations to store, retrieve, process, and organize data in formatted files.	PO2(3), PO5(3)	PSO2(2)
CO5	Develop problem-solving applications using Python modules and packages such as NumPy, SciPy, Pandas, and Scikit-learn.	PO1(3), PO2(3), PO5(3), PO11(2)	PSO2(3), PSO3(2)

(1) = Low; (2) = Medium; (3) = High



26EE201	Electric Circuit Analysis	L	T	P	C
		3	0	2	4
Course Objectives: - To apply the basic circuit solving techniques for both AC and DC circuits. - To know the applications of various network theorems, transient analysis. Resonance and Three phase circuits.					
Unit I	DC/AC Circuits and Steady State Analysis				9
Ohm's law, Kirchhoff's laws, Types of sources, Review of Series parallel circuits, Review of Mesh and Nodal Analysis. Mesh and Nodal analysis with dependent sources applied to DC and AC Circuits- Super mesh and Super node analysis applied to DC and AC Circuits.					
Suggested Activities: Conduct a group activity to analyze real-life DC/AC circuits using mesh, nodal.					
Unit II	Network Reduction and Theorems				9
Star and delta transformation. Superposition, Reciprocity, Thevenin's , Norton's and Maximum Power Transfer Theorems; Analysis with dependent and independent sources-Application to DC and AC networks					
Suggested Activities: Conduct a circuit-solving challenge using different network theorems and compare the solutions.					
Unit III	Transient Response Analysis				9
R-L,R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response. Application of Laplace transforms and inverse Laplace transforms for electrical circuits					
Suggested Activities: Create and interpret transient-response plots for RL, RC and RLC circuits using simulation tools.					
Unit IV	Resonance in AC Circuits				9
Resonant circuits-series, parallel, series-parallel circuits-effect of variation of Q on resonance. Relations between circuit parameters- Q, resonant frequency and bandwidth.					
Suggested Activities: Develop a frequency-response chart to identify resonance, bandwidth and quality factor of AC circuits					
Unit V	Three Phase Circuits				9
Three phase balanced / unbalanced circuits, phase sequence – analysis of three phase 3-wire and 4-Wire circuits with star and delta connected loads, balanced & unbalanced loads– phasor diagram of voltages and currents–power and power factor-Measurements in three phase circuits.					
Suggested Activities: Prepare and present a phasor-based analysis of balanced and unbalanced three-phase electrical systems.					
TOTAL(Theory) : 45 PERIODS					
List of Experiments: - Determination of sinusoidal current response for a series RL, RLC network. - Application and experimental verification of network theorems (Thevenin's, Norton's, Superposition, Maximum Power Transfer and Reciprocity theorem). - Circuit Transient and steady state analysis - Determination of time constant of series RL and RC circuits. - Determination of frequency response of RL and RC circuits. - Steady state analysis of series RL, RC and RLC circuits.					

4. Determination of resonant frequency and bandwidth for Series and Parallel resonant circuits.
5. Determination of power in a three phase balanced and unbalanced circuits.

TOTAL(Lab) : 30 PERIODS

TOTAL : 45+30 = 75 PERIODS

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.

Assessment Methodology: Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).

Textbooks:

1. Nahvi, M., & Edminister, J. A. (2009). Electric circuits (4th ed., Schaum's Outline Series). Tata McGraw-Hill.
2. Alexander, C. K., & Sadiku, M. N. O. (2013). Fundamentals of electric circuits (5th ed.). McGraw-Hill.

References:

1. Rahmani - Andebili, M. (2020). DC electrical circuit analysis: Practice problems, methods, and solutions (1st ed.). Springer.
2. Van Valkenburg, M. E. (2015). *Network Analysis* (3rd ed.). Pearson Education.
3. Rahmani-Andebili, M. (2020). *DC Electrical Circuit Analysis: Practice Problems, Methods, and Solutions*. Springer.
4. Roy Choudhury, D. (2013). *Networks and Systems* (2nd ed.). New Age International
5. Sudhakar, A., & Shyamamohan, S. P. (2015). Circuits and Networks: Analysis and synthesis (5th ed.). Tata McGraw-Hill. "Engineering Circuit Analysis" by Hayt, Kemmerle, 9th edition, 2020

E-resources:

1. <https://archive.nptel.ac.in/courses/108/104/108104139/>
2. https://onlinecourses-archive.nptel.ac.in/noc18_ee18/preview
3. <https://archive.nptel.ac.in/courses/108/102/108102042/>

CO	CO Description	PO	PSO
CO1	Apply basic circuit analysis techniques to solve DC and AC circuits using mesh and nodal methods.	PO1(3), PO2(3)	PSO1(3)
CO2	Analyze electrical networks using network theorems and reduction techniques.	PO1(3), PO2(3)	PSO1(3)
CO3	Evaluate transient and steady-state responses of first and second order circuits using differential equations and Laplace transforms.	PO1(3), PO2(3), PO4(2)	PSO1(3), PSO2(2)
CO4	Analyze resonance phenomena and two-port network parameters in electrical circuits.	PO1(3), PO2(3)	PSO1(3)
CO5	Analyze balanced and unbalanced three-phase circuits and apply concepts to practical Power systems.	PO1(3), PO2(3), PO3(2)	PSO1(3)

(1) = Low; (2) = Medium; (3) = High



26GEC02	Basic Civil and Mechanical Engineering	L	T	P	C
		3	0	0	3
Course Objective: To impart major fundamental concept of civil & mechanical engineering & provide the insight with regard to applications.					
Unit I	Introduction to Civil Engineering and Building Materials				9
Historical Evaluation of Engineering: History, Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering, Role for infrastructure development, Buildings, Types and Terminologies, Impact on environment. Building Materials: Types, Selection criteria, Bricks and Blocks, Composition, Fly ash brick, FRP bricks, Types of Cements, Mortar. Suggested Activities: Visit to construction sites, Energy consumption in building, Virtual demonstration of cement manufacturing.					
Unit II	Building Materials and Building Components				9
Building Materials: Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Building Components: Foundations, Types, Bearing capacity and settlement, Brick masonry, Stone Masonry, Beams, Columns, Lintels, Rain Water Harvesting, Concept of Green Buildings. Suggested Activities: Virtual demonstration of heat infiltration to the building, Virtual demonstration of foundations, Erection of transformers.					
Unit III	Power Generation Systems				9
Power Plants: Classifications, Working principle of Steam, Gas, Diesel, Hydroelectric and Nuclear Power Plants, Renewable energy scenario. Suggested Activities: Virtual demonstration of Power plants.					
Unit IV	Thermal Systems and Energy Applications				9
Thermal Systems: Classifications, Working of IC Engines and its applications, Turbines and Pumps, Working of HVAC systems. Suggested Activities: Virtual demonstration of IC Engines, Turbines and Pumps, Case study on energy consumption in Refrigeration systems.					
Unit V	Manufacturing Processes				9
Manufacturing: Welding, Machining, Forming and Additive Manufacturing. Suggested Activities: Virtual demonstration of any machining processes.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Books: - Palanichamy M.S., —Basic Civil Engineering, Tata McGraw-Hill, New Delhi, 2006. - Pravin Kumar, —Basic Mechanical Engineering, Pearson Publishers, New Delhi, 2013.					
References: - Ramesh Babu, V. (2010). Basic Civil and Mechanical Engineering. SciTech Publications. - Venugopal, K., & Prahu Raja, V. (2006). Basic Mechanical Engineering. Anuradha Publications. - Shanmugam, G., & Palanichamy, M. S. (2015). Basic Civil and Mechanical Engineering. Tata McGraw Hill. - Rangwala, S. C. (2008). Engineering Materials. Charotar Publishing House. - B.C., Ashok Kumar Jain, Arun Kumar Jain, —Building Construction, Laximi Publications (P) Ltd., New Delhi, 2005.					
E-resources: https://nptel.ac.in/courses/civil-engineering https://nptel.ac.in/?utm_source https://onlinecourses-archive.nptel.ac.in/noc17-ce22/preview?					



CO	CO Description	PO	PSO
C01	Explain the evolution of Civil Engineering, infrastructure development, building concepts, environmental impact, and identify suitable building materials for construction.	PO1(3), PO6(3)	PSO3(1)
C02	Describe the properties, selection criteria, and applications of building materials and explain the functions of building components, foundations, masonry, and green building concepts.	PO1(3), PO3(2), PO6(3)	PSO3(1)
C03	Explain the working principles and applications of conventional and renewable power plants.	PO1(3), PO6(3)	PSO1(3), PSO2(2)
C04	Explain the construction, working principles, and applications of IC engines, turbines, pumps, and HVAC systems.	PO1(3), PO5(2)	PSO1(2)
C05	Describe the principles and applications of welding, machining, forming, and additive manufacturing processes used in engineering industries.	PO1(3), PO5(3)	PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26ENC02	Communicative English Lab	L	T	P	C
		0	0	4	2
Course Objectives: - To make students proficient and confident communicators in English across a variety of contexts. - To enable learners to comprehend both spoken English in diverse settings. - To develop students' ability in the nuances Reading English. - To enhance the ability of different formal and technical writings. - To prepare learners to tackle situations and seek employment with assurance in the modern globalized world.					
List of Suggested Activities					
Listening Skill - Listening Comprehension - Listening Native Speakers and Repeat - Listening to Pod casts - Experiencing Listening Technical Reports - Listening Barriers Speaking Skill - Phonetics - Pronunciation - Accent - Intonation - Stress - Pause - Nuances Reading skill - General and Technical Comprehension - Experiencing Intensive reading, - Extensive reading - Skimming and Scanning - Practice on Terminologies - Synonyms and Antonyms from technical subjects Writing Skill - Common Errors - Paragraphs and Essays - Writing Technical Reports - Business Letters, Emails, Notices - Agenda and Minutes of Meeting Personality Development - SWOT Analysis - Digital Presentation - Role Play - Dialogue and Conversation - TED Talks –Extempore					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					



Text Books

1. Dutt, Kiranmai, et al . *A Course in Communication Skills*. Cambridge University Press, 2008.
2. Green, David. *Contemporary English Grammar: Structures & Composition*. TrinityPress, 2018

Reference Books

1. Narayanaswami ,V.R. *Strengthen Your Writing*. Orient Black swan, 2009.
2. Nicholls, Anne. *Mastering Public Speaking*. Jaico Publication, 1999.
3. Raman, Meenakshi. *Principles and Practice in Technical Communication*. Oxford University Thomson,
4. A.J. and A. V.Martinet. *A Practical English Grammar*. Oxford University Press.
5. Howard, Peter. *Perfect Your Punctuation*. Orient Longman, Delhi. 1997.

E-resources

1. <https://www.shortform.com/summaries>
2. <https://www.skillsyouneed.com/rhubarb.html>
3. Swayam-NPTEL Business English Communication Portal

CO	Description of CO	PO	PSO
CO1	Demonstrate effective inter personal and intrapersonal communication skills in all the contexts.	PO8(2), PO9(3), PO10(3)	PSO3(2)
CO2	Apply appropriate listening and speaking strategies to comprehend technical information.	PO9(2), PO10(3), PO11(2)	PSO3(2)
CO3	Employ reading strategies to comprehend and interpret general and technical texts and acquire relevant technical vocabulary.	PO2(2), PO10(3), PO11(2)	PSO3(2)
CO4	Produce clear and accurate written communication to use in appropriate grammar and professional conventions.	PO10(3), PO11(2)	PSO3(2)
CO5	Develop personality and professional competencies for career development.	PO8(2), PO9(3), PO10(3), PO11(3)	PSO3(3)

(1) = Low; (2) = Medium; (3) = High



Semester - III



26MAC06	Transforms and its Applications	L	T	P	C
		3	1	0	4
Course Objectives: - To provide a strong foundation in Fourier series, Laplace, Fourier and Z -Transforms. - To develop the ability to analyze and solve engineering problems in continuous and discrete time domains using appropriate transform techniques.					
Unit I	Laplace Transforms	12			
Existence conditions, Properties of Laplace transform, Laplace transform of standard functions, derivatives and integrals, Unit step function and Dirac delta function, Laplace transform of periodic functions; Inverse Laplace transform: Partial fraction technique, Convolution theorem. Suggested Activities: Compute the Laplace transform of time-domain functions, Inverse Laplace transform, Solution of ordinary differential equations using Laplace transform.					
Unit II	Z-Transform	12			
Z-transform of standard functions, properties; Inverse Z – transform: Standard functions, Partial fraction technique, Convolution theorem. Application: Solution of difference equation using Z – transform. Suggested Activities: Compute the Z-transform of a discrete-time signal, Solution of linear constant-coefficient difference equations using Z-transform.					
Unit III	Fourier Series	12			
Dirichlet’s conditions, General Fourier series, Convergence of Fourier series, Odd and even functions; Half range sine series, Half range cosine series, Root mean square value, Parseval’s identity Suggested Activities: Compute Fourier coefficients, Reconstruct signal using Fourier series (Partial sum), Plot convergence of Fourier series					
Unit IV	Fourier Transform	12			
Complex Fourier transform, Properties, Relation between Fourier and Laplace transform, Fourier sine and cosine transforms, Parseval’s identity, Convolution theorem. Application: Simple applications to solve partial differential equations using Fourier transform. Suggested Activities: Compute the Fourier and inverse Fourier transform, Parseval’s theorem					
Unit V	Laplace Transforms and Fourier Series its application	12			
Application: Solution of second order ordinary differential equations using Laplace transform. Application: Solution of one-dimensional wave and heat equation. Suggested Activities: Compare the Laplace transform method with the classical method of solving second-order ODEs and Solve a simple boundary-value problem for a stretched string.					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: - Erwin Kreyszig, Advanced Engineering Mathematics, (11th ed.), John Wiley & Sons, USA,2025. - Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 45th Edition, 2026					
References: - Kreyszig, G. E. (2018). Advanced engineering mathematics. John Wiley & Sons Ltd. - Zill, D. G. (2022). Advanced engineering mathematics. Jones & Bartlett India Ltd. - Wylie, C. R., & Barrett, L. C. (2019). Advanced engineering mathematics. Tata McGraw-Hill. - Duffy, D. G. (2017). Advanced engineering mathematics with MATLAB. CRC Press. E-resources: 1. Stanford Engineering Everywhere - Chandrika Prasad. (2018). Engineering Mathematics. Khanna Book Publishing. New Delhi, 2016.					



E-resources:

1. Stanford Engineering Everywhere EE261 - The Fourier Transform and its Applications
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-003-signals-and-systems-fall-2011/>
3. <https://www.coursera.org/learn/mathematics-engineers-fourier-laplace-ztransforms>

CO	CO Description	PO	PSO
C01	Apply Laplace transform techniques to analyze and solve linear differential equations and engineering problems.	PO1(3) PO2(2)	PSO1(3) PSO2(2)
C02	Apply Z-transform techniques to analyze discrete-time signals and systems and solve difference equations.	PO1(3) PO2(3)	PSO1(3) PSO2(2)
C03	Apply Fourier series techniques to represent periodic functions and analyze engineering systems involving periodic signals.	PO1(3) PO2(3)	PSO1(3) PSO2(2)
C04	Apply Fourier series to express functions and analyze the convergence behavior of the series.	PO1 (3) PO2 (1)	PSO1(2) PSO2(2)
C05	Apply Laplace transform and Fourier series techniques to analyze and solve mathematical models and engineering problems involving continuous and periodic signals.	PO1(3) PO2(3)	PSO1(3) PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE301	Electromagnetic Theory	L	T	P	C
		3	1	0	4
Course Objectives: • To develop an understanding of vector analysis, electrostatics and magnetostatics. • To analyze electromagnetic induction, inductance, magnetic circuits and Maxwell's equations for electromagnetic field applications. • To understand and analyze electromagnetic-wave propagation, polarization, reflection, refraction and power flow in different media					
Unit I	Vector Analysis and Electrostatics	12			
Coordinate systems and vector algebra – Vector calculus: Gradient, Divergence and Curl – Coulomb's Law – Electric Field Intensity – Electric Flux Density – Gauss's Law and applications – Electric Potential and Potential Gradient – Electric Dipole – Boundary Conditions – Capacitance – Electrostatic Energy and Energy Density. Suggested Activities: Visualization and simulation of electric fields using Coulomb's Law and Gauss's Law.					
Unit II	Magnetostatics	12			
Biot-Savart's Law – Ampere's Circuital Law – Magnetic Field Intensity – Magnetic Flux Density – Magnetic Scalar Potential – Magnetic Vector Potential – Force on a Current-Carrying Conductor – Force between Current-Carrying Conductors – Magnetic Dipole – Torque on a Magnetic Dipole – Boundary Conditions in Magnetostatics. Suggested Activities: Simulation of magnetic fields around current-carrying conductors using Biot-Savart's Law and Ampere's Law.					
Unit III	Electromagnetic Induction	12			
Faraday's Law of Electromagnetic Induction – Lenz's Law – Transformer EMF – Motional EMF – Inductance – Self-Inductance – Mutual Inductance – Magnetic Energy – Magnetic Circuits – Displacement Current – Continuity Equation. Suggested Activity: Experimental demonstration of Faraday's Law and Lenz's Law using a coil and magnet.					
Unit IV	Maxwell's Equations	12			
Maxwell's Equations – Integral and Differential Forms – Physical Significance of Maxwell's Equations – Gauss's Law for Electric Fields – Gauss's Law for Magnetic Fields – Faraday's Law – Ampere-Maxwell Law – Displacement Current – Electromagnetic Wave Equation – Wave Propagation in Free Space. Suggested Activities: Simulation and interpretation of Maxwell's equations and electromagnetic-wave generation.					
Unit V	Electromagnetic Waves and Power Flow	12			
Uniform Plane Waves – Wave Propagation in Dielectrics – Wave Propagation in Conductors – Intrinsic Impedance – Propagation Constant – Skin Depth – Polarization of Electromagnetic Waves – Poynting Vector – Poynting Theorem – Electromagnetic Power Flow – Reflection and Refraction of Electromagnetic Waves – Applications of Electromagnetic Waves. Suggested Activities: Simulation of electromagnetic-wave propagation, polarization and Poynting vector in different media.					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: 1. Sadiku, M. N. O., & Kulkarni, S. V. (2015). Principles of Electromagnetics (6th ed., Asian Edition). Oxford University Press. 2. Guru, B. S., & Hiziroglu, H. R. (2009). Electromagnetic Field Theory Fundamentals (2nd ed.). Cambridge University Press.					



References:

1. Pramanik, A. (2008). Electromagnetism – Theory and Applications (2nd ed.). PHI Learning Private Limited, New Delhi.
2. Edminister, J. A. (2010). Schaum's Outline of Electromagnetics (3rd ed.). Tata McGraw-Hill.
3. Cheng, D. K. (2014). Field and Wave Electromagnetics (2nd ed.). Pearson Education.
4. Hayt, W. H., & Buck, J. A. (2019). Engineering Electromagnetics (9th ed.). McGraw-Hill Education.
5. Griffiths, D. J. (2017). Introduction to Electrodynamics (4th ed.). Cambridge University Press.

E-resources:

1. <https://archive.nptel.ac.in/courses/108/104/108104087/>
2. <https://archive.nptel.ac.in/courses/108/106/108106073/>
3. <https://archive.nptel.ac.in/courses/115/101/115101005/>

CO	CO Description	PO	PSO
CO1	Apply vector algebra, coordinate systems and vector calculus to represent and analyze electromagnetic field quantities.	PO1(3), PO2(2)	PSO1(3)
CO2	Apply fundamental electrostatic principles to determine electric field, potential, capacitance and electrostatic energy in engineering systems.	PO1(3), PO2(3)	PSO1(3)
CO3	Analyze magneto static fields, magnetic circuits and electromagnetic induction using fundamental electromagnetic laws and inductance concepts.	PO1(3), PO2(3)	PSO1(3)
CO4	Apply Maxwell's equations in integral and differential forms to analyze time-varying electromagnetic fields and electromagnetic wave generation.	PO1(3), PO2(3)	PSO1(3), PSO2(2)
CO5	Analyze electromagnetic-wave propagation, polarization, reflection, refraction and power flow in different media for engineering applications.	PO1(3), PO2(3), PO6(2)	PSO1(3), PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE302	Electrical machines- I	L	T	P	C
		3	0	0	3
Course Objectives: - To educate the students about the concept of electromechanical energy conversion system construction and different types of DC generator and its characteristics. - To impart knowledge on the principle of operation, starting and speed control methods of DC motor. - To facilitate the students regarding the working principle of single phase Transformers and various tests involved. - To make the students to understand the working of auto transformer and three phase Transformers.					
Unit I	Electro Mechanical Energy Conversion				9
Principle of Energy conversion – Review of magnetic circuit–Faraday's law of induced EMF - Hysteresis and Eddy Current losses – AC operation of magnetic circuits - Singly and Doubly Excited magnetic field systems – Torque production in rotating machines. Suggested Activities: Concept mapping and group discussion on electromechanical energy conversion and torque production in rotating machines					
Unit II	DC Generators				9
Principle of operation – Constructional details – Armature windings and types – EMF equation – Armature reaction – Demagnetizing and cross-magnetizing ampere turns – Commutation and methods of improving commutation – Interpoles – OCC and load characteristics of different types of DC generators – Parallel operation and equalizer connections – Applications of DC generators. Suggested Activities: Group-based characteristic curve analysis and quiz on different types of DC generators and their applications					
Unit III	DC Motors				9
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. -applications of DC motors. Suggested Activities: Application-based group activity for selecting suitable DC motors based on torque, speed, starting, and speed-control requirements.					
Unit IV	Testing of DC Machines				9
Brake test, Swinburne's test, Hopkinson's test, Field test, Retardation test, Separation of core losses Suggested Activities: Problem-solving activity on selection and comparison of suitable testing methods for DC machines					
Unit V	Transformers				9
Single-Phase Transformers: Construction and principle of operation – Equivalent circuit – Phasor diagrams – Open-circuit and short-circuit tests – Voltage regulation – Losses and efficiency – Parallel operation – Applications. Auto Transformer and Three: Phase Transformer: Construction and working of autotransformer – Comparison with two-winding transformer – Applications – Three-phase transformer construction and Connections – Comparative features of transformer connections – Scott connection and applications. Suggested Activities: Transformer connection puzzle and case-study discussion on selection of suitable transformer connections for practical power-system applications.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: - Chapman, Stephen J. (2012). Electric Machinery Fundamentals (5th ed.) McGraw-Hill Education. - Fitzgerald, A. E., & Kingsley, (2017). Electric machinery (6th ed.) McGraw Hill Education.					



References:

1. Bimbhra, P. S. (2021). Electrical Machinery (2nd ed.). Khanna Publishers.
2. Kothari, D. P., & Nagrath, I. L. (2021). Electric Machines (5th ed., Fully Revised). Tata McGraw-Hill Publishing Company Ltd.
3. Say, M. G. (2008). Performance and Design of AC Machines. CBS Publishers.
4. Sen, P. C. (1997). Principles of Electric Machines and Power Electronics (2nd ed.). John Wiley & Sons.
5. Del Toro, V. (1990). Electrical Engineering Fundamentals. Prentice Hall.

E-resources:

1. https://onlinecourses.nptel.ac.in/noc24_ee103/preview
2. <https://archive.nptel.ac.in/courses/108/105/108105155/>
3. <https://www.nptel.ac.in/courses/108105131>

CO	CO Description	PO	PSO
CO1	Explain principles of electromechanical energy conversion magnetic circuits	PO1(3), PO2(2)	PSO1(3)
CO2	Analyze the performance and characteristics of DC generators under various operating conditions	PO1(3), PO2(3), PO4(2)	PSO1(3), PSO2(2)
CO3	Evaluate the operation, control, and testing methods of DC Motors.	PO1(3), PO2(3), PO4(2)	PSO1(3), PSO2(2)
CO4	Learn the concept of testing of DC machines.	PO1(3), PO4(3)	PSO1(3)
CO5	Analyze single-phase, auto, and three-phase transformers Performance and applications.	PO1(3), PO2(3)	PSO1(3)

(1) = Low; (2) = Medium; (3) = High



26EE303	Linear Integrated Circuits	L	T	P	C
		3	0	2	4
Course objective: - To understand the fundamentals, fabrication, and characteristics of linear integrated circuits. - To analyze and design basic and advanced operational amplifier circuits. - To understand the applications of op-amps, voltage regulators, timers, PLLs, and data converters. - To develop practical skills through simulation, circuit design, and laboratory experimentation.					
Unit I	Introduction	9			
Classification and advantages of integrated circuits – monolithic, thin-film and thick-film ICs – Surface Mount Technology (SMT) – basic IC fabrication process – wafer preparation – epitaxial growth – oxidation – photolithography – diffusion – ion implantation – isolation – metallization – packaging – overview of bipolar and MOSFET fabrication.					
Suggested Activities: Group discussion and concept mapping on IC fabrication techniques, classification, advantages, limitations, and applications.					
Unit II	Operational Amplifier	9			
Differential amplifier – op-amp block diagram – ideal and practical characteristics – op-amp parameters – voltage follower – inverting and non-inverting amplifiers – summing and differential amplifiers – scale changer – logarithmic and antilogarithmic amplifiers – integrator – differentiator – instrumentation amplifier.					
Suggested Activities: Op-amp application challenge: Analyze simple real-world problems and select suitable op-amp circuits.					
Unit III	Op-Amp Applications	9			
Voltage-to-current and current-to-voltage converters – precision rectifier – clipper and clamper – sample and hold circuits – active filters – low-pass, high-pass, band-pass and band-reject filters – comparators – Schmitt trigger – square, triangular and sine-wave generators – RC phase-shift and Wien bridge oscillators.					
Suggested Activities: Group activity to compare filters, comparators, converters, and waveform generators for different applications.					
Unit IV	Other Linear ICS	9			
IC voltage regulators – fixed and variable regulators – 78XX and 79XX series – LM317 – switching regulators – IC 555 timer – astable and monostable modes – phase-locked loop (PLL) – operation, characteristics, and applications.					
Suggested Activities: Case study: Selection of suitable voltage regulators, 555 timer configurations, and PLL applications in electronic systems.					
Unit V	D/A and A/D Converters	9			
Digital-to-Analog Converters: Weighted resistor DAC – R-2R ladder DAC.					
Analog-to-Digital Converters: Counter-type ADC – successive approximation ADC – flash ADC delta-sigma ADC – comparison of ADC/DAC characteristics and applications.					
Suggested Activities: Quiz and card-matching activity on different D/A and A/D converter architectures, their characteristics, advantages, limitations, and applications					
TOTAL (Theory) : 45 PERIODS					
List of Experiments: - Design and verify inverting, non-inverting, summing and differential amplifier circuits using an op-amp. - Design integrator, differentiator, precision rectifier and Schmitt trigger circuits - Design low-pass/high-pass active filters and generate square, triangular or sine waveforms using op-amp circuits - Study LM317 voltage regulator and design astable/mono stable multi vibrator using IC 555. - Analyze weighted resistor/R-2R DAC and any one ADC such as successive approximation or flash ADC.					



TOTAL (Lab.): 30 PERIODS	
TOTAL : 45+30 = 75 PERIODS	
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.	
Assessment Methodology: Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).	
Text Book: 1. Roy Choudhury, D., & Jain, S. B. (2018). Linear integrated circuits (5th ed.). Wiley Eastern Ltd. 2. Gayakwad, R. A. (2015). Op-amps and linear integrated circuits (4th ed.). Pearson Education. References: 1. Sedra, A. S., & Smith, K. C. (2019). Microelectronic Circuits (7th ed.). Oxford University Press. 2. Salivahanan, S., & Kanchana Bhaskaran, V. S. (2014). Linear Integrated Circuits and Applications (2nd ed.). McGraw Hill Education 3. Franco, S., Design with Operational Amplifiers and Analog Integrated Circuits, 4th Edition, McGraw-Hill Education, 2015. 4. Coughlin, R. F., & Driscoll, F. F., Operational Amplifiers and Linear Integrated Circuits, 6th Edition, Pearson Education, 2012. 5. Botkar, K. R. (2008). Integrated circuits (10th ed.). Hanna Publishers. E-resources: 1. https://nptel.ac.in/courses/108108111 2. https://www.nptel.ac.in/courses/108101094 3. https://www.nptel.ac.in/courses/117101106	

CO	CO Description	PO	PSO
CO1	Explain the fabrication, classification, and basic concepts of integrated circuits including op-amps and linear ICs.	PO1(3), PO2(2)	PSO1(3)
CO2	Analyze and design basic operational amplifier circuits such as inverting, non-inverting, summing, differential, integrator, and differentiator circuits.	PO1(3), PO2(3), PO3(2)	PSO1(3), PSO2(2)
CO3	Design and implement advanced op-amp applications including precision rectifiers, instrumentation amplifiers, and Active filters.	PO1(3), PO2(3), PO3(3)	PSO1(3), PSO2(2)
CO4	Understand the concepts of PLL and other linear IC applications.	PO1(3), PO2(2)	PSO1(3), PSO2(2)
CO5	Understand and apply the working principles of D/A and A/D converters	PO1(3), PO2(3)	PSO1(3), PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE304	Electronic Devices and Circuits	L	T	P	C
		3	0	2	4
Course Objective: - The course introduces students to the physical principles and operational characteristics of electronic devices such as diodes, BJTs, and FETs. Through laboratory-integrated lectures, students will apply these concepts in designing and analyzing rectifiers, amplifiers, and switching circuits. - The course emphasizes problem-solving and hands-on skills needed for analog circuit implementation					
Unit I	Semiconductor Physics and Diodes				9
Energy bands, carrier generation and recombination, drift and diffusion currents. PN junction Operation, ideal and real diode characteristics. Diode Applications: Rectifiers, clippers, clampers, and voltage regulators. Suggested Activities: Group activity on semiconductor concepts and identification of practical applications of diodes such as rectifiers, clippers, clampers, and voltage regulators.					
Unit II	Bipolar Junction Transistors				9
Structure and modes of operation: Active, Cutoff, Saturation. . BJT biasing techniques and stability analysis. Small signal analysis and single-stage amplifier design. Suggested Activities: Problem-solving activity on BJT biasing, operating regions, stability, and selection of suitable biasing techniques for amplifier applications					
Unit III	Field Effect Transistors				9
JFET and MOSFET structures, characteristics and parameters. FET biasing methods. Common source amplifier design and multistage configurations. Suggested Activities: Comparative group activity on JFET and MOSFET characteristics, biasing methods, and selection of FETs for different electronic applications.					
Unit IV	Frequency Response and Power Amplifiers				9
Frequency response of amplifiers: low, mid, and high frequency. Decibel gain, Bode plots, gain-bandwidth trade-off. Power amplifiers: Class A, B, AB, C – operation and efficiency. Suggested Activities: Bode plot and frequency-response analysis activity, followed by a group discussion comparing Class A, B, AB, and C power amplifiers.					
Unit V	Feedback Amplifiers and Oscillators				9
Positive and negative feedback, feedback topologies, gain enhancement. Oscillators – Colpitts, Hartley design and analysis. Suggested Activities: Design challenge and group discussion on selecting suitable feedback configurations and oscillators (Colpitts/Hartley) for different practical applications					
TOTAL (Theory) : 45 PERIODS					
List of Experiments: (a) Characteristics of PN junction diode and Zener diode. (b) Characteristics of PN junction diode and Zener diode. - Common Emitter Input and Output Characteristics - Characteristics of Field Effect Transistor - Frequency response of an amplifier. (a) Study of Colpitts oscillator (b) Study of Hartley design oscillator					
TOTAL (Lab.): 30 PERIODS					
TOTAL : 45+30 = 75 PERIODS					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.					
Assessment Methodology: Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).					
Text Book: - Salivahanan, S., & Suresh Kumar, N. (2023). Electronic devices and circuits (5th ed.). McGraw Hill Education. - Bell, D. A. (2008). Electronic devices and circuits (5th ed.). Oxford University Press.					

References:

1. Mehta, V. K., & Mehta, R. (2020). Principles of electronics (12th ed.). S. Chand Publishing.
2. Boylestad, R. L., & Nashelsky, L. (2012). Electronic devices and circuit theory (11th ed.). Pearson Education.
3. Floyd, T. L. (2018). Electronic Devices (10th ed.). Pearson Education.
4. Millman, J., & Halkias, C. C. (2001). Integrated Electronics: Analog and Digital Circuits and Systems. McGraw-Hill Education
5. Donal Neamen (2006). Electronic circuits: Analysis and design (3rd ed.). Tata McGraw-Hill Education.

E-resources:

1. <https://archive.nptel.ac.in/courses/117/107/117107095/>
2. <https://www.nptel.ac.in/courses/117103063>
3. <https://www.nptel.ac.in/courses/108102097>

CO	CO Description	PO	PSO
CO1	Explain semiconductor physics and analyze the characteristics of diodes and their applications.	PO1(3), PO2(2)	PSO1(3)
CO2	Analyze and design BJT-based circuits including Biasing and single-stage amplifiers.	PO1(3), PO2(3), PO3(3)	PSO1(3)
CO3	Analyze FET characteristics and design amplifier and Switching circuits using JFET and MOSFET.	PO1(3), PO2(3), PO3(3)	PSO1(3), PSO2(2)
CO4	Evaluate frequency response and design power Amplifiers for various applications.	PO1(3), PO2(3), PO3(3)	PSO1(3)
CO5	Apply feedback concepts and design oscillators and Electronic circuits for practical implementations.	PO1(3), PO2(3), PO3(3), PO5(2)	PSO1(3), PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE305	Power Plant Engineering	L	T	P	C
		3	0	0	3
Course Objectives: • To understand the basic principles and operation of different power generation systems. • To study the major components and working of thermal, hydro, gas turbine, diesel and nuclear power plants. • To understand the principles and applications of renewable and non-conventional power generation systems. • To study power plant layouts, auxiliary systems, operation and maintenance. • To understand power plant economics, environmental impacts and sustainable power generation.					
Unit I	Thermal Power Plants				9
Energy scenario – Steam power plant – Basic thermodynamic cycles – Fuels and combustion – Boilers – Steam turbines – Impulse and reaction turbines – Fuel and ash handling – Draught systems – Feed water treatment – Condensers – Cooling systems – Performance of thermal power plants. Suggested Activities: Group discussion and concept mapping on the layout, components, working, and performance of thermal power plants.					
Unit II	Hydro, Gas Turbine And Diesel Power Plants				9
Hydroelectric power plants – Classification – Dams and reservoirs – Hydraulic turbines – Pelton, Francis and Kaplan turbines – Pumped storage plants – Gas turbine power plants – Open and closed cycles – Intercooling, reheating and regeneration – Diesel power plants – Components and working – Advantages and limitations. Suggested Activity: Group activity to compare hydro, gas turbine, and diesel power plants based on construction, operation, efficiency, advantages, limitations, and applications.					
Unit III	Nuclear Power Plants				9
Nuclear energy – Nuclear fission and fusion – Nuclear fuels – Nuclear reactor principles – Reactor components – Types of nuclear reactors – Boiling Water Reactor (BWR) – Pressurized Water Reactor (PWR) – Pressurized Heavy Water Reactor (PHWR) – Fast breeder reactors – Nuclear power plant – Safety and waste management. Suggested Activities: Case study and group discussion on nuclear reactor types, nuclear safety, radiation protection, and nuclear waste management.					
Unit IV	Power from Renewable Energy				9
Solar energy – Solar photovoltaic power plants – Solar thermal power plants – Wind power plants – Wind energy conversion systems – Geothermal power plants – Tidal power plants – Ocean Thermal Energy Conversion (OTEC) – Biomass and biogas power plants – Fuel cell power generation. Suggested Activities: Renewable energy identification activity where students match different renewable sources with suitable power-generation technologies and applications.					
Unit V	Energy, Economic and Environmental Issues of Power Plants				9
Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants Suggested Activities: Problem-solving and group discussion on load curves, load factor, capacity factor, power tariffs, power plant economics, and environmental pollution control					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					



Text Book:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.
2. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998

References:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Rao, S., & Parulekar, B. B. (2005). Energy Technology: Non-Conventional, Renewable and Conventional. Khanna Publishers.
4. R. K. Rajput (2006). A Textbook of Power Plant Engineering. Laxmi Publications
5. Arora, S. C., & Domkundwar, S. A Course in Power Plant Engineering. Dhanpat Rai & Co

E-resources:

1. <https://www.nptel.ac.in/courses/112107291>
2. <https://www.nptel.ac.in/courses/112103421>
3. <https://www.nptel.ac.in/courses/121106014>

CO	CO Description	PO	PSO
CO1	Explain the operating principles, components and Performance of coal-based thermal power plants.	PO1(3), PO2(2)	PSO1(3)
CO2	Analyze and explain the components of diesel and gas Turbine power plants.	PO1(3), PO2(3)	PSO1(3)
CO3	Explain the principles, layout, operation and safety Aspects of different nuclear power plants and reactors.	PO1(3), PO2(2), PO6(2), PO7(2)	PSO1(2), PSO2(2)
CO4	Describe the construction, working and applications of Hydro, wind, solar, tidal, geothermal, biogas and fuel-cell power systems.	PO1(3), PO2(2), PO6(3)	PSO1(2), PSO2(3)
CO5	Evaluate power plant economics, tariff, load characteristics, site selection and environmental Pollution-control methods.	PO1(2), PO2(3), PO3(2), PO6(3), PO10(2)	PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE306	Electrical Machines Laboratory - I	L	T	P	C
		0	0	4	2
Course Objectives: • To educate the students about the concept of electromechanical energy conversion system and different types of DC generator and its characteristics. • To impart knowledge on the principle of operation, starting and speed control methods of DC motor. • To facilitate the students regarding the working principle of single phase Transformers and various tests involved. • To make the students to understand the working of auto transformer and three phase transformers.					
List of Experiments 1. Open circuit and load characteristics of a separately excited DC Generator 2. Study of starters of DC motors 3. Speed control of DC shunt motor 4. Load test on DC shunt motor. 5. Load test on DC series motor 6. Load test of DC compound motor 7. Swinburne’s test. 8. Open circuit and short circuit test on single-phase transformer. 9. Separation of no-load losses in a single phase transformer. 10. Sumpner’s test to determine the temperature rise of transformer					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					

CO	Description of CO	PO	PSO
CO1	Construct and connect appropriate circuits for DC machines and Transformers.	PO1, PO2, PO3	PSO1
CO2	Experimentally determine the characteristics and performance of Different types of DC machines.	PO1, PO2, PO4	PSO1
CO3	Demonstrate various speed control techniques and starters of DC Motors for industrial applications.	PO1, PO2, PO3, PO5	PSO1
CO4	Identify and apply suitable testing methods for transformers and DC machines.	PO1, PO2, PO4, PO5	PSO1
CO5	Predetermine the performance parameters of transformers and DC Motors and explain three-phase transformer connections.	PO1, PO2, PO3, PO5	PSO1

(1) = Low; (2) = Medium; (3) = High



26SDC01	Foundation Aptitude and Verbal ability Skills	L	T	P	C
		0	0	2	1
Course Objectives: - To solve quantitative aptitude problems through practical exercises. - To Apply logical and analytical reasoning techniques. - To improve grammar and vocabulary through practice-oriented activities. - To demonstrate effective reading, listening and speaking skills. - To demonstrate professional communication skills required for placement activities.					
List of Activities: - Number System, Simplification, Percentage and Ratio - Average, Profit and Loss, Simple and Compound Interest - Time, Work, Speed, Distance and Data Interpretation - Number Series, Analogy, Coding-Decoding and Logical Patterns - Blood Relations, Direction Sense, Ranking, Syllogism and Data Sufficiency - Grammar, Sentence Correction and Error Spotting - Vocabulary, Synonyms, Antonyms, Idioms and Sentence Completion - Reading Comprehension, Para Jumbles and Listening Skills - Speaking Skills, Group Discussion and Presentation Skills - Resume Preparation, Interview Skills and Mock Placement Activities					
TOTAL : 30 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					
References: R. S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publishing. R. S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publishing. - Wren & Martin, High School English Grammar and Composition, S. Chand Publishing. - Arun Sharma, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGraw Hill Education.					
E-resources: https://nptel.ac.in/courses/109104030					

CO	Description of CO	PO	PSO
CO1	Solve quantitative aptitude problems using appropriate numerical and arithmetic techniques.	PO1 (3), PO2 (2)	PSO2 (1)
CO2	Apply logical and analytical reasoning techniques to solve aptitude problems.	PO2 (3), PO4 (2),	PSO2 (2), PSO3 (1)
CO3	Apply grammar and vocabulary skills to solve verbal ability exercises.	PO1 (2), PO10 (3),	PSO3 (2)
CO4	Demonstrate effective reading, listening, speaking, and group discussion and presentation skills.	PO8 (3), PO9 (3), PO10 (3),	PSO3 (3)
CO5	Demonstrate professional communication skills through resume preparation, interviews and mock placement activities.	PO6 (2), PO8 (3), PO9 (3)	PSO1 (1), PSO2 (2), PSO3 (3)

(1) = Low; (2) = Medium; (3) = High



Semester - IV



26MAC03	Probability and Statistics	L	T	P	C
		3	1	0	4
Course Objective: The Objectives of the course are to introduce data collection methods, classification techniques, and graphical representation of data using charts and plots, to explain the fundamental concepts of descriptive statistics, probability theory, random variables, and hypothesis testing for analyzing data and to demonstrate the application of statistical techniques such as experimental design and process control using R/Python for data-driven decision-making.					
Unit I	Descriptive Statistics				12
Measures of Central Tendency: Arithmetic Mean, Median and Mode – Measures of Variation: Range, Quartile Deviation - Standard Deviation and Coefficient of Variation – Five Number Summary – Box Plot Technique. Suggested Activities : Application of descriptive statistics and data presentation methods using R/ Python programming and Analysing data using Box Plots using R/ Python programming.					
Unit II	Probability				12
Introduction, sample space and events Axioms of probability - Conditional probability – Total probability – Bayes’ theorem–problems- Random variable – Distribution function- Probability mass function – Probability density function . Suggested Activities: Application of various distributions using R/ Python programming.					
Unit III	Probability distributions				12
Moments - Standard Distributions - Binomial, Poisson and Normal Distributions-Problems, Uniform Distribution and Exponential Distribution (Simple Problems)- Correlation and regression (for discrete data only) - Central limit theorem – Statement only. Suggested Activities: Applications of Correlation and Regression using R/ Python programming					
Unit IV	Testing of Hypothesis				12
Large sample tests for single mean and difference of means – Small samples tests based on t and F distributions (single mean, difference of means, paired t- test and variance ratio test) – Chi-square test for independence of attributes and goodness of fit. Suggested Activities: Application of Student – t test, F test ,Chi –s square test using R/ Python programming..					
Unit V	Design of Experiments				12
Analysis of Variance (ANOVA) – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD) Suggested Activities: Application and visualization of One-way ANOVA and Two –way ANOVA using R/ Python programming..					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Books: - Walpole R. E., Myers S.L. & Keying Ye, “Probability and Statistics for Engineers and Scientists”, Pearson Education Inc, 9th edition, 2024. - Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, “An Introduction to Statistical Learning with Applications in R”, Springer, 2021					



References:

1. Johnson R. A., Miller & Freund's, "Probability and Statistics for Engineers", 9th Edition, Pearson Education, Delhi, 2020.
2. Charles Henry Brase and Corrinne Pellillo Brase, "Understandable Statistics: Concepts and Methods", Cengage Learning, 12th Edition, 2018.
3. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", 6th Edition, Pearson Education, Asia, 2012.
4. Anderson, T. W, "An Introduction to Multivariate Statistical Analysis", 3rd edition, John Wiley and Sons, 2009.
5. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 7th Edition, Wiley, 2018.

E-resources:

1. NPTEL – Descriptive Statistics with R Software - https://onlinecourses.nptel.ac.in/noc22_mg87/preview
2. MIT OCW – Introduction to Probability and Statistics (18.05, Spring 2022) - <https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/>
3. MIT OCW – Statistics for Applications (18.650, Fall 2016) - <https://ocw.mit.edu/courses/18-650-statistics-for-applications-fall-2016/>

CO	Description of CO	PO	PSO
CO1	Apply descriptive statistical measures such as mean, median, mode, range, quartile deviation, standard deviation and coefficient of variation to summarize and interpret data.	PO1(3), PO2(3), PO5(3)	PSO1(3), PSO2(2), PSO3(3)
CO2	Apply the concepts of probability, conditional probability, Bayes' theorem, random variables and standard probability distributions to solve real-world problems.	PO1(3), PO2(3), PO5(3)	PSO1(3), PSO3(3)
CO3	Analyze data using correlation, regression, and probability models.	PO1(3), PO4(3), PO5(3)	PSO1(3), PSO3(3)
CO4	Perform statistical hypothesis testing using large-sample tests, t-tests, F-tests and chi-square tests, and interpret the results for decision-making.	PO1(3), PO2(3), PO5(3)	PSO1(3), PSO3(3)
CO5	Utilize hypothesis testing, ANOVA for data-driven decision-making.	PO1(3), PO2(3), PO5(3)	PSO1(3), PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26EE401	Transmission and Distribution	L	T	P	C
		3	0	0	3
Course Objectives: - To understand the basic concepts of electrical transmission and distribution systems. - To analyze transmission lines, overhead lines, insulators, and underground cables. - To calculate voltage regulation, transmission efficiency, sag, tension, and voltage drop in distribution systems.					
Unit I	Basic Concepts of Transmission Lines	9			
Transmission and distribution systems – main components – conductors – resistance – inductance – capacitance – single-phase and three-phase lines – conductor transposition – basic requirements of transmission lines.					
Suggested Activities: Group discussion and concept mapping on transmission-line components and conductor arrangements.					
Unit II	Transmission Line Performance	9			
Short, medium and long transmission lines – equivalent circuits – ABCD constants – voltage regulation – transmission efficiency – Ferranti effect – skin effect – power flow – power circle diagram.					
Suggested Activities: Problem-solving activity on voltage regulation, efficiency, Ferranti effect, and power flow.					
Unit III	Overhead Lines and Insulators	9			
Overhead line construction – supports and towers – sag and tension – factors affecting sag – pin, suspension and strain insulators – string efficiency – methods of improving string efficiency – corona and corona loss.					
Suggested Activities: Group activity to identify and compare different supports, insulators, sag conditions, and corona effects.					
Unit IV	Underground Cables	9			
Underground cables – construction and types – single-core and multi-core cables – capacitance – insulation resistance – electric stress – dielectric loss – cable grading – capacitance grading – inter-sheath grading.					
Suggested Activities: Case study on underground cable construction, electric stress, dielectric loss, and cable grading.					
Unit V	Distribution Systems	9			
Distribution systems – AC distributors – voltage-drop calculations – power factor referred to receiving-end voltage – power factor referred to respective load voltages – basic distribution applications.					
Suggested Activities: Application-based problem solving on voltage drop in AC distributors under different load conditions.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: - Kothari, D. P., & Nagrath, I. J. (2019). Power system engineering (3rd ed.). McGraw-Hill Publishing Company Limited. - Singh, S. N. (2008). Electric power generation, transmission and distribution (2nd ed.). Prentice Hall of India. https://doi.org/978-81-203-36508					
References: - Wadhwa, C. L. (2010). Electrical power system (6th ed.). New Age International. - Hardy, J. B., & Bayliss, C. R. (2011). Transmission and distribution in electrical engineering (4th ed.). New Publications. - Grainger, J. J., & Stevenson, W. D. (1994). Power System Analysis. McGraw Hill.					

4. Glover, J. D., Sarma, M. S., & Overbye, T. J. (2017). Power System Analysis and Design (6th ed.). Cengage Learning.
5. Wadhwa, C. L. (2006). Generation, distribution and utilization of electrical energy (2nd ed.). New Age International Publishers

E-resources:

1. <https://archive.nptel.ac.in/courses/108/105/108105067/>
2. <https://archive.nptel.ac.in/courses/108/105/108105104/>
3. <https://archive.nptel.ac.in/courses/108/107/108107028/>

CO	Description of CO	PO	PSO
CO1	Explain the basic principles of transmission systems, conductor parameters, and the electrical characteristics of transmission lines.	PO1 (3)	PSO1 (3)
CO2	Analyze the performance of short, medium and long transmission lines using equivalent circuits, ABCD constants, voltage regulation and transmission efficiency.	PO1 (3), PO2 (3)	PSO1 (3)
CO3	Analyze overhead transmission lines, including sag and tension, Insulators, string efficiency, corona effects and related performance parameters.	PO1 (3), PO2 (2), PO3 (2)	PSO1 (3)
CO4	Analyze the construction, electrical characteristics, dielectric stresses, losses and grading methods of underground cables.	PO1 (3), PO2 (3)	PSO1 (3), PSO2 (2)
CO5	Evaluate voltage drop and performance of AC distribution systems under different load power-factor conditions for effective power delivery.	PO1 (3), PO2 (3), PO4 (2)	PSO1 (3), PSO2 (2)

(1) = Low; (2) = Medium; (3) = High



26EE402	Electrical machines- II	L	T	P	C
		3	0	0	3
Course Objectives: - To understand the construction, operating principles and performance of synchronous generators and synchronous motors. - To analyze the construction, operation, performance, starting and speed control techniques of three-phase induction motors. - To understand the construction, operation and performance of single-phase induction motors and special electrical machines.					
Unit I	Alternator	9			
Construction and types of rotors – Winding factors – EMF equation – Synchronous reactance – Armature reaction – Phasor diagrams – Synchronization and parallel operation – Effect of excitation and mechanical input – Voltage regulation by EMF and MMF methods – Power-angle characteristics – Two-reaction theory – Slip test – Short-circuit transients – Capability curves. Suggested Activities: Group discussion and concept mapping on alternators, focusing on construction, winding factors, voltage regulation, synchronization, and power-angle characteristics.					
Unit II	Synchronous Motor	9			
Principle of operation – Torque equation – Operation on infinite bus – V and inverted-V curves – Power input and power developed – Starting methods – Hunting – Damper windings – Synchronous condenser and applications. Suggested Activities: Case study and group activity on synchronous motor applications, including V-curves, starting methods, hunting, damper windings, and synchronous condensers.					
Unit III	Three-Phase Induction Motor	9			
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 . Suggested Activities: Problem-solving activity on three-phase induction motors covering slip, torque-slip characteristics, losses, efficiency, and different types of induction motors.					
Unit IV	Starting and Speed Control of Three-Phase Induction Motor	9			
Need for starting – Types of starters – DOL, rotor resistance, autotransformer and star-delta starters – Speed control methods – Voltage control, frequency control and pole changing – V/f control – Braking of three-phase induction motors: Plugging, dynamic braking and regenerative braking. Suggested Activities: Application-based group activity to select suitable starting, speed-control, and braking methods for three-phase induction motors in different industrial applications.					
Unit V	Single - Phase Induction Motors and Special Electrical Machines	9			
Constructional details and principle of operation of single-phase induction motors – Double-revolving-field theory – Equivalent circuit – Starting methods – Capacitor-start and capacitor-run induction motors – Performance analysis – Shaded-pole induction motor – Linear induction motor – Servo Motors – Stepper motors – Introduction to magnetic levitation systems. Suggested Activities: Group discussion and application-matching activity on single-phase induction motors and special machines such as servo motors, stepper motors, linear induction motors, and magnetic levitation systems.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: - Fitzgerald, A. E., & Kingsley, C. (2016). Electric machinery (6th ed.)McGraw Hill Education. - Kothari, D. P., & Nagrath, I. L. (2019). Electric machines (5th ed., fully revised). Tata McGraw Hill Publishing Company Ltd.					

References: 1. Bimbhra, P. S. (2021). Electrical machinery (2nd ed.) Khanna Publishers. 2. Nagrath, I. J., & Kothari, D. P., Electric Machines, Tata McGraw-Hill. Say, M. G. (2008). Performance and design of AC machines (1st ed.). CBS Publishers. 3. Chapman, S. J., Electric Machinery Fundamentals, 5th Edition, McGraw-Hill Education, 2012. 4. Sen, P. C., Principles of Electric Machines and Power Electronics, 2nd Edition, John Wiley & Sons, 1997.			
E-resources: 1. https://archive.nptel.ac.in/courses/108/105/108105155/ 2. https://archive.nptel.ac.in/courses/108/105/108105131/ 3. https://nptel.ac.in/courses/108105131			

CO	Description of CO	PO	PSO
CO1	Analyze the construction, operation, and voltage regulation and performance characteristics of synchronous generators.	PO1, PO2, PO3	PSO1(3)
CO2	Explain the operation, performance, starting methods and excitation characteristics of synchronous motors.	PO1, PO2, PO3	PSO1(3)
CO3	Analyze the equivalent circuit, torque characteristics, losses and performance of three-phase induction motors.	PO1, PO2, PO3, PO4	PSO1(3)
CO4	Analyze and select suitable starting, speed control and braking methods for three-phase induction motors.	PO2, PO3, PO5	PSO1(3)
CO5	Explain the operation, performance and applications of single-phase induction motors and special electrical machines.	PO1, PO2, PO3, PO7	PSO2(3)

(1) = Low; (2) = Medium; (3) = High



26EE403	Measurements and Instrumentation	L	T	P	C
		3	0	0	3
Course Objectives: - To understand the fundamental concepts, characteristics, errors and statistical evaluation of electrical and electronic measurements. - To analyze the working principles and functional aspects of various electrical measuring instruments and bridge circuits. - To understand sensors, transducers and digital instrumentation techniques used for measurement and industrial applications.					
Unit I	Measurement Basics and Standards				9
Measurement systems – Classification of instruments – Static and dynamic characteristics – Accuracy and precision – Sensitivity and resolution – Measurement errors – Statistical evaluation of measurement data – Standards of measurement – Primary and secondary standards – Electrical standards and standardization practices. Suggested Activity: Identify the elements of a measurement system and compare measurement characteristics, errors and different types of standards.					
Unit II	Electrical Measurements				9
Moving-coil instruments – Moving-iron instruments – Induction-type instruments – Dynamometer wattmeter – Energy meter – Megger – Instrument transformers – Current transformer (CT) – Potential transformer (PT) – Applications and limitations. Suggested Activity: Instrument identification and comparison of different electrical measuring instruments.					
Unit III	Bridges and Instrumentation Amplifiers				9
Wheatstone bridge – Kelvin double bridge – Maxwell bridge – Hay bridge – Wien bridge – Schering bridge – Measurement of resistance, inductance and capacitance – Errors and compensation – Instrumentation amplifiers – Characteristics and applications. Suggested Activity: Select suitable bridges for resistance, inductance and capacitance measurement through simple problem-solving exercises.					
Unit IV	Transducers and Sensors				9
Classification of transducers – Active and passive transducers – Analog and digital transducers – Measurement of temperature, pressure, displacement, flow and angular velocity – Digital transducers – Smart sensors – Characteristics and applications. Suggested Activity: Match suitable transducers and sensors with practical measurement applications.					
Unit V	Digital Instrumentation				9
A/D converters – Types and characteristics – Sampling and quantization – Measurement of voltage, current, frequency and phase – D/A converters – Digital Storage Oscilloscope (DSO) – Data loggers – Basics of PLC – Introduction to virtual instrumentation. Suggested Activities: Case study on ADC, DAC, DSO, data loggers, PLC and virtual instrumentation.					
TOTAL : 45 PERIODS					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (20%), Flipped Class (10%), Internal Examinations (40%).					
Text Book: A. K. Sawhney and Puneet Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co., New Delhi. - David A. Bell, Electronic Instrumentation and Measurements, 3rd Edition, Oxford University Press.					
References: J. B. Gupta, A Course in Electronic and Electrical Measurements and Instrumentation, S. K. Kataria & Sons. R. K. Rajput, Electrical and Electronic Measurements and Instrumentation, S. Chand Publishing.					



3. Helfrick, A. D., & Cooper, W. D., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall.
4. Doebelin, E. O., & Manik, D. N., Measurement Systems: Application and Design, 6th Edition, McGraw-Hill Education.
5. H. S. Kalsi, Electronic Instrumentation, 4th Edition, McGraw Hill Education.

E-resources:

1. <https://nptel.ac.in/courses/108105153>
2. <https://nptel.ac.in/courses/108102191>
3. https://onlinecourses-archive.nptel.ac.in/noc17_ec09/preview

CO	CO Description	PO	PSO
CO1	Explain the fundamental concepts, characteristics and Errors associated with engineering measurements.	PO1(3), PO2(2)	PSO1(3)
CO2	Analyze the construction, operating principles and Applications of various electrical measuring instruments.	PO1(3), PO2(3), PO4(2)	PSO1(3)
CO3	Analyze and apply AC/DC bridge circuits and Instrumentation amplifiers for measurement of electrical parameters.	PO1(3), PO2(3), PO3(2), PO4(3)	PSO1(3)
CO4	Explain the characteristics, operation and applications of Sensors and transducers for measurement of non-electrical parameters.	PO1(3), PO2(2), PO5(2)	PSO2(3)
CO5	Analyze digital instrumentation systems including ADCs, DACs, DSO, data loggers, PLCs and virtual instrumentation.	PO1(3), PO2(3), PO4(3), PO5(3)	PSO2(3)

(1) = Low; (2) = Medium; (3) = High



26EE404	Control Systems	L	T	P	C
		3	0	2	4
Course Objectives:					
• The objective of this course is to equip students with a fundamental understanding of control systems by modelling physical systems using transfer functions and state-space methods. • The course aims to develop analytical skills to evaluate system behaviour in both time and frequency domains, assess system stability, and design appropriate controllers and compensators to meet desired performance specifications. • Through theoretical concepts and design techniques, students will gain the ability to model, analyse, and control dynamic systems effectively.					
Unit I	Transfer Function of Physical Systems				9
Systems - open and closed loop systems configurations - Modelling: electrical, mechanical and electrical analogues mechanical systems - Block Diagram Reduction techniques-Signal Flow Graph. Suggested Activities: Group activity on modelling real-life electrical and mechanical systems using block diagrams and signal flow graphs.					
Unit II	Time Domain Analysis of the System				9
Standard test signals - Time response analysis of first and second order systems – Time domain specifications – Steady State Error . PID control algorithms. Suggested Activities: Problem-solving activity on time-domain specifications, steady-state error, and selection of suitable PID controller actions for different control applications.					
Unit III	Frequency Domain Analysis of the System				9
Frequency domain analysis -specifications - Correlation between time domain and frequency domain – Open loop frequency response: Bode Plot - Polar Plot. Design of Lag compensator, Lead compensator and Lag - Lead Compensator using Bode plot. Suggested Activities: Group activity on interpreting Bode and polar plots and selecting suitable lead, lag, and lead-lag compensators for given system requirements.					
Unit IV	Stability analysis of the System				9
Stability Analysis and Root Locus: Routh Hurwitz Criteria - Root Locus: concepts and construction rules - Effect of addition of poles and Zeros – Analysis of system using Root Locus. Suggested Activities: Case-based problem-solving activity on determining system stability using Routh-Hurwitz criterion and analyzing system behaviour using root-locus techniques.					
Unit V	State Space Analysis of the System				9
State Space model Representation – State space from transfer function: Phase variable, Canonical variable – Block diagram representation of state space model – Solution of state equations – controllability, observability and stability analysis of the system. Suggested Activities: Group activity on state-space modelling, with students analyzing controllability, observability, and stability for practical control-system applications					
TOTAL (Theory) : 45 PERIODS					
List of Experiments:					
1. Mathematical modeling and simulation of physical systems 2. System identification using process reaction curve 3. Stability analysis using pole-zero maps and Routh-Hurwitz criterion 4. Root locus based analysis 5. Transfer function determination using frequency response and Bode asymptotes 6. Lag and lead compensator design 7. PID controller design 8. Controllability and observability					
TOTAL (Lab.): 30 PERIODS					
TOTAL : 45+30 = 75 PERIODS					
Weightage: Continuous Assessment: 50% and Semester Examinations: 50%.					
Assessment Methodology: Assignments (20%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).					

Text Book:

1. Nise, N. S. (2020). Control systems engineering (8th ed.). John Wiley.
2. Nagrath, I. J., & Gopal, M. (2016). Control systems engineering (5th ed., Reprint). New Age International Publishers.

References:

1. Dorf, R. C., & Bishop, R. H. (2022). Modern control systems (14th ed.). Pearson.
2. Ogata, K. (2010). Modern control engineering (5th ed.). Prentice Hall Private Limited.
3. Kuo, B. C., & Golnaraghi, F. (2017). Automatic control systems (10th ed.). McGraw Hill Education.
4. Gopal, M., Control Systems: Principles and Design, McGraw-Hill Education.
5. DiStefano, J. J., Stubbleud, A. R., & Williams, I. J., Schaum's Outline of Feedback and Control Systems, McGraw-Hill Education

E-resources:

1. NPTEL course: Control Engineering - Dr. Ramkrishna Pasumarthu, Professor, IITM.
<https://archive.nptel.ac.in/courses/108/106/108106098/>
2. <https://www.nptel.ac.in/courses/108101037>
3. Virtual Lab: Control Engineering. Link: <https://ce-dei.vlabs.ac.in/>

CO	CO Description	PO	PSO
CO1	Model physical systems using transfer function and block diagram representations	PO1(3), PO2(3), PO4(2), PO5(2)	PSO1(3), PSO2(2)
CO2	Analyze simple systems in time domain and stability of the given system.	PO1(3), PO2(3), PO4(3)	PSO1(3)
CO3	Analyze the stability of the given system in frequency domain.	PO1(3), PO2(3), PO4(3), PO5(2)	PSO1(3), PSO2(2)
CO4	Compute the state space analysis of the given system	PO1(3), PO2(3), PO4(2), PO5(3)	PSO1(3), PSO2(3)
CO5	Design controllers and compensator using classical methods to meet desired specifications	PO1(3), PO2(3), PO3(3), PO4(3), PO5(3)	PSO1(3), PSO2(3)

(1) = Low; (2) = Medium; (3) = High



26EE405	Digital Logic Circuits	L	T	P	C
		3	0	2	4
Course Objectives: - To understand number systems, Boolean algebra and basic logic gates. - To analyze and design combinational and sequential digital circuits. - To understand memory devices, programmable logic devices and basic Verilog HDL.					
Unit I	Digital Fundamentals				9
Number systems – Binary, Octal, Decimal and Hexadecimal – Number conversion – 1's and 2's complements – BCD, Excess-3 and Gray codes – Boolean algebra and theorems – Logic gates – Universal gates – SOP and POS forms – Karnaugh map simplification. Suggested Activities: Number-system conversion and K-map simplification exercises.					
Unit II	Combinational Logic Design				9
Half and full adders – Half and full subtractors – Parallel adder – BCD adder – Multiplexer – Demultiplexer – Encoder – Decoder – Priority encoder – Magnitude comparator. Suggested Activities: Design challenge using adders, multiplexers, decoders and comparators for simple digital applications.					
Unit III	Sequential logic Circuits				9
Flip-flops – SR, JK, D and T flip-flops – Excitation tables – Triggering – Registers – Shift registers – Counters – Ripple and synchronous counters – Up/down counters – Ring and Johnson counters – Basic Moore and Mealy models. Suggested Activities: Design and analyze simple counter and shift-register circuits.					
Unit IV	Memory and Programmable Logic				9
RAM and ROM – PROM – EPROM – EEPROM – Programmable Logic Devices – PLA – PAL – CPLD – FPGA – Implementation of simple logic functions using PLDs – TTL and CMOS logic families – Introduction to asynchronous circuits and hazards. Suggested Activities: Compare memory devices, PLDs and FPGA applications.					
Unit V	Verilog HDL and Digital Circuit Design				9
Introduction to Verilog HDL – Module structure – Data types and operators – Dataflow and behavioral descriptions – Logic gates – Half and full adders – Multiplexers – Decoders and encoders – Latches and flip-flops. Suggested Activities: Develop simple Verilog programs for gates, adders, multiplexers and flip-flops.					
TOTAL (Theory) : 45 PERIODS					
List of Experiments: - Verify basic and universal gates and implement simplified SOP/POS Boolean expressions - Design and verify half/full adders, subtractors, multiplexer, decoder and encoder circuits. - Design and verify flip-flops, counters and shift-register circuits - Implement simple logic functions using PLA/PAL/FPGA simulation. - Study about basic digital circuits using Verilog HDL.					
TOTAL (Lab.): 30 PERIODS					
TOTAL : 45+30 = 75 PERIODS					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%.					
Assessment Methodology: Assignments (10%), Quiz (10%), Competitive Examinations (10%), Flipped Class (10%), Practical (20%), Internal Examinations (40%).					



Text Book:

1. Mano, M. M. (2016). Digital logic and computer design (1st ed.). Pearson India.
2. Floyd, T. L. (2025). Digital fundamentals (11th ed.). Pearson Education.

References:

1. Roth, C. H., Jr., & Kinney, L. L. (2014). Fundamentals of logic design (7th ed.). Cengage Learning.
2. Wakerly, J. F. (2021). Digital design: Principles and practices (5th ed.). Pearson Education.
3. Leach, D. P., Malvino, A. P., & Saha, G. (2017). Digital principles and applications (7th ed.). McGraw-Hill Education.
4. Tocci, R. J., Widmer, N. S., & Moss, G. L., *Digital Systems: Principles and Applications*, 12th Edition, Pearson Education, 2017.
5. Brown, S., & Vranesic, Z., *Fundamentals of Digital Logic with VHDL Design*, 3rd Edition, McGraw-Hill Education.

E-resources:

1. <https://archive.nptel.ac.in/courses/108/105/108105132/>
2. <https://archive.nptel.ac.in/courses/117/106/117106086/>
3. <https://nptel.ac.in/courses/117106086>

CO	CO Description	PO	PSO
CO1	Explain number systems, binary codes, and Boolean algebra and logic gate operations.	PO1(3)	PSO1(3)
CO2	Analyze and design combinational logic circuits using Boolean simplification and MSI devices.	PO1(3), PO2(3), PO3(3)	PSO1(3)
CO3	Analyze and design synchronous sequential circuits using flip-flops, registers and counters.	PO1(3), PO2(3), PO3(3)	PSO1(3)
CO4	Explain memory devices and programmable logic devices and analyze their applications in digital systems.	PO1(3), PO2(3), PO3(2)	PSO1(3), PSO2(2)
CO5	Design and implement digital circuits using Verilog HDL.	PO1(3), PO2(3), PO3(3), PO5(3)	PSO1(3), PSO2(3)

(1) = Low; (2) = Medium; (3) = High



26EE406	Electrical Machines Laboratory - II	L	T	P	C
		0	0	4	2
Course Objectives: To provide hands-on experience in the operation, testing and performance evaluation of synchronous machines, three-phase induction motors and single-phase induction motors.					
List of experiments: - Regulation of three-phase alternator by EMF and MMF methods - Regulation of three-phase alternator by ZPF and ASA methods - Measurement of negative-sequence and zero-sequence impedance of alternators - V and inverted-V curves of three-phase synchronous motor - Load test on three-phase induction motor - No-load and blocked-rotor tests on three-phase induction motor – determination of equivalent circuit parameters - Separation of no-load losses of three-phase induction motor - Load test on single-phase induction motor - No-load and blocked-rotor tests on single-phase induction motor - Study of induction motor starters					
TOTAL : 60 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					

CO	CO Description	PO	PSO
CO1	Determine the voltage regulation of three-phase Alternators using EMF, MMF, ZPF and ASA methods.	PO1(3), PO2(3), PO4(3)	PSO1(3)
CO2	Analyze the V and inverted-V characteristics of three-phase synchronous motors under different excitation Conditions.	PO1(3), PO2(3), PO4(3)	PSO1(3)
CO3	Conduct standard tests on alternators and determine Their performance parameters using analytical and graphical methods.	PO1(3), PO2(3), PO4(3), PO5(2)	PSO1(3)
CO4	Conduct standard tests on single-phase and three-Phase induction motors and determine their performance characteristics.	PO1(3), PO2(3), PO4(3), PO5(2)	PSO1(3)
CO5	Determine and analyze the losses of induction motors and study suitable starting methods for practical Applications.	PO1(3), PO2(3), PO3(2), PO4(3), PO5(2)	PSO1(3), PSO2(2)

(1) = Low; (2) = Medium; (3) = High



26SDC02	Professional and Corporate Communication Skills	L	T	P	C
		0	0	2	1
Course Objectives: - To develop effective verbal and professional communication skills. - To enhance grammar, vocabulary, reading and listening abilities. - To demonstrate effective speaking, presentation and group discussion skills. - To prepare students for corporate communication and workplace interactions. - To develop professional skills required for interviews, placements and corporate environments.					
List of Activities: - Professional Communication Fundamentals and Workplace Etiquette - Verbal Ability, Grammar and Vocabulary Enhancement - Reading Comprehension and Critical Verbal Reasoning - Listening Skills and Effective Workplace Conversations - Professional Speaking, Pronunciation and Presentation Skills - Group Discussion, Team Communication and Negotiation Skills - Corporate Email, Business Writing and Digital Communication - Resume Writing, Self-Introduction and Personal Branding - Interview Skills, Corporate Etiquette and Workplace Interaction - Mock Corporate Communication, Presentation and Placement Simulation					
TOTAL : 30 PERIODS					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.					
Assessment Methodology: Observation and Record (20%), Practical (30%), Internal Examinations (50%)					
References: - Meenakshi Raman & Sangeeta Sharma – Technical Communication: Principles and Practice, Oxford University Press. M. Ashraf Rizvi – Effective Technical Communication, McGraw Hill. - Rajendra Pal & H. S. Korlahalli – Essentials of Business Communication, Sultan Chand. Norman Lewis – Word Power Made Easy, Penguin. - John Seely – The Oxford Guide to Writing and Speaking, Oxford University Press. - Michael Swan – Practical English Usage, Oxford University Press.					
E-resources: https://nptel.ac.in/courses/112107291					

CO	CO Description	PO	PSO
CO1	Apply verbal and professional communication techniques in workplace situations.	PO10(3), PO11(2)	PSO3(2)
CO2	Demonstrate effective reading, listening, speaking and presentation skills.	PO9(2), PO10(3)	PSO3(2)
CO3	Construct professional emails, business documents and other forms of corporate communication.	PO10(3), PO11(2)	PSO3(2)
CO4	Demonstrate effective participation in group discussions, interviews and professional interactions.	PO9(3), PO10(3)	PSO3(3)
CO5	Develop professional communication profiles through resume preparation, personal branding and placement-oriented activities.	PO9(2), PO10(3), PO11(3)	PSO3(3)

(1) = Low; (2) = Medium; (3) = High



MANDATORY COURSES

26MCC01	Disaster Management and Safety Awareness	L	T	P	C
		1	0	0	-
Course Objectives: To provide students with fundamental knowledge of natural and man-made disasters, disaster preparedness, risk reduction, emergency response, industrial safety and personal/community safety, enabling them to respond effectively during emergency situations					
Unit I	Fundamentals of Disaster Management				3
Disaster, hazard, vulnerability and risk; types of disasters; disaster management cycle; prevention, mitigation, preparedness, response and recovery; disaster risk reduction and early warning systems.					
Unit II	Natural Disasters				3
Earthquakes, tsunamis, floods, landslides, cyclones, thunderstorms, droughts and heat waves; causes and impacts; preparedness, mitigation, evacuation and emergency response.					
Unit III	Industrial and Man-Made Disasters				3
Industrial hazards and accidents; fire and explosion; chemical leakage; electrical and machinery hazards; biological and transportation disasters; personal protective equipment; hazard identification and risk assessment.					
Unit IV	Emergency Response and First Aid				3
Emergency action and evacuation plans; fire prevention and fire extinguishers; basic first aid; bleeding, burns, fractures, electric shock and heat-related emergencies; basic CPR awareness; emergency communication and rescue procedures.					
Unit V	Safety and Community Resilience				3
Occupational, laboratory, workshop, road and electrical safety; disaster recovery and rehabilitation; community resilience; role of government agencies, NGOs and volunteers; disaster risk mapping, safety audit, emergency drills and institutional disaster management planning.					
TOTAL : 15 PERIODS					
Text Books: 1. R. B. Singh, Disaster Management, Rawat Publications, Jaipur, 2015 2. S. K. Singh, Disaster Management, A.K. Publications, New Delhi, 2017.					
References: 1. M. M. S. Maheshwari, Disaster Management, Pointer Publishers, Jaipur, 2011. 2. B. K. Khanna, All You Wanted to Know About Disasters, New India Publishing Agency, New Delhi, 2005. 3. National Disaster Management Authority (NDMA), National Disaster Management Guidelines, Government of India. 4. Ministry of Home Affairs, National Disaster Management Plan, Government of India. 5. S. K. Sharma, Disaster Management and Preparedness, CBS Publishers & Distributors, New Delhi.					

CO	CO Description	PO	PSO
CO1	Explain the concepts, types and phases of disaster management.	PO9(2), PO11(2)	PSO3(3)
CO2	Identify disaster hazards, vulnerabilities and associated risks.	PO7(3), PO9(2)	PSO3(3)
CO3	Apply appropriate preparedness and mitigation measures for different disasters.	PO9(2), PO11(2)	PSO3(3)
CO4	Demonstrate basic emergency response, first aid, fire safety and evacuation procedures.	PO9(3), PO10(2)	PSO3(3)
CO5	Develop awareness of industrial, occupational, environmental and community safety practices	PO9(3), PO11(3)	PSO3(3)

(1) = Low; (2) = Medium; (3) = High



26MCC02	Gender Sensitization and Inclusive Society	L	T	P	C
		1	0	0	-
Course Objectives: - To create awareness about gender equality, equity, diversity and social inclusion. - To understand gender roles, stereotypes, discrimination and constitutional values. - To familiarize students with gender-based violence, safety measures and relevant legal provisions. - To promote respectful behaviour, empathy and equal opportunities in educational and professional environments.					
Unit I	Gender Concepts and Social Awareness				3
Gender, sex and gender identity; gender roles and stereotypes; gender equality and equity; socialization and discrimination; importance of gender sensitivity.					
Unit II	Gender and Constitutional Values				3
Fundamental rights and duties; equality and non-discrimination; constitutional provisions for gender equality; dignity, freedom and social justice; relevant laws for protection against discrimination and harassment.					
Unit III	Gender-Based Violence and Safety				3
Types of gender-based violence; domestic violence, sexual harassment and cyber harassment; prevention and reporting mechanisms; workplace and institutional safety; role of Internal Complaints Committee (ICC).					
Unit IV	Inclusive Education and Workplace				3
Inclusive education; equal opportunities; diversity and inclusion; accessibility; respectful communication; prevention of bias and discrimination in educational institutions and workplaces.					
Unit V	Building an Inclusive Society				3
Role of students and professionals in promoting equality; empathy and responsible behaviour; gender-sensitive leadership; community awareness; case studies, group discussions and awareness activities.					
TOTAL : 15 PERIODS					
Text Books: A. S. Altekar, The Position of Women in Hindu Civilization, Motilal Banarsidass, New Delhi. B. R. Ambedkar, Annihilation of Caste, Navayana Publishing.					
References: - United Nations, Gender Equality and Women’s Empowerment, UN Publications. - Government of India, The Sexual Harassment of Women at Workplace Act, 2013. - National Commission for Women, Handbook on Sexual Harassment of Women at Workplace, Government of India. - UGC, Policy on Prevention, Prohibition and Redressal of Sexual Harassment of Women Employees. - UNESCO, Gender Equality and Education, UNESCO Publications.					

CO	CO Description	PO	PSO
CO1	Explain the concepts of gender, gender equality, equity and social inclusion.	PO9(2), PO11(2)	PSO3(3)
CO2	Identify gender stereotypes, discrimination and inequalities in society.	PO7(3), PO9(2)	PSO3(3)
CO3	Understand constitutional provisions and legal mechanisms related to gender equality and safety.	PO9(2), PO11(2)	PSO3(3)
CO4	Demonstrate respectful and inclusive behaviour in academic and workplace environments.	PO9(3), PO10(2)	PSO3(3)
CO5	Promote gender-sensitive practices and contribute to building an equitable and inclusive society.	PO9(3), PO11(3)	PSO3(3)

(1) = Low; (2) = Medium; (3) = High



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