



COURSE CONTENT

ELEMENTS OF ELECTRICAL AND ELECTROINCS ENGINEERING

II Semester: CE/Mech

Course Code	Category	Hours/Week			Credit s	Maximum Marks		
2520202	Foundation	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:45			
Prerequisites: Mathematics.								

Course Overview:

This course introduces elements of electrical and electronics engineering concepts, including DC/AC circuits, electrical machines, installations, semiconductor devices, and digital logic. It builds fundamental analytical and practical skills required for electrical and electronics applications.

Course Objectives:

1. To understand the basics of electrical circuits and perform AC/DC waveform analysis.
2. To study the principles and performance of electrical machines.
3. To gain knowledge of electrical installations and LT switchgear components.
4. To learn the operation and characteristics of semiconductor devices and rectifier circuits.
5. To understand and compare different transistor types and configurations for electronic circuit applications.

Course Outcomes: After Completion of the Course, Students should be able to

1. Apply basic laws and network theorems for DC and AC circuits.
2. Analyze the working principles, performance characteristics of transformers, DC and induction machines.
3. Identify electrical installation components, compute energy consumption and power factor improvement.
4. Explain the features, functions of diodes, rectifiers and filter circuits.
5. Understand working principles and biasing techniques of BJTs, FETs.

UNIT - I: ELECTRICAL CIRCUITS

DC Circuits: Basic Circuit elements, Classification, Ohm's Law, KVL & KCL, Series, Parallel, Star-Delta Connections, Mesh and Nodal Analysis (Simple Problems).

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - II: ELECTRICAL MACHINES

Transformers: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency.

DC Machines: Construction and working principle of DC generators, EMF equation, Working Principle of DC motor, Torque Equation, Speed Control methods of DC Motors.

UNIT - III: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

Batteries: Types of Batteries, Important Characteristics for Batteries. Elementary calculations for



energy consumption, power factor improvement and battery backup.

UNIT - IV: DIODES & TRANSISTORS

Diodes: Classification of solids based on energy band theory- Intrinsic Semi Conductors- Extrinsic Semiconductors- P-type and N-type- PN junction- Zener effect- Zener diode characteristics- Half wave and full wave rectifiers.

Bipolar Junction Transistor (BJT): CB, CE, CC configuration and characteristics- Biasing circuits – Class A, B and C amplifiers.

UNIT - V: DIGITAL LOGIC DESIGN

Binary number system, Boolean algebra, Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive OR and NOR gates, Flip flops, half and full adders, Registers, Counters, A/D and D/A conversion.

TEXT BOOKS:

1. "Basic Electrical and electronics Engineering", M S Sukija and TK Nagasarkar, Oxford University, 1st Edition, 2012
2. "Basic Electrical and electronics Engineering", D P Kothari and I J Nagarath, McGraw Hill Education, 2nd Edition, 2020

REFERENCE BOOKS:

1. "Electronic Devices and Circuits", R. L. Boylestad and Louis Nashelsky, PEI and PHI, 9th Edition, 2006.
2. "Millman's Electronic Devices and Circuits", J. Millman, C. C. Halkias and Satyabrata Jit, TMH, 2nd Edition, 1998.
3. "Engineering Circuit Analysis", William Hayt and Jack E. Kemmerly, McGraw Hill, 6th Edition, 1971.
3. "Linear circuit analysis", Raymond A. De Carlo and Pen, Min, Lin, Oxford University Press, 2nd edition, 2004.
4. "Network Theory", N. C. Jagan and C. Lakshminarayana, McGraw Hill, 2nd Edition, 2005.
5. "Network Theory", Sudhakar and Shyam Mohan Palli, Tata McGraw Hill, 2nd Edition, 2011.
6. "Fundamentals of Electrical Engineering", L. S. Bobrow, Oxford University Press, 12th edition, 2003.
7. "Electrical and Electronic Technology", E. Hughes, Pearson Education, 10th Edition, 2010.
8. "Electrical Engineering Fundamentals", V. D. Toro, Prentice Hall India, 2nd Edition, 1989.

ELECTRONIC RESOURCES:

1. <https://www.allaboutcircuits.com/textbook/>
2. <https://www.electricaltechnology.org/>
3. <https://www.electronics-tutorials.ws/>
4. <https://www.geeksforgeeks.org/digital-logic/>



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MATERIALS ON LINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper-I
8. Model question paper-II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)