

ELECTRICAL CIRCUIT ANALYSIS -I

Course Code	23EE3201	Year	I	Semester	II
Course Category	Professional Core	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	NIL
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the basic electrical elements and different fundamental laws, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.(L2)
CO2	Apply the basics of electrical engineering to solve various electrical and magnetic circuits.(L3)
CO3	Apply the concepts of electrical circuits to obtain various mathematical and graphical representations.(L3)
CO4	Analyze nodal and mesh networks, series and parallel magnetic circuits, resonance circuits, Network theorems, steady state response of different circuit topologies (with R, L and C components).(L4)
CO5	Submit a report on Electric Circuits, Magnetic circuits, Single phase circuits, Resonance, Locus diagrams, Network Theorems.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3												3	2
CO3	3												3	2
CO4		3											3	2
CO5				3					3	3			3	2

SYLLABUS		
Unit No.	Contents	Mapped CO
I	INTRODUCTION TO ELECTRICAL CIRCUITS Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources.	CO1, CO2, CO4, CO5
II	MAGNETIC CIRCUITS Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.	CO1, CO2, CO4, CO5

PVP23 Regulations

III	SINGLE PHASE CIRCUITS Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit.	CO1, CO3, CO4, CO5
IV	RESONANCE AND LOCUS DIAGRAMS Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.	CO1, CO3, CO4, CO5
V	NETWORK THEOREMS (DC & AC EXCITATIONS) Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem	CO1, CO4, CO5

Learning Resources	
Text Books:	
1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition. 2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition	
Reference Books:	
1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition 2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition. 3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition. 4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition. 5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.	
E-Resources:	
1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview 2. https://nptel.ac.in/courses/108104139 3. https://nptel.ac.in/courses/108106172 4. https://nptel.ac.in/courses/117106108	