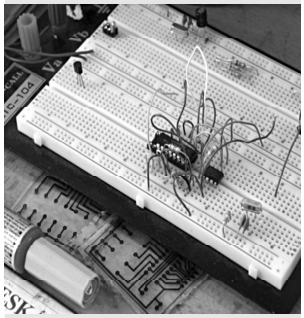
19EE202 ELECTRICAL CIRCUIT ANALYSIS



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Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	30	-	10	5	5

PREREQUISITE COURSE : Basic Electrical and Electronics Engineering.

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the analysis of DC and AC circuits using methods like mesh, node and network theorems. It also introduces the concepts of Electrical Resonance, two port networks and coupled circuits. The objective of this course is to introduce the properties of network elements and methods of analysis for various electrical circuits and magnetic coupled circuits.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Formulate equations based on physical laws and analyze the steady state behaviour of complex electric networks.	1, 2
2	Solve complex electrical networks by applying fundamental network theorems.	1, 2
3	Illustrate series and parallel resonant circuits.	1, 2
4	Synthesize two port networks.	2
5	Apply mathematical and analytical techniques to observe the transient behaviour of networks and verify using electrical simulation tools.	1, 2, 5, 9

SKILLS:

- ***ü*** *Determine currents and voltages of all elements in any electrical network.*
- ***ü*** *Analyze simple house wiring diagram.*
- ***ü*** *Calculate power, current and voltage in any three phase circuit.*
- ***ü*** *Select suitable fuse for over current protection.*
- ***ü*** *Analyze transient behaviour of various electrical networks.*

UNIT- I **L - 9**

CIRCUIT ANALYSIS: Analysis of DC and AC circuits by Mesh and Nodal Analysis, Super mesh and super node analysis, Concept of capacitance, Effects and Energy storage.

UNIT- II **L - 9**

NETWORK THEOREMS: Superposition, Thevenin's, Norton's, Reciprocity, Compensation, Maximum Power transfer and Millman's theorems for both DC and AC circuits.

UNIT- III **L - 9**

RESONANCE: Series and Parallel Resonance, Different combinations, Quality factor, Bandwidth, Selectivity of different circuits.

THREE PHASE SYSTEMS: Three phase voltage generation, Wye and Delta connections, Relationships between line and phase quantities, Balanced and unbalanced systems, Measurement of Power in three phase circuits.

UNIT- IV **L - 9**

TWO PORT NETWORKS: Open circuit (impedance), Short circuit (admittance), Transmission (ABCD) and Inverse Transmission, Hybrid and Inverse hybrid parameters, Inter relation between them, Inter connection of 2-port networks.

COUPLED CIRCUITS: Concept of mutual coupling, Calculation of equivalent inductance in complex coupled circuit, Coupled impedance.

UNIT-V **L - 9**

TRANSIENTS: Response of simple RL, R-C and R-L-C series and parallel circuits subjected to DC, Impulse, Pulse and Sinusoidal excitations using Laplace transforms method.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

1. Verification of ohm's law, KVL and KCL using MATLAB.
2. Determination of mutual inductance for 2 or 3 inductive coils connected in series and parallel.
3. Verification of source transformation technique.
4. Determination of Average and R.M.S. Values of various waveforms using MATLAB.
5. Determination of impedance in complex AC circuits using MATLAB.
6. Measurement of Active and Reactive Power for Star/Delta connected balanced load.
7. Measurement of 3-phase Power by two Wattmeter Method for balanced and unbalanced load (Star/Delta).
8. Verification of Thevenin's, Norton's Theorem, Super-position and Maximum Power Transfer Theorem.
9. Determination of Z, Y, h and ABCD Parameters in a Two-Port network.
10. Determination of Time-Response in simple series RL and RC network using MATLAB.

TEXT BOOKS:

1. A. Chakrabarti, "Circuit Theory Analysis & Synthesis, 7th revised edition, Dhanpat Rai & Co., 2018.
2. W.H. Hayt, J.E.Kimmerly and Steven. M. Durbin, "Engineering Circuit Analysis", 8th edition, Tata Mc Graw Hill, 2013.

REFERENCE BOOKS:

1. Joseph Edminister and Mahmood Nahvi, "Electric Circuits", 5th edition, (Schaum's outline series) Tata Mc Graw Hill, 2017.
2. M.E. Van Valkenburg, "Network Analysis", 3rd edition, Prentice Hall of India, 2009.