JAWAHARLAL NEHR U TECHNOLOGICAL UNIVERSITY. ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS): PULIVENDULA
ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
	ELECTRICAL CIRCUITS - I	2	1	0	3

COURSE OBJECTIVES:

To make the student learn about:

1.	Basic characteristics of R,L,C parameters, their Voltage and Current Relations and Various combinations of these parameters.
2.	The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference.
3.	Series and parallel resonances, bandwidth, current locus diagrams.
4.	Network theorems and their applications.
5.	Network Topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree.

COURSE OUTCOMES:

After completing the course, the student should be able to do the following:

CO1	Understand the network reduction techniques, different basic laws, concepts related to magnetic circuits, network topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree.
CO2	Analyze the steady state performance of R,L and C in series and parallel combination.
CO3	Design and develop the LOCUS diagrams for R, L and C series and parallel combination.
CO4	Apply the network theorems suitably for electrical circuits.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2			2						
CO2	2	2	2			1						
CO3	1	2	2			1						
CO4	2	2	1			1						

The course outcomes of the course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

SYLLABUS:

UNIT- 1 INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage - Current Relationship for Passive Elements (For Different Input Signals-Square, Ramp, Saw Tooth, Triangular).

Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

UNIT OUTCOMES:

After completing the unit, the student should be able to do the following:

1. Able to understand the basic circuit elements for different input signals.
2. Analyze the network reduction techniques.
3. Apply different basic laws to solve the electric circuits.

UNIT- II SINGLE PHASE A.C CIRCUITS

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation- Phasor diagrams - Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

UNIT OUTCOMES:

After completing the unit, the student should be able to do the following:

1. Understand the average and rms values for different periodic waveforms.
2. Analyze the steady state performance of R,L,and C in series ,parallel &series-parallel system.
3. Understand the concept of p.f,reactance,impedance,susceptance,admittance.

UNIT- III LOCUS DIAGRAMS & RESONANCE

Series R-L, R-C, R-L-C and Parallel Combination with Variation of Various Parameters - Resonance-Series, Parallel Circuits, Frequency Response, Concept of Bandwidth and Q Factor.

UNIT OUTCOMES:

After completing the unit, the student should be able to do the following:

1. Unserstand and develop the locus diagrams for Series R-L, R-C, R-L-C and Parallel Combination.
2. Analyse the concept of resonance for series and parallel circuits.

UNIT- IV NETWORK THEOREMS

Superposition and Reciprocity Theorems, Thevenin's, Norton's, Maximum Power Transfer, Millman's Theorems, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.

UNIT OUTCOMES:

After completing the unit, the student should be able to do the following:

1. Understand the concept of different Theorems.
2. Apply the concept of theorems to different circuits to find the Thevenin's, voltage ,resistance..RMS power etc.

1 2 3 4 5

6 7 8 9 10

UNIT- V NETWORK TOPOLOGY

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis, Super Node and Super Mesh for D.C Excitations.

UNIT OUTCOMES:

After completing the unit, the student should be able to do the following:

1.Understand the concept of network topology.
2.Apply the tieset,cutest for different electrical circuits.
3.Apply the mesh & nodal analysis for D.C. excitations.

TEXT BOOKS:

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company.
2. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill.
3. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons

REFERENCE BOOKS:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Electrical Engineering Fundamentals by V. Del Toro, Prentice – Hall International.
3. Electric Circuits by N.Sreenivasulu, REEM Publications
4. Electric Circuits- Schuam Series
5. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis
6. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill