SCHEME OF COURSE WORK

Course Title	ELECTRICAL CIRCUIT ANALYSIS		
Course Code	22EE1101	L T P C	3 0 0 3
Program	B.Tech		
Branch	ELECTRICAL AND ELECTRONICSENGINEERING		
Semester	3		
Prerequisites	Physics		
Course to which it is prerequisite	All advanced courses in Electrical Engineering		

Course Outcomes (COs):

CO1: Analyze electrical circuits with DC excitation.
CO2: Analyze single phase and three phase AC circuits.
CO3: Define and Understand Network Theorems and apply them for solving electrical Circuits.
CO4: Analyze Two Port Networks and study frequency response of electrical circuits including resonance.
CO5: Evaluate transient behavior of electrical circuits using Differential equation approach and Laplace Transforms approach.

Program Outcomes (POs):

A graduate of Electronics and Communications Engineering will be able to

PO-1	Apply the knowledge of basic sciences and electrical and electronics engineering fundamentals to solve the problems of power systems and drives.
PO-2	Analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present Information and Communications Technology.
PO-3	Design and develop electrical machines and associated controls with due considerations to societal and environmental issues.
PO-4	Design and conduct experiments, analyze and interpret experimental data for performance analysis
PO-5	Apply appropriate simulation tools for modeling and evaluation of electrical systems.
PO-6	Apply the electrical engineering knowledge to assess the health and safety issues and their consequences.
PO-7	Demonstrate electrical engineering principles for creating solutions for sustainable development.
PO-8	Develop a techno ethical personality that help to serve the people in general and Electrical and Electronics Engineering in particular.
PO-9	Develop leadership skills and work effectively in a team to achieve project objectives.
PO-10	Communicate effectively in both verbal and written form.
PO-11	Understand the principles of management and finance to manage project in multi disciplinary environments.
PO-12	Pursue life-long learning as a means of enhancing the knowledge and skills.

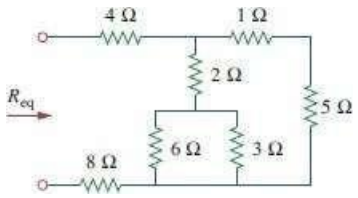
Course Outcome versus Program Outcomes:

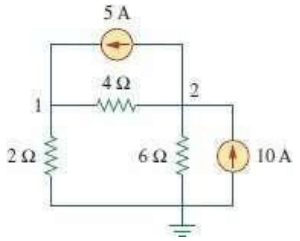
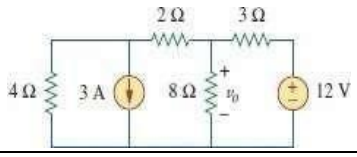
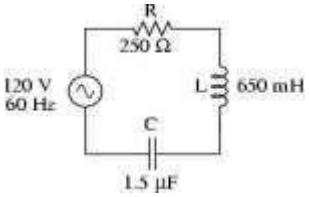
CO \ PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	3	3	3	3	-	3	-	-	-	-	2
CO-2	3	3	3	3	3	-	3	-	-	-	-	3
CO-3	3	3	3	3	3	-	3	-	-	-	-	3
CO-4	3	3	3	3	3	-	3	-	-	-	-	3
CO-5	3	3	3	3	2	-	3	-	-	-	-	2

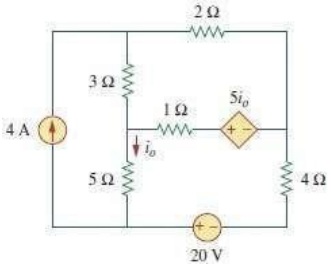
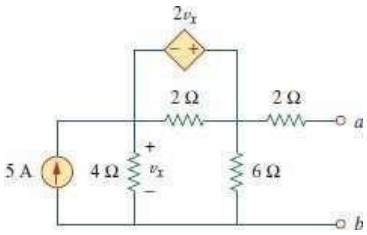
3 - Strongly correlated, 2 - Moderately correlated, 1- Weakly correlated, Blank - No correlation

Assessment Methods	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	Teaching-learning strategy	Assessment Method & Schedule
1.	Types of sources and their characteristics, Network elements, Voltage - Current Relationship for Passive Elements.	CO-1	a) Define charge, current, potential difference, EMF b) What are the types of dependent sources and how are they represented?	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
2.	Source Transformation, Network Reduction Techniques: Series, Parallel, Series Parallel, Star-to Delta or Delta-to-Star Transformation	CO-1	a) Find the equivalent resistance of the given network.  b) How much energy does a 100W electric bulb consume in 2 hours?	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
3.	Analysis with dependent current and voltage sources, Node and Mesh Analysis	CO-1	a) Calculate the node voltages of the given circuit.	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)

					
4.	Source Transformation, Problem re-solving on the covered topics	CO-1	a) Use source transformation to find v_o. 	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
5.	UNIT-II SINGLE PHASE AC CIRCUITS R.M.S, Average Values and Form Factor for Different Periodic Waveforms: Sinusoidal Alternating Quantities	CO-2	a) Determine RMS and Average value of Sinusoidal wave	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
6.	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, Concept of Power Factor	CO-2	**a)** Find the impedance and current in the following circuit. 	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz
7.	Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power and Complex Power	CO-2	a) Derive relation between phase and line voltage of 3 phase star connected load	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)

	Relation between Line and Phase Voltages and Currents, Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems				
8.	Real and Reactive Power and Complex Power Mutual coupled circuits, Dot convention in coupled circuits	CO-2	a) A series-connected load draws a current $i(t)$ = 4 cos(100pt+ 10) A when the applied voltage is $v(t)$ = 120 cos(100pi$t$+ 20) V. Find the apparent power and the power factor of the load. Determine the element values that form the series-connected load.	▪ Lecture ▪ Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7))
9.	Superposition Theorem, Reciprocity Theorem, Problems	CO-3	a) Find i_o using superpostition theorem 	▪ Lecture Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
10.	**MID TEST – 1**				
11.	Thevenin's and Norton's Theorems ,Maximum Power Transfer Theorem, Problems	CO-3	a) Determine the Thevenin's equivalent of the circuit at terminals a & b.. 	▪ Lecture Problem solving	Assignment (Week 5) Quiz (Week 6) Mid-Test 1 (Week 7)
12.	Concept of duality and dual networks.	CO-3	a. Explain the procedure for duality of the network.	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)

13.	Parallel Resonance (with constant current & Variable frequency excitation)	CO-4	a). Derive the formula for resonant frequency in a parallel R, L, C circuit.	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)
14.	Two Port Network Parameters: Impedance, Admittance, Transmission and Hybrid Parameters	CO-4	a) Obtain y parameters in terms of z parameters	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)
15.	Relations and Interconnection of two port networks.	CO-4	a) Explain the interconnection of 2 two-port network connected in series	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)
16.	D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms,	CO-5	a) Determine transient response of R-L Circuit using unit step signal	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13)

					Quiz-2 (Week 14) Mid-Test 2 (Week 15)
17.	Response of R-L & R-C Networks to Pulse Excitation	CO-5	a) Determine transient response of R-L-C Circuit using unit step signal.	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)
18.	A.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations- Initial Conditions- Solution Method Using Differential Equations and Laplace Transforms	CO-5	a) What is an initial value and final value theorems	▪ Lecture ▪ Problem solving	Assignment -2 (Week 13) Quiz-2 (Week 14) Mid-Test 2 (Week 15)
19.	**MID TEST – 2**				
20.	**SEMESTER END EXAM**				