Code: 23EE3201

I B.Tech - II Semester – Regular / Supplementary Examinations MAY 2025

ELECTRICAL CIRCUIT ANALYSIS-I
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
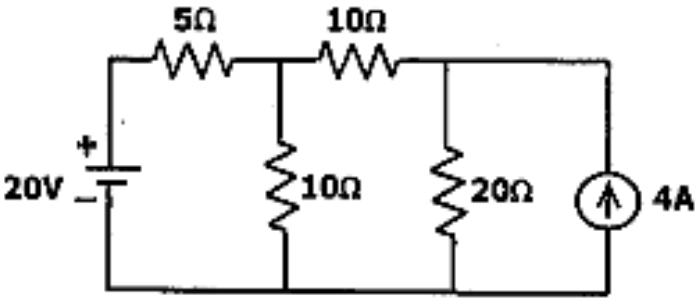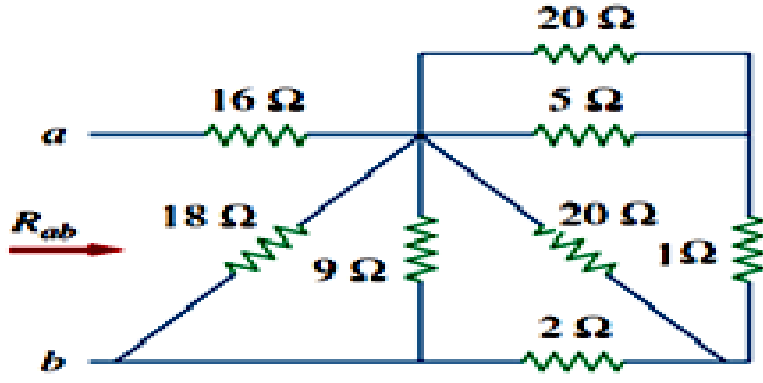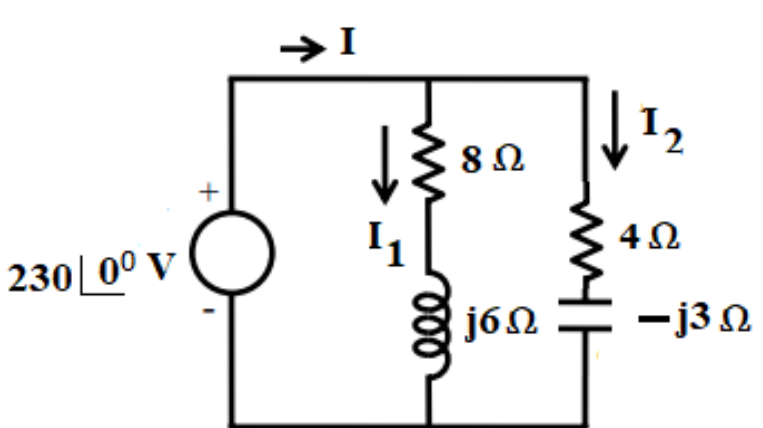4. All parts of Question paper must be answered in one place.

BL – Blooms Level   CO – Course Outcome

PART – A

		BL	CO
1.a)	Illustrate Kirchhoff's Voltage Law with an example.	L3	CO2
1.b)	An electric iron is rated 1000W, 240V. Find the current drawn & resistance of the heating element.	L3	CO2
1.c)	Define Magnetic flux and Flux density.	L2	CO1
1.d)	State Faraday's law of Electromagnetic Induction.	L3	CO2
1.e)	Define Peak Factor and Form Factor.	L2	CO1
1.f)	An alternating current is given by i=70.71 sin (100πt), find R.M.S value and Average value.	L4	CO4
1.g)	Define resonance?	L2	CO1
1.h)	Draw the current locus for Series RL circuit with varying Resistance R.	L3	CO3
1.i)	State Millman's Theorem.	L2	CO1
1.j)	Give the condition to transfer maximum power to load impedance.	L2	CO1

PART – B

			BL	CO	Max. Marks
		UNIT-I			
2	a)	Discuss in detail the classification of network elements.	L3	CO2	4 M
	b)	Find the value of current flowing through 20 Ohms resistor by using source transformation and network reduction techniques.	L4	CO4	6 M
		OR			
3	a)	Derive the equivalent DELTA expressions for given STAR.	L3	CO2	6 M
	b)	Find the equivalent resistance R_{ab} in the circuit given below.	L4	CO4	4 M
		UNIT-II			
4	a)	Give the differences between magnetic and electric circuits.	L3	CO2	5 M
	b)	An iron ring of mean circumference 30cm	L4	CO4	5 M

		with area of cross section of 1.5 cm^2 has 240 turns of wire wound uniformly on it through which a current of 2A Passes. The flux on iron is found to be 0.75mwb in the iron. Find the relative permeability of iron.			

		OR			
5	a)	Explain about dot convention in mutually coupled circuits.	L3	CO2	5 M
	b)	Derive the expression for equivalent inductance when the two coupled inductors are connected in Series aiding and series opposition.	L3	CO2	5 M

UNIT-III

6	a)	Interpret Average and RMS values.	L3	CO3	4 M
	b)	Calculate the form factor and peak factor for the following waveforms i) sinusoidal waveform ii) Full wave rectified sine wave.	L3	CO3	6 M

		OR			
7	a)	Find **I, I$_1$, I$_2$**, Total Active, Reactive and Apparent Powers of the circuit shown below 	L4	CO4	5 M
	b)	Interpret the steady state analysis of R-C series circuit and draw the phasor diagram.	L3	CO3	5 M

UNIT-IV

8	a)	Derive the equation for resonance frequency of a series RLC circuit. Also	L3	CO3	4 M

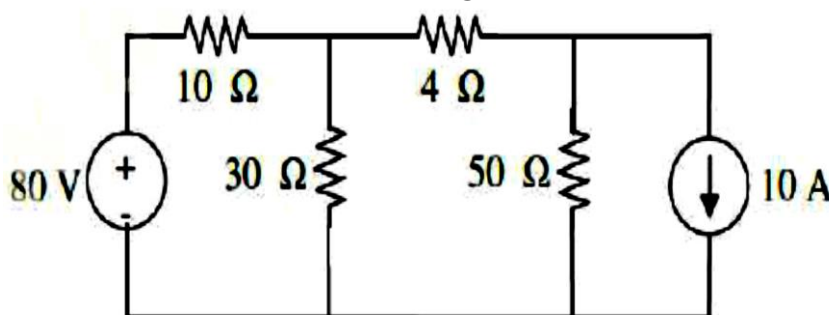|					
		obtain relation between bandwidth, resonant frequency and Q-factor.			
	b)	A series RLC circuit has R=10Ω, L=0.2H and C=40µF. The applied voltage is 100V. Find (i) Resonant frequency (ii) Quality factor of a coil (iii) Bandwidth (iv) Upper and Lower half power frequencies.	L4	CO4	6 M

<div align="center">OR</div>

9		Interpret the procedure to draw the locus diagram of R-C series circuit when C is varying.	L3	CO3	10 M

<div align="center">UNIT-V</div>

10	a)	State and explain Superposition theorem.	L2	CO1	4 M
	b)	Verify Superposition theorem for 4Ω resistor for the following circuit.	L4	CO4	6 M

<div align="center">OR</div>

11	a)	State and explain Thevenin's theorem.	L2	CO1	4 M
	b)	Find the Thevenin's equivalent circuit across A&B terminals. Also draw the Norton's equivalent circuit.	L4	CO4	6 M