PVP 23

Code: 23EE3201

I B.Tech - II Semester – Supplementary Examinations
DECEMBER 2025

ELECTRICAL CIRCUIT ANALYSIS-I
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

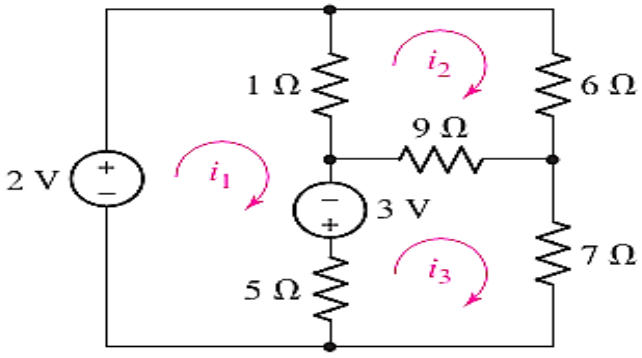
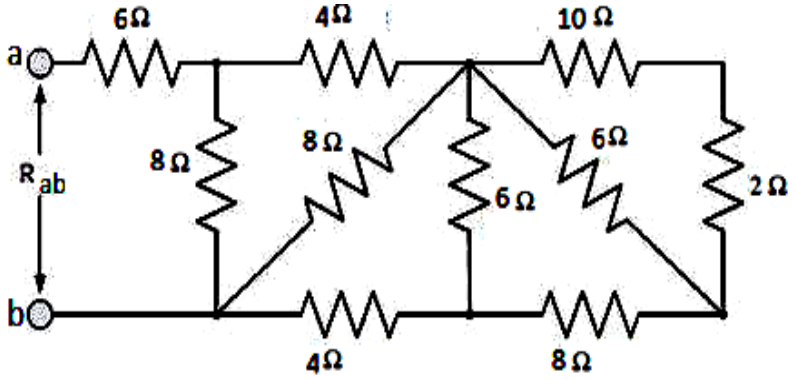
Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

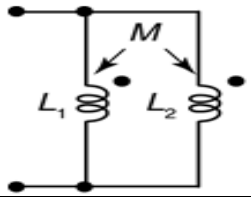
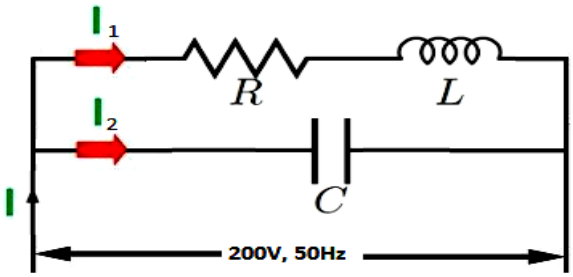
PART – A

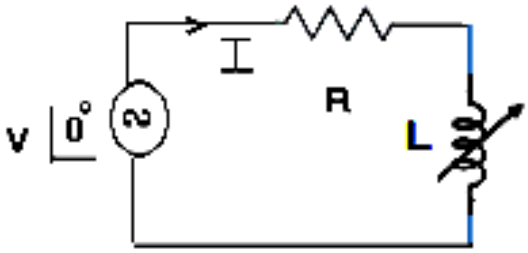
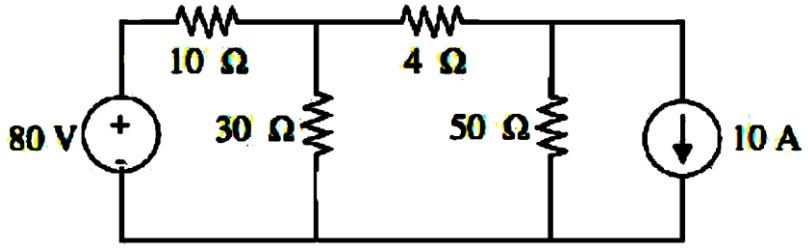
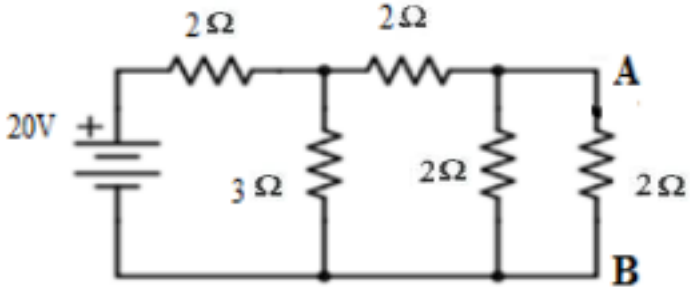
1.a)	Illustrate Kirchhoff's current Law with an example.
1.b)	An electric iron is rated 1500W, 230V. Find the current drawn & resistance of the heating element.
1.c)	Define MMF and reluctance.
1.d)	State Faraday's law of Electromagnetic Induction.
1.e)	Define Average and RMS values.
1.f)	An Alternating current is given by $i=28.28\sin(100\pi t)$, find R.M.S value and Average value.
1.g)	Define resonance.
1.h)	Draw the current locus for Series RC circuit with varying Resistance.
1.i)	State millman's theorem.
1.j)	State compensation theorem.

PART – B

			Max. Marks
UNIT-I			
2	a)	Explain in detail about the active elements and passive elements with examples.	5 M
	b)	Derive the equivalent STAR expressions for given DELTA network.	5 M

		OR	
3	a)	Determine the three mesh currents as labeled in the circuit diagram shown below. 	6 M
	b)	Find the equivalent resistance R_{ab} in the circuit given below? 	4 M
		UNIT-II	
4	a)	Derive the expression for the equivalent inductance, when the two mutually coupled inductors are connected in series aiding and series opposition.	5 M
	b)	An iron ring of mean circumference 150 cm with area of cross section of 5 cm^2 is wound uniformly with 200 turns of wire. Find the current required to produce a flux of 0.3 mwb in the iron. Assume the relative permeability of iron is 400.	5 M
		OR	
5	a)	Explain about dot convention in mutually coupled circuits	5 M

	b)	Determine the total inductance, if L_1=50 mH, L_2=200 mH and M=100 mH. 	5 M
UNIT-III			
6	a)	Define Form Factor and crest Factor.	4 M
	b)	Find the form factor and crest factor for the following waveforms i) sinusoidal waveform ii) Half wave rectified sine wave.	6 M
OR			
7	a)	Explain the steady state analysis of R-L series circuit and draw the phasor diagram.	4 M
	b)	A series circuit having pure resistance of 50 ohms and an inductance of 0.02 H is connected in parallel with a capacitor of 25 µF across a 200 V, 50 Hz ac supply as shown in figure below. Calculate the currents **I, I_1, I_2**, total p.f and total power consumed by the circuit. 	6 M
UNIT-IV			
8	a)	Derive the equation for resonance frequency of a parallel RLC circuit and bandwidth for a parallel RLC circuit as a function of resonant frequency	5 M
	b)	A series RLC circuit has R=10 Ω, L=0.5 H and C=40 µF. The applied voltage is 100 V. Find (i) Resonant frequency & Quality factor of a coil (ii) Bandwidth (iii) Upper and Lower half power frequencies.	5 M

		OR	
9		Explain the procedure to draw the locus diagram of R-L series circuit when L is varying. 	10 M
		UNIT-V	
10	a)	State and explain Superposition theorem.	5 M
	b)	Verify Superposition theorem for 4 Ω resistor for the following circuit. 	5 M
		OR	
11	a)	State and explain Maximum power transfer theorem.	4 M
	b)	Find the Thevenin's equivalent circuit across A&B terminals. Also draw the Norton's equivalent circuit. 	6 M