Hall Ticket Number:

Code No. : 11323 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

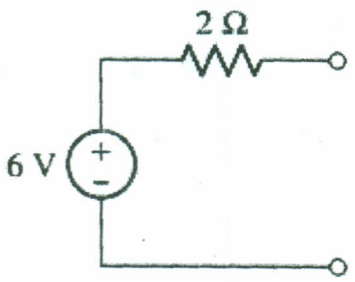
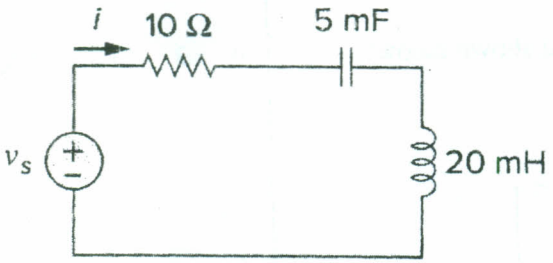
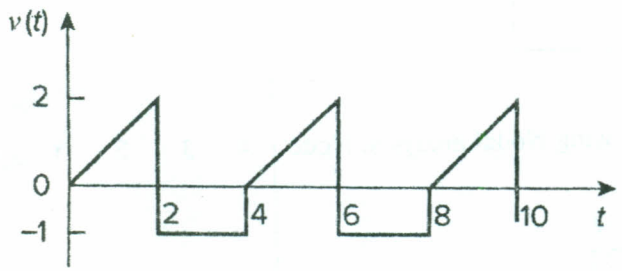
B.E. (E.E.E.) I-Semester Main & Backlog Examinations, Jan./Feb.-2024

Circuit Theory

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define KCL and KVL?	2	1	1	1,2,3,12
2.	Convert the practical voltage source shown below into practical current source? 	2	2	1	1,2,3,12
3.	Represent the network in phasor domain, where $v_s(t) = 115\cos(200t)$ Volts. 	2	2	2	1,2,3,12
4.	Evaluate average value of waveform shown below? 	2	3	2	1,2,3,12
5.	Draw the phasor diagram for the following, when excited by sinusoidal voltage waveform (i) Pure resistive circuit (ii) Pure inductive circuit (iii) Pure capacitive circuit	2	3	3	1,2,3,12
6.	Define power factor of an AC circuit?	2	1	3	1,2,3,12
7.	State Superposition theorem.	2	1	4	1,2,3,12

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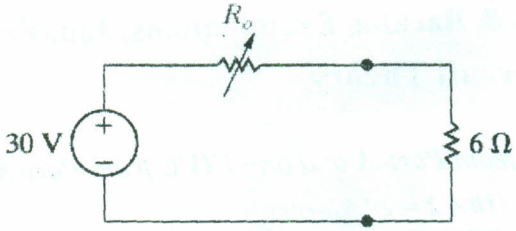
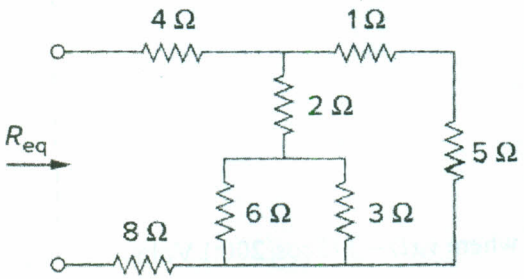
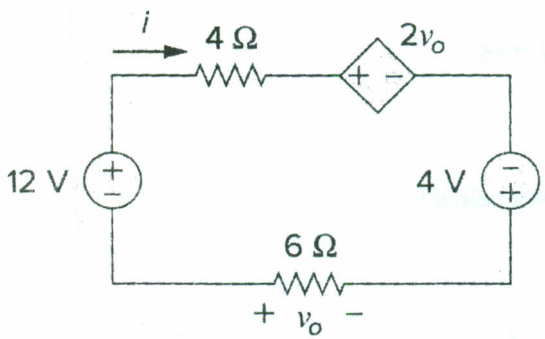
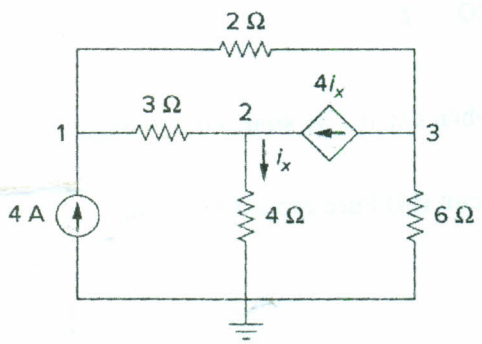
8.	Calculate the maximum power that can be delivered to the 6Ω resistor, assume source resistance as R_o? 	2	2	4	1,2,3,12
9.	Explain the advantages of three phase system?	2	1	5	1,2,3,12
10.	Write relation for the following in a delta connected three phase system? a) Line voltage and phase voltage b) Line current and phase current	2	2	5	1,2,3,12
	Part-B (5×8 = 40 Marks)				
11. a)	Evaluate equivalent resistance (R_{eq}) for the circuit shown below? 	4	2	1	1,2,3,12
b)	Compute the current 'i' and the value of 'v_o' in the circuit shown below? 	4	2	1	1,2,3,12
12. a)	Find the node voltages in the circuit shown below using Nodal analysis. Node numbers are assigned as 1, 2 and 3 in the circuit. 	4	3	2	1,2,3,12

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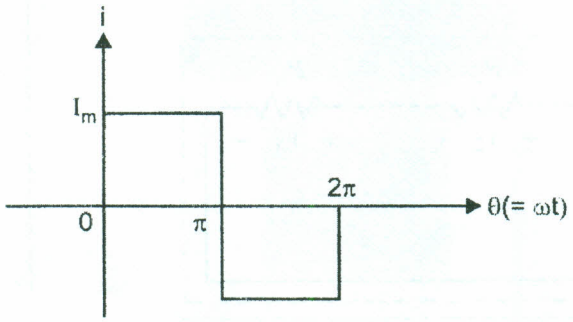
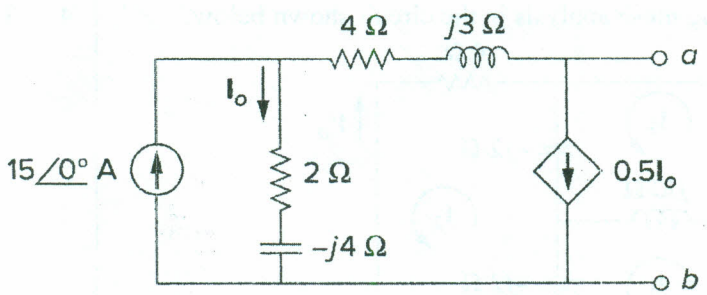
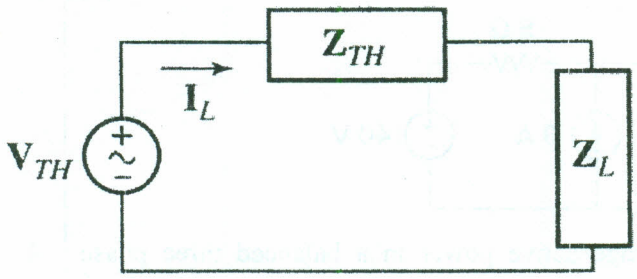
b)	Evaluate the following for the waveform shown below (a) Average value (b) RMS value (c) Form factor (d) Peak factor 	4	3	2	1,2,3,12
13. a)	Show that average power consumed by a pure inductive circuit is zero, when excited by sinusoidal voltage source.	4	2	3	1,2,3,12
b)	A series RLC circuit of resistance R, inductance L and a capacitance C, is excited by an AC voltage source $v = V_m\cos(wt)$. Write the expression for the following (a) Inductive reactance and capacitive reactance (b) Impedance of the circuit (c) Current through the circuit (d) Active power consumed by the circuit.	4	1	3	1,2,3,12
14. a)	Find Thevenin's equivalent of the circuit shown below across the terminals a-b? 	4	3	4	1,2,3,12
b)	Derive the condition to get maximum power transfer to the load, in an AC excitation circuit of source voltage V_{TH}, source impedance $Z_{TH} = R_{TH} + jX_{TH}$ and load impedance $Z_L = R_L + jX_L$. 	4	2	4	1,2,3,12
15. a)	With a neat diagram, explain the measurement of three phase power using two wattmeter method?	4	2	5	1,2,3,12
b)	A three-phase, balanced delta-connected load of (4 + j8) Ω is connected across a 415V, 50Hz, three-phase balanced power supply. Determine the phase currents and line currents. Assume phase sequence as RYB.	4	3	5	1,2,3,12

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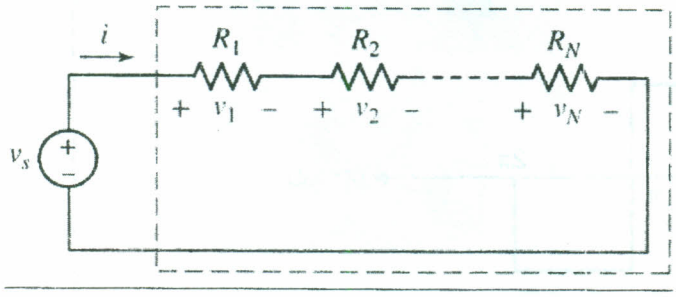
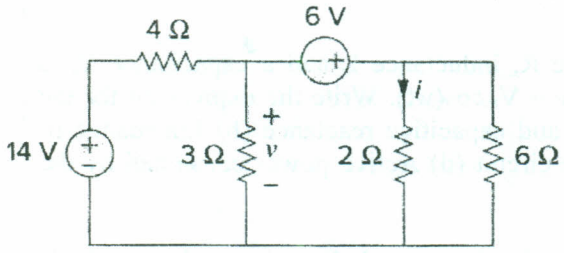
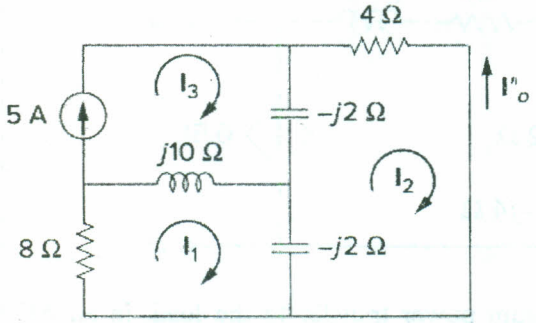
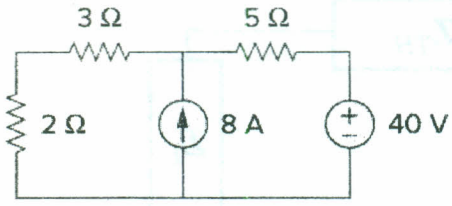
16. a)	Derive the expression for equivalent resistance of the circuit shown below, if 'N' number of resistors are connected in series across a voltage source *Vs*. Also derive the expression for voltage across N^{th} resistor? 	4	1	1	1,2,3,12
b)	Determine the voltage '*v*' and current '*i*' in the circuit shown below using Nodal analysis? 	4	3	2	1,2,3,12
17.	Answer any ***two*** of the following:				
a)	Evaluate I_1, I_2 , I_3 and I_o'' using mesh analysis in the circuit shown below? 	4	3	3	1,2,3,12
b)	Find current through 2Ω resistor in the circuit shown below using Superposition theorem? 	4	3	4	1,2,3,12
c)	Derive the expression for average active power in a balanced three phase system?	4	2	5	1,2,3,12

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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