Hall Ticket Number:

Code No. : 12035 (C)

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

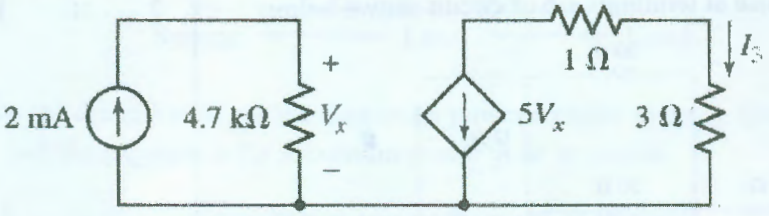
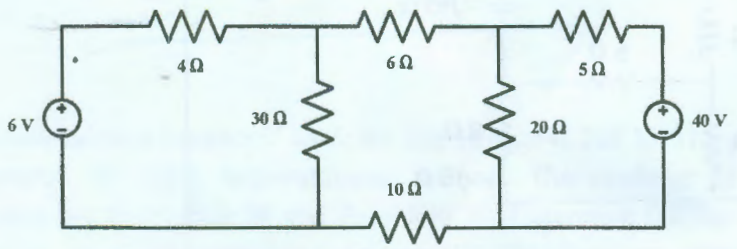
B.E. (E.E.E: CBCS) II-Semester Main Examinations, January-2021

Circuit Theory

Time: **2** hours Max. Marks: **60**

*Note: Answer any **NINE** questions from **Part-A** and any **THREE** from **Part-B***

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define the terms (a) Power (b) Energy	2	1	1	1
2.	Calculate the current labeled I_3 in the circuit shown below. 	2	2	1	2
3.	Compare the nodal analysis and the mesh analysis techniques for analyzing the networks.	2	4	1	1
4.	Define the average value and the effective value for a periodic waveform	2	1	1	1
5.	What is power factor of an ac circuit? List the methods to improve the power factor.	2	1	1	1
6.	A voltage $v(t) = 100 \cos(60t + 20°)$ V is applied to a parallel combination of a 40-kΩ resistor and a 50-μF capacitor. Calculate the steady-state currents through the resistor and the capacitor.	2	2	1	2
7.	Draw the Norton's equivalent circuit of a linear two-terminal bilateral network.	2	2	2	1
8.	State the Tellegen's theorem and write the significance of it.	2	1	2	1
9.	Give the necessary and sufficient conditions for the voltages in a three phase system to be balanced.	2	4	3	1
10.	The two wattmeter method produces wattmeter readings $P_1 = 1500$ W and $P_2 = 2100$ W, when connected to a delta-connected load. If the line voltage is 220 V (rms). Calculate the power factor.	2	2	3	2
11.	For the circuit shown below, calculate the power associated with 6V source and also specify whether the power is delivered or absorbed? 	2	2	4	2

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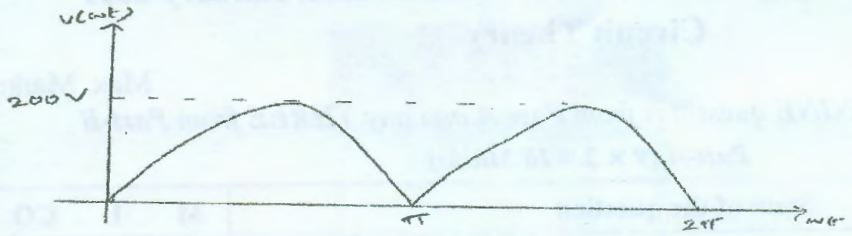
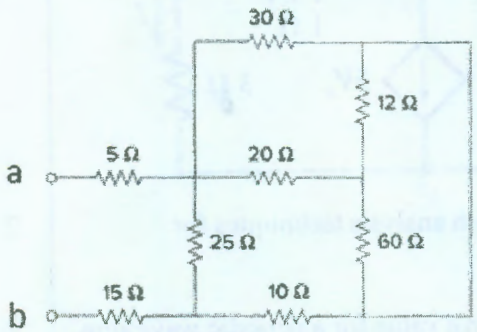
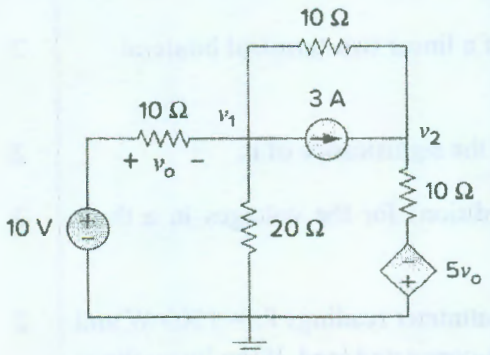
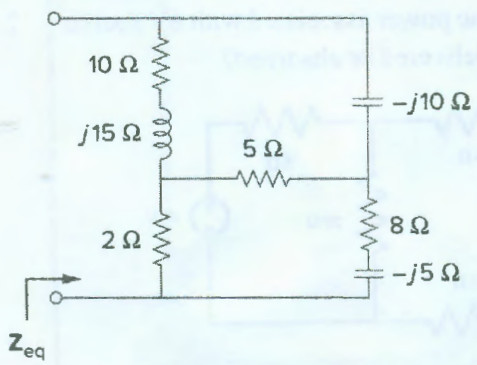
12.	Calculate the rms value of the full-wave rectified sine wave shown below. 	2	4	1	2
	Part-B (3 × 14 = 42 Marks)				
13. a)	Find the equivalent resistance at terminals a-b of circuit shown below. 	7	4	1	2
b)	Derive an expression for the energy stored in an inductor with suitable assumptions. Also write the properties of an inductor.	7	2	1	2
14. a)	Obtain the form factor of a half wave rectified output voltage with sine wave input voltage of $v = V_m \sin(wt)$.	7	2	1	2
b)	Determine V_1 and V_2 in the circuit shown below, by using mesh analysis. 	7	4	1	2
15. a)	Find the equivalent impedance of the circuit shown below 	7	4	1	2

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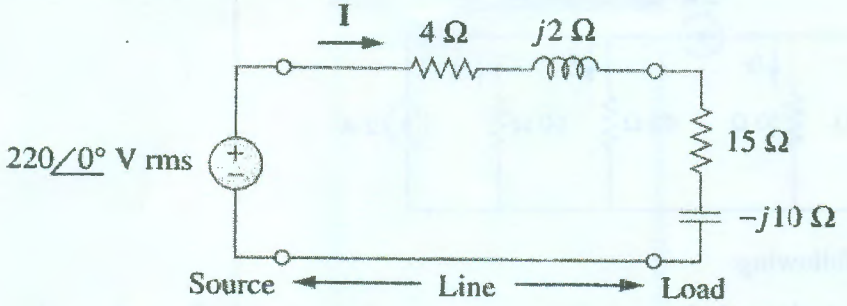
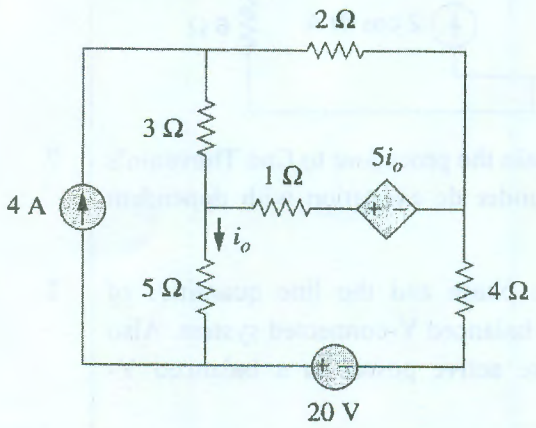
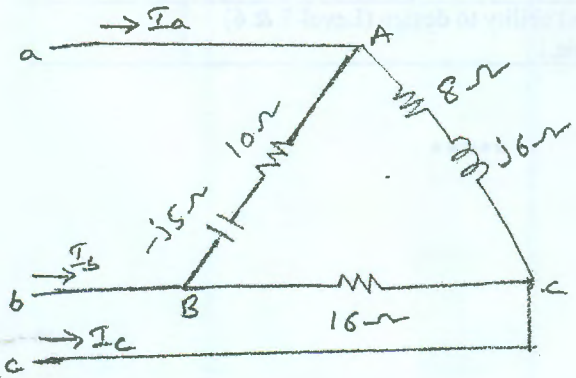
b)	A load being fed by a voltage source through a transmission line is shown in the circuit below. The impedance of the line and return path is represented by (4+j2). Find the real power and reactive power absorbed by: (a) the line and (b) the load.  	7	4	1	2
16. a)	Derive the condition to get the maximum power transfer in an ac circuit. Also find the expression for maximum power in an ac circuit.	7	2	2	1
b)	Find i_o in the circuit shown below, using superposition theorem.  	7	4	2	2
17. a)	The unbalanced delta-load shown in figure below, is supplied by balanced line-to-line voltages of 440 V in the positive sequence. Determine the line currents. Take V_{ab} as reference.  	7	4	3	2
b)	For a balanced wye connected load, the line voltage is 208 V. The power is measured by using two-wattmeter method. The readings of two wattmeters are P_1 = -560 W and P_2 = 800 W. Determine (i) The total average power (ii) The total reactive power (iii) The phase impedance (iii) The power factor	7	4	3	2

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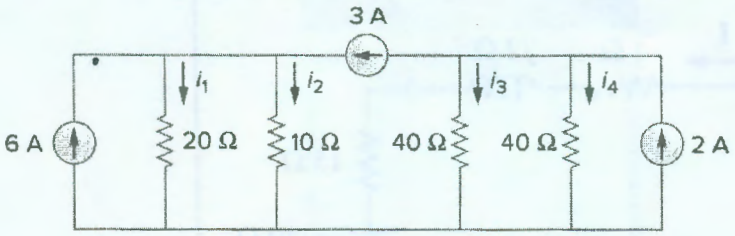
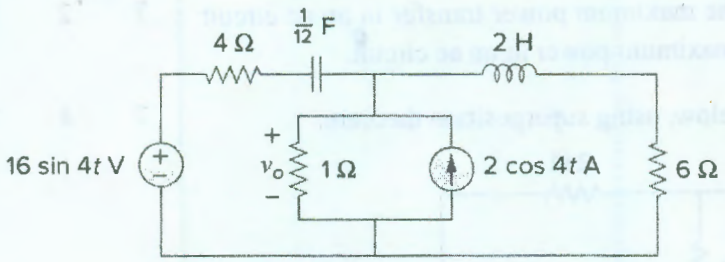
18. a)	Illustrate Kirchhoff's voltage law and Kirchhoff's current law with suitable examples.	7	2	1	1
b)	Calculate the currents in the circuit shown below, by using nodal analysis. 	7	2	1	2
19.	Answer any ***two*** of the following:				
a)	Determine v_o in the circuit shown below 	7	4	1	2
b)	State the Thevenin's theorem and expain the procedure to find Thevenin's voltage and Thevenin's ressistance under dc excitation with dependent sources.	7	2	2	2
c)	Obtain the relationship between the phase and the line quantities of voltages and currents in a three phase balanced Y-connected system. Also derive an expression for three phase active power in a balanced Y-connected system.	7	2	3	2

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	51.93
2	Knowledge on application and analysis (Level-3 & 4)	48.07
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable,)	-

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