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Code No. : 12326 AS O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.E.E.) II-Semester Advanced Supplementary Examinations, September-2023

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.	What is meant by super node?	2	1	1	1,2
2.	Draw the I-V characteristics of practical voltage source.	2	2	1	1,2
3.	If the admittance of an element is $(0.1 - j 0.5)$ S then calculate the impedance of the element.	2	2	2	1,2
4.	Define frequency of an alternating quantity.	2	1	2	1,2
5.	Define complex power.	2	1	3	1,2
6.	Sketch the phasor diagram of series RL circuit.	2	1	3	1,2
7.	State the Tellegen's theorem.	2	1	4	1,2
8.	Illustrate the linearity property.	2	2	4	1,2
9.	What is balanced supply and balanced load?	2	1	5	1,2
10.	Give any two advantages of three phase supply over single phase supply.	2	2	5	1,2
Part-B (5 × 8 = 40 Marks)					
11. a)	Derive the expression for energy stored in a capacitive element from the fundamentals.	4	2	1	1,2
b)	Calculate the effective resistance between points A and B in the circuit shown in figure 1.	4	4	1	1,2,3
Figure 1					
12. a)	Define the terms (i) average value (ii) RMS value (iii) Form factor of an alternating quantity.	4	1	2	1,2

b) Determine the mesh currents i_1 , i_2 and i_3 of the circuit shown in figure 2.

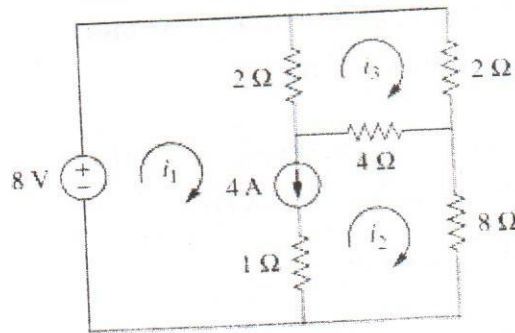


Figure 2

4 4 2 1,2,3

13. a) Derive an expression for steady state current of parallel RL circuit when excited by sinusoidal source. Also draw the phasor diagram.

4 3 3 1,2

b) For the circuit shown in figure 3, find the current I_o

4 4 3 1,2,3

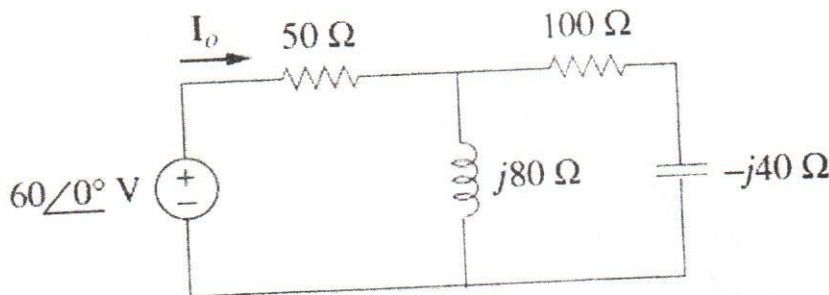


Figure 3

14. a) State and explain superposition theorem for DC network with an example.

4 2 4 1,2

b) Obtain the Thevenin's equivalent circuit across the terminals a-b of the circuit shown in figure 4. Hence find current 'I'.

4 3 4 1,2,3

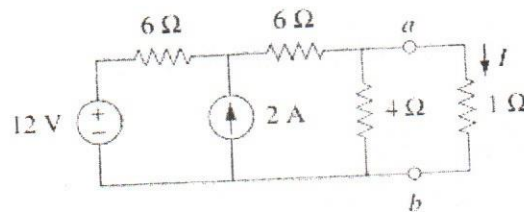


Figure 4

15. a) With a neat circuit diagram, explain the measurement of three phase power using two wattmeter method.

4 2 5 1,2

b) A Δ - connected source supplies power to a Y-connected load in a three-phase balanced system. Given that the line impedance is $(2 + j1) \Omega$ per phase while the load impedance is $(6 + j4) \Omega$ per phase, find the magnitude of the line voltage at the load. Assume the source phase voltage $V_{ab} = 208 \angle 0^\circ$ V rms.

4 3 5 1,2,3

16. a) State and explain Kirchoff's laws.

4 2 1 1,2

b) Obtain the average value and rms value of the voltage waveform shown in figure 5

4 2 2 1,2,3

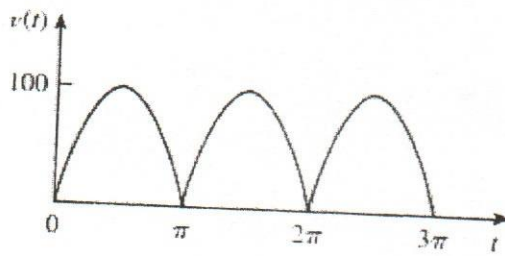
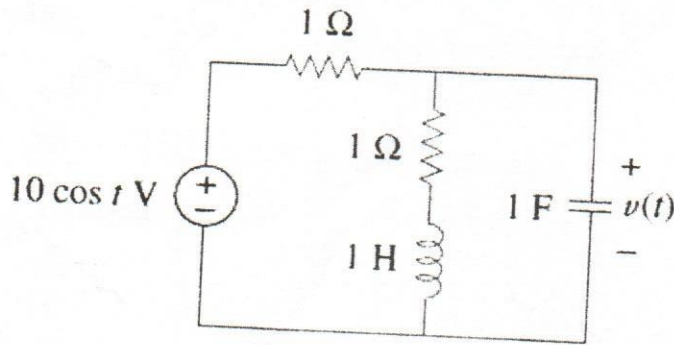


Figure 5

17. Answer any *two* of the following:

a) For the circuit shown in figure, find the voltage $v(t)$.

4 4 3 1,2,3



b) Derive the condition to get maximum power transfer in a circuit with DC excitation. Hence obtain the expression for maximum power.

4 3 4 1,2

c) Express the relationship between line and phase quantities in a 3-phase balanced Star connected system. Also obtain the expression for active power in a balanced three phase system.

4 2 5 1,2

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%
