CBCS SCHEME

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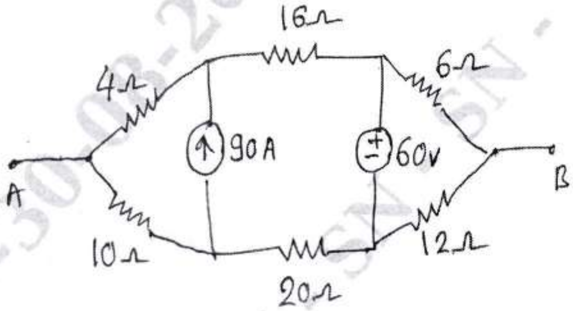
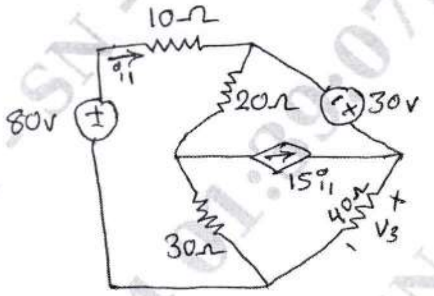
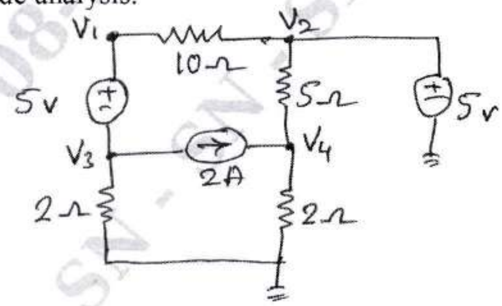
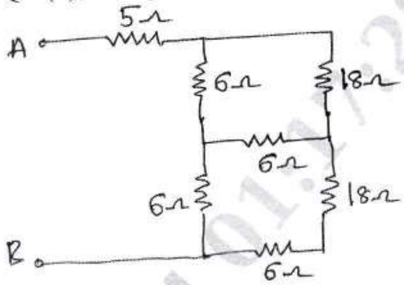
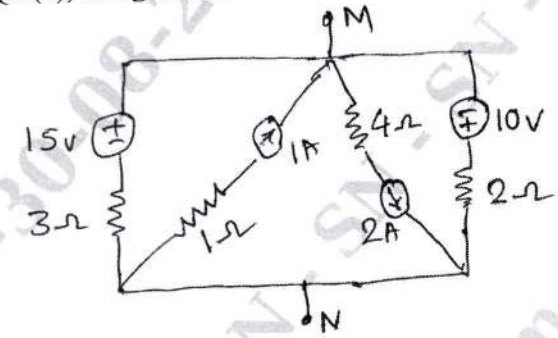
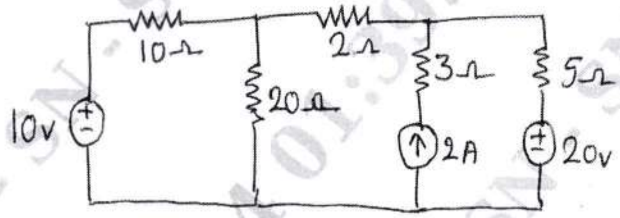
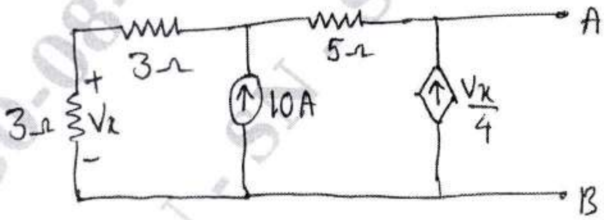
BEC304

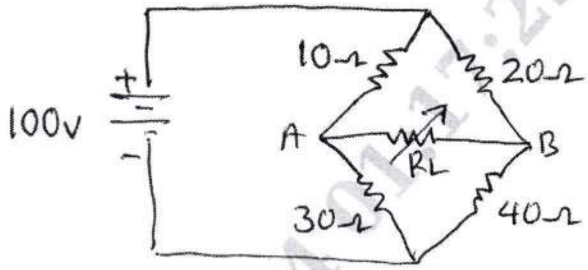
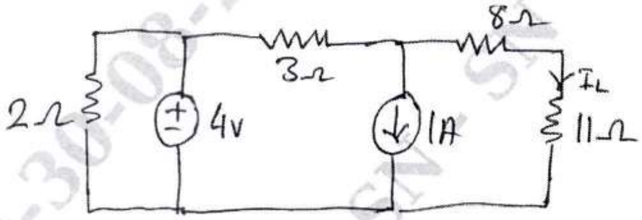
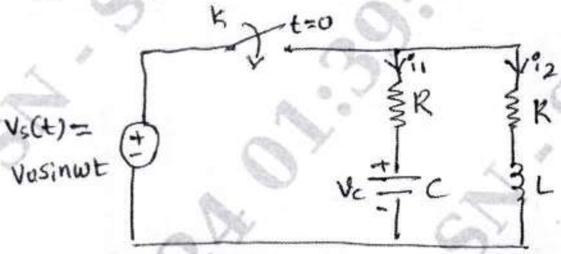
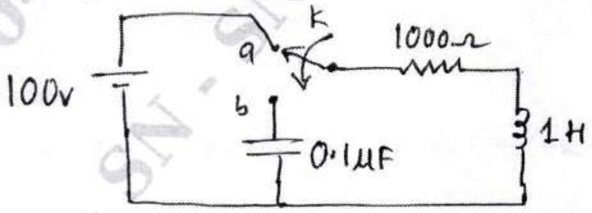
Third Semester B.E./B.Tech. Degree Examination, June/July 2024
Network Analysis

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Reduce the network shown in Fig. Q1 (a) to a single voltage source in series with resistance between terminals A and B. Use source transformation and source shifting technique.  Fig. Q1 (a)	10	L3	CO1
	b.	Determine voltage V_3 in the circuit shown in Fig. Q1 (b), using loop analysis.  Fig. Q1 (b)	10	L3	CO1
		OR			
Q.2	a.	For the network shown in Fig. Q2 (a), compute all node voltages V_1, V_2, V_3 and V_4 using Node analysis.  Fig. Q2 (a)	8	L3	CO1

	b.	Determine the equivalent resistance between terminal A and B, in the network shown in Fig. Q2 (b), using star Delta transformation.  Fig. Q2 (b)	7	L3	CO1
	c.	Find the potential difference between terminals M and N in the network shown in Fig. Q2 (c), using source transformation.  Fig. Q2 (c)	5	L3	CO1
		Module – 2			
Q.3	**a.**	Determine the voltage across 2Ω resistor in the circuit shown in Fig. Q3 (a), using the super position theorem.  Fig. Q3 (a)	10	L3	CO2
	b.	Find Thevenin's equivalent at terminal A and B, in the network shown in Fig. Q3 (b).  Fig. Q3 (b)	10	L3	CO2

		OR			
Q.4	**a.**	Determine the load resistance to receive maximum power from the source. Also find the maximum power delivered to the load in the circuit shown in Fig. Q4 (a).  Fig. Q4 (a)	**8**	**L3**	**CO2**
	b.	For the circuit shown in Fig. Q4 (b), determine current I_L using Norton's theorem.  Fig. Q4 (b)	**8**	**L3**	**CO2**
	c.	State Millman's theorem.	**4**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	In the network shown in Fig. Q5 (a), a switch K is closed at t = 0. Determine $\frac{di_1}{dt}$, $\frac{di_2}{dt}$ at $t = 0^+$.  Fig. Q5 (a)	**10**	**L3**	**CO3**
	b.	In the Network shown in Fig. Q5 (b), the switch K is changed position from a to b at t = 0. Solve for i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. The circuit is reached steady state before switching.  Fig. Q5 (b)	**10**	**L3**	**CO3**

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OR

Q.6 a. In the network shown in Fig. Q6 (a), steady state has been reached with switch K open. At time t = 0, the switch is closed. Deteremine the value of $V_a(0^-)$ and $V_a(0^+)$ at $t = 0^+$. — 10 | L3 | CO3

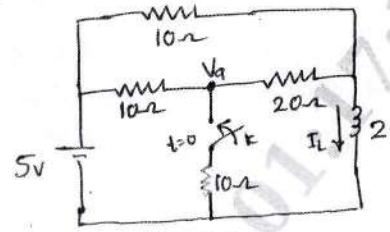

Fig. Q6 (a)

b. In the network shown in Fig. Q6 (b), a steady state is reached with switch K closed. At t = 0, switch is opened. Determine voltage across switch V_K, $\frac{dV_K}{dt}$ at $t = 0^+$. — 10 | L3 | CO3

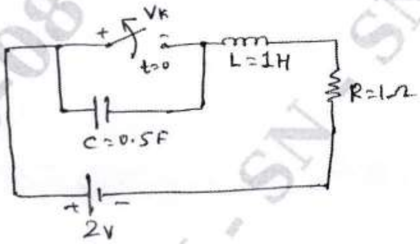

Fig. Q6 (b)

Module – 4

Q.7 a. State and prove initial and final value theorem in Laplace transformation. — 10 | L3 | CO3

b. Obtain the Laplace transform of the waveform shown in Fig. Q7 (b). Assume that waveform is periodic. — 10 | L3 | CO3

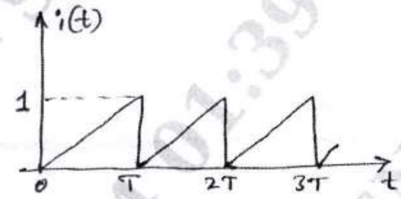

Fig. Q7 (b)

OR

Q.8 a. In the series RL circuit shown in Fig. Q8 (a), the source voltage is $V(t) = 50 \sin 250t$ V. Using Laplace transform determine the current i(t) when switch K is closed at t = 0. — 10 | L3 | CO3

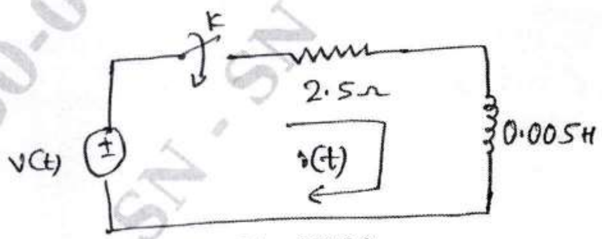

Fig. Q8 (a)

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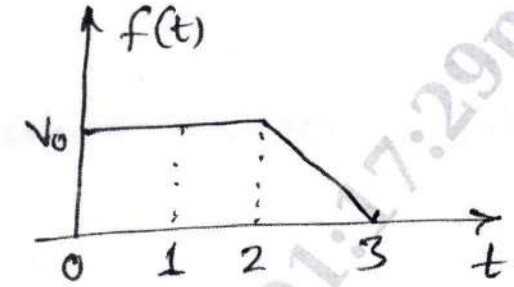
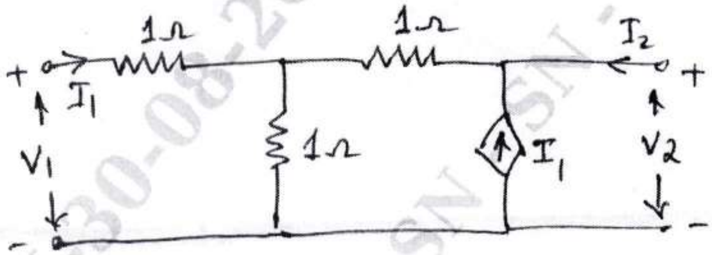
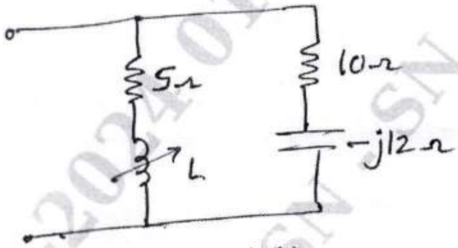
	b.	Find Laplace transform of the waveform shown in Fig. Q8 (b).  Fig. Q8 (b)	**10**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Find Z and ABCD parameters for the network shown in Fig. Q9 (a). Also verify whether network is Reciprocal or Symmetrical.  Fig. Q9 (a)	**10**	**L3**	**CO4**
	b.	A series RLC circuit has a resistance of 10 Ω, an inductance of 0.3 H and a capacitance of 100 μF. The applied voltage is 230 V. Find Resonance frequency, lower and upper cut-off frequencies, current at resonance, current at f_1 and f_2, voltage across inductance at resonance.	**10**	**L3**	**CO4**
		OR			
Q.10	**a.**	Derive Z-parameters in terms of H parameter.	**8**	**L3**	**CO4**
	b.	Find the value of L for which the circuit resonates at frequency of 1000 rad/sec, for the circuit shown in Fig. Q10 (b).  Fig. Q10 (b)	**7**	**L3**	**CO4**
	c.	Derive the relation between resonating frequency and half power frequencies i.e. $f_r = \sqrt{f_1 f_2}$	**5**	**L2**	**CO4**

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