CBCS SCHEME

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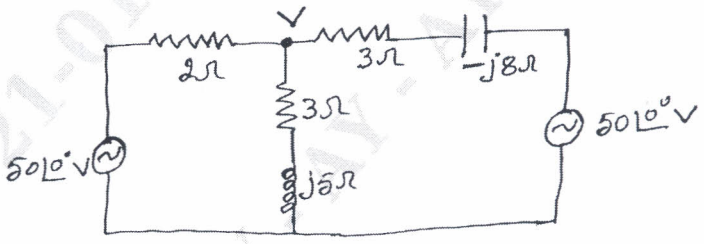
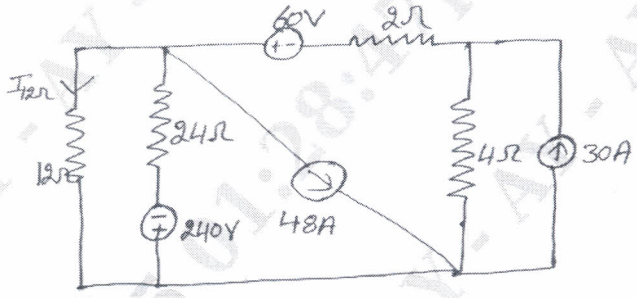
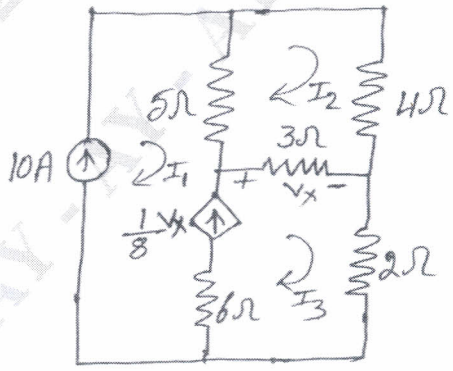
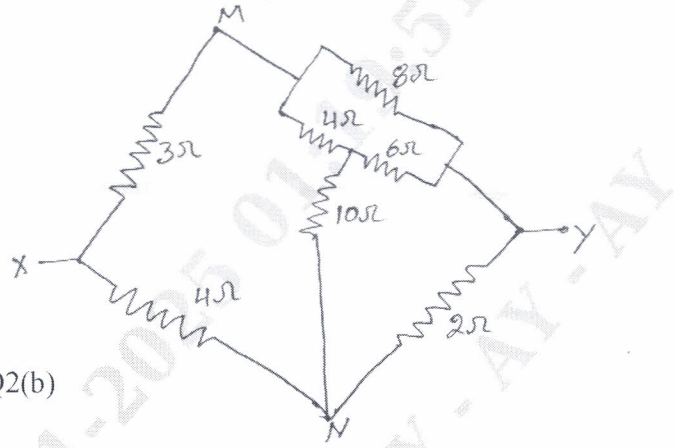
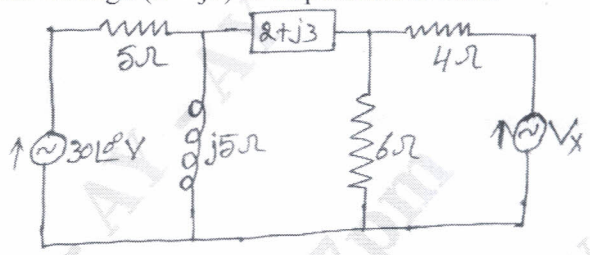
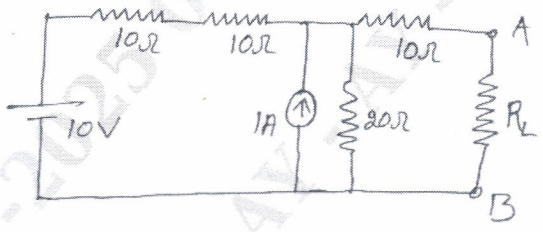
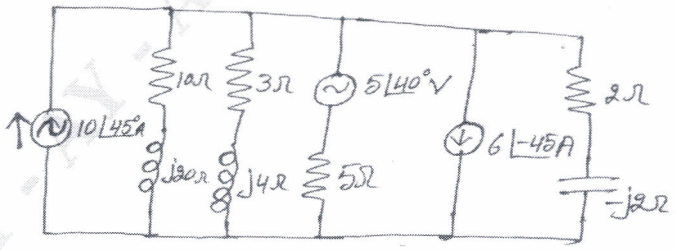
BEC304

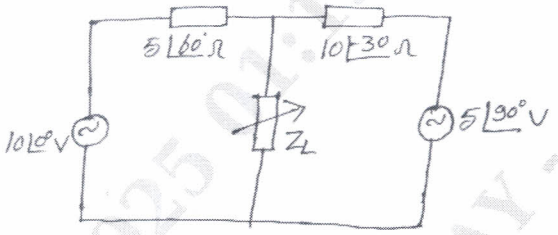
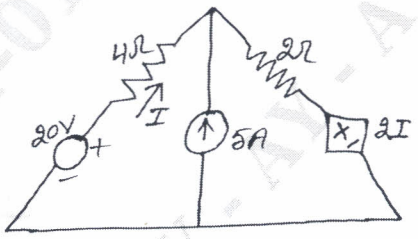
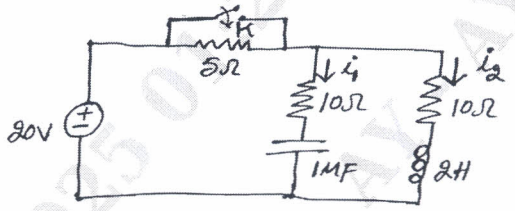
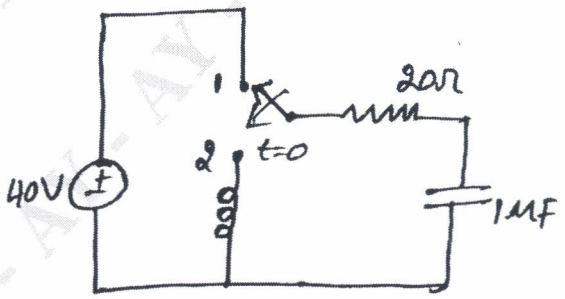
Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Network Analysis

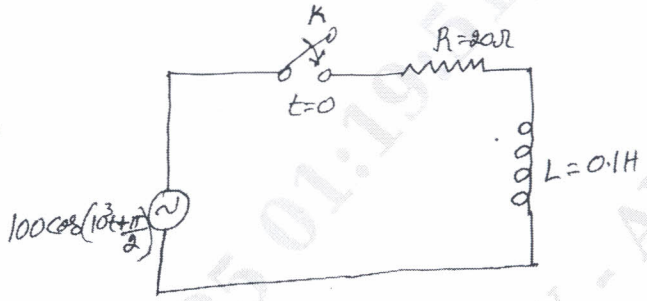
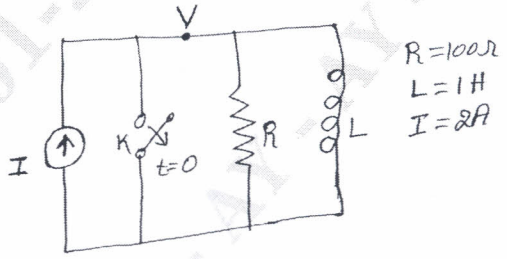
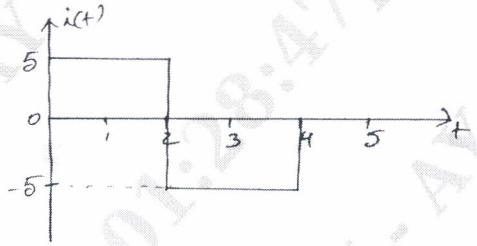
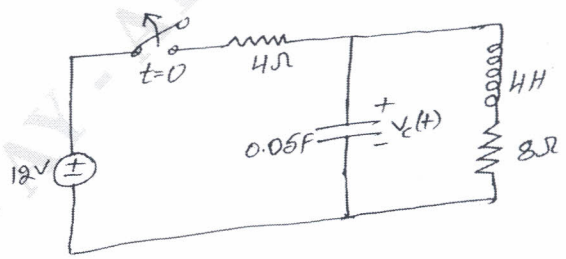
Time: 3 hrs. Max. Marks: 100

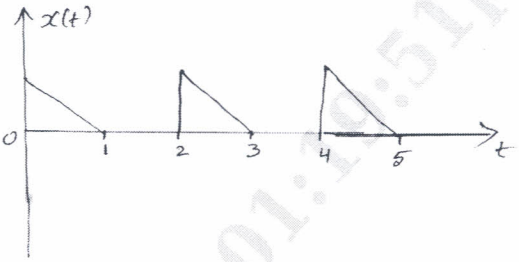
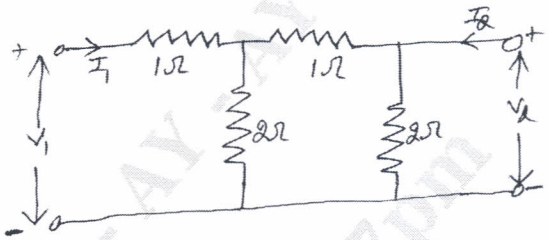
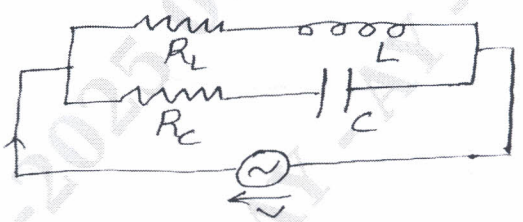
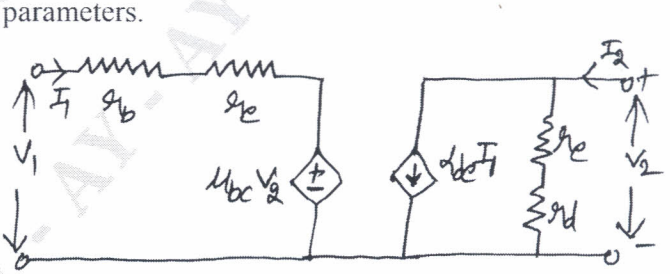
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Three impedances are connected in Delta. Obtain the star equivalent of the network.	7	L3	CO1
	b.	For the circuit shown in Fig. Q1(b). Find the voltage 'V' at node by using nodal analysis.  Fig. Q1(b)	6	L3	CO1
	c.	Determine the current in 12Ω resistor shown in Fig. Q1(c) using source transformation method.  Fig. Q1(c)	7	L3	CO1
		OR			
Q.2	a.	Find the loop currents I_1, I_2, and I_3 in the circuit shown in Fig. Q2(a).  Fig. Q2(a)	7	L3	CO1

	b.	Determine the resistance between the terminals X, Y using star delta transformation in the network shown in Fig. Q2(b).  Fig. Q2(b)	**6**	**L3**	**CO1**
	c.	Use the nodal analysis to find the value of V_X and the circuit shown in Fig. Q2(c). Such that the current through (2 + j3) Ω Impedance is zero.  Fig. Q2(c)	**7**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	Sate and prove Superposition theorem.	**7**	**L2**	**CO2**
	b.	For the circuit shown in Fig. Q3(b), obtain the Thevenin's equivalent circuit.  Fig. Q3(b)	**7**	**L3**	**CO2**
	c.	Using Millman's theorem, find current flowing through (3 + j4) Ω impedance for the circuit shown in Fig. Q3(c).  Fig. Q3(c)	**6**	**L3**	**CO2**
		OR			

Q.4	**a.**	State and prove Norton's theorem.	**7**	**L2**	**CO2**
	b.	Find the value of Z_L for Maximum Power transfer and the value of Maximum power for the circuit shown in Fig. Q4(b).  Fig. Q4(b)	**6**	**L3**	**CO2**
	c.	Find current 'I' using Super position theorem for the circuit shown in Fig. Q4(c).  Fig. Q4(c)	**7**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Use the concepts of initial condition to illustrate the voltage behavior in inductor circuit for DC supply.	**6**	**L3**	**CO3**
	b.	In the circuit steady state is reached with switch 'K' open. The switch is closed at t = 0. Compute i , di/dt and d^2i/dt^2 at $t = 0^+$.  Fig. Q5(b)	**7**	**L3**	**CO3**
	c.	The switch is moved from position (1) to position (2) at t = 0. The steady state has been reached before switching. Computer i , di/dt and d^2i/dt^2 at $t = 0^+$ for Fig. Q5(c).  Fig. Q5(c)	**7**	**L4**	**CO3**
		OR			

Q.6	**a.**	In the circuit shown in Fig. Q6(a), determine complete solution for current when switch 'K' is closed at t = 0. Fig. Q6(a) 	**10**	**L3**	**CO3**
	b.	Compute v , dv/dt , d^2v/dt^2 at t = 0^+ for the circuit shown in below Fig. Q6(b), when the switch K is opened at t = 0. Fig. Q6(b) 	**10**	**L4**	**CO3**
		Module – 4			
Q.7	**a.**	Using waveform synthesis method to express the voltage pulse interms of unit step. Find i) L{i(t)} ii) L{∫ i(t).dt}. Fig. Q7(a) 	**8**	**L3**	**CO4**
	b.	State and prove initial value and final value theorem for Laplace transform.	**6**	**L2**	**CO4**
	c.	Obtain the Laplace transform of step and ramp function with relevant expressions.	**6**	**L3**	**CO4**
		OR			
Q.8	**a.**	Determine $i_L(t)$ for t ≥ 0 using Laplace transform for circuit shown in Fig. Q8(a). Fig. Q8(a) 	**10**	**L3**	**CO4**

	b.	Find the Laplace transform of the periodic signal x(t) as shown in Fig. Q8(b).  Fig. Q8(b)	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define Z – parameters. Determine Y parameters interms if Z – parameters.	**6**	**L3**	**CO5**
	b.	Show that resonant frequency is geometric mean of cut off frequency in series R – L – C circuit.	**7**	**L3**	**CO5**
	c.	Apply the two – port network analysis technique to determine ABCD – parameters of the network shown in Fig. Q9(c).  Fig. Q9(c)	**7**	**L3**	**CO5**
		OR			
Q.10	**a.**	Derive the expression for the resonant frequency of the circuit shown in Fig. Q10(a). Also show that the circuit resonate at all frequency if $R_L = R_C = \sqrt{\frac{L}{C}}$.  Fig. Q10(a)	**10**	**L3**	**CO5**
	b.	The model of a transistor in the CE mode is shown in Fig. Q10(b). Determine the h – parameters.  Fig. Q10(b)	**10**	**L3**	**CO5**

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