CBCS SCHEME

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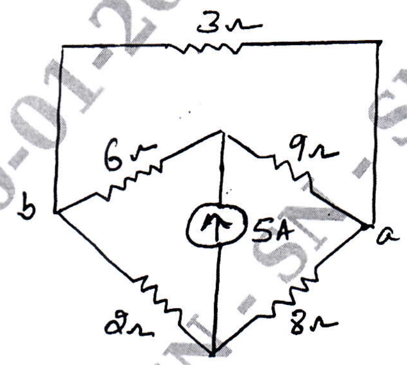
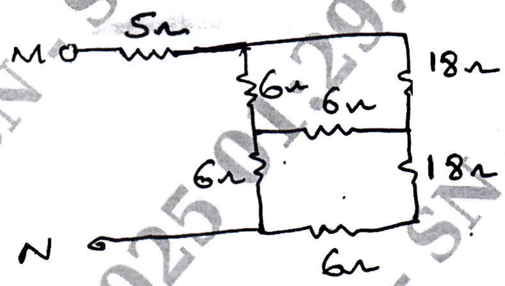
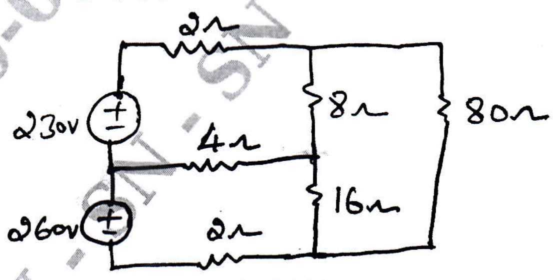
BEE302

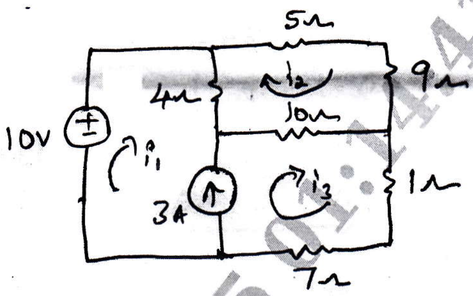
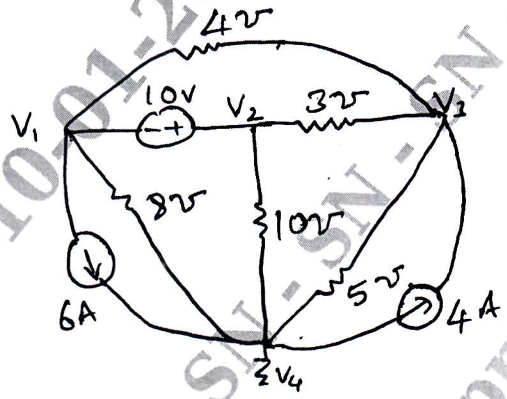
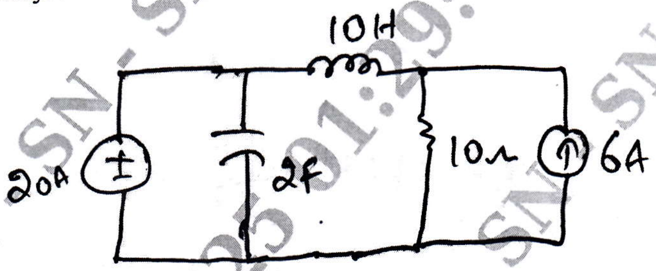
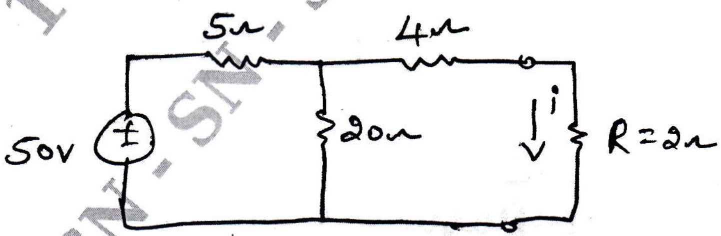
Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

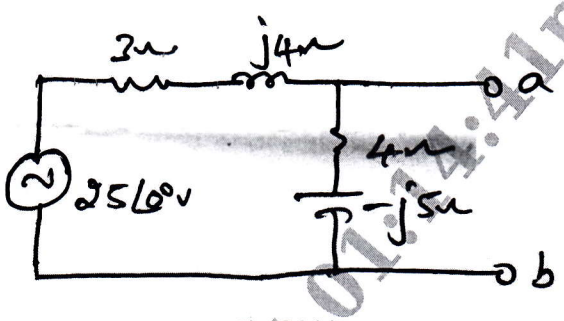
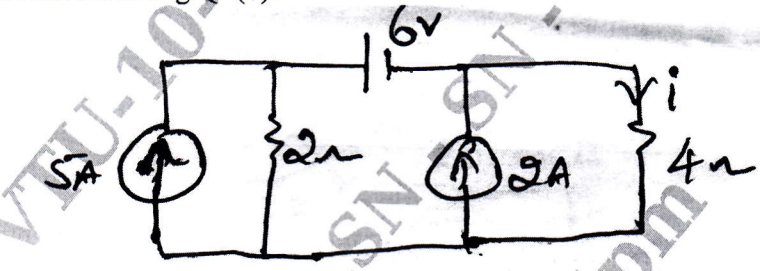
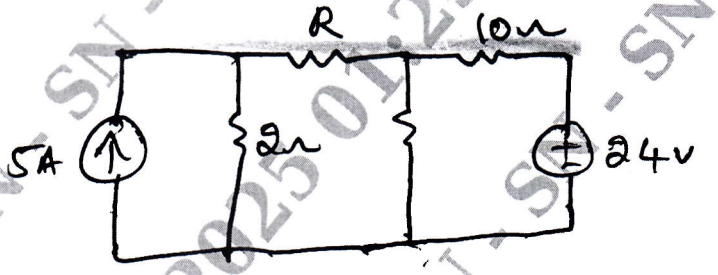
Electric Circuit Analysis

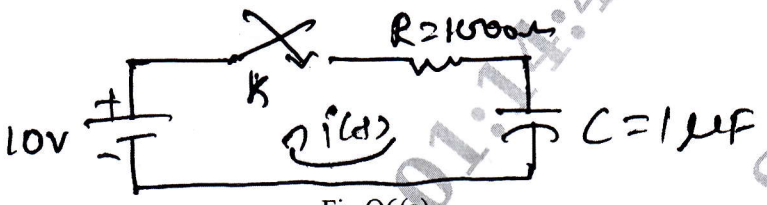
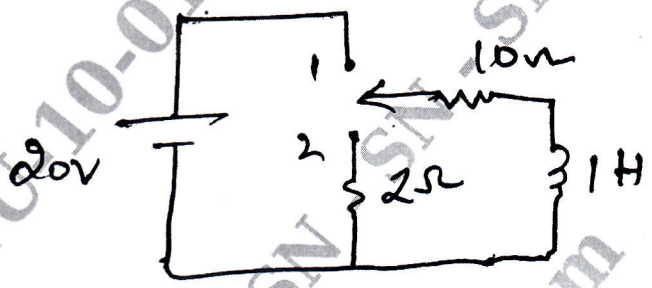
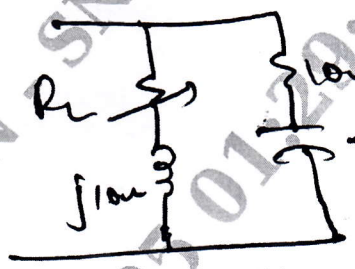
Time: 3 hrs. Max. Marks: 100

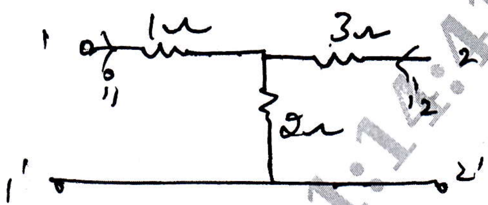
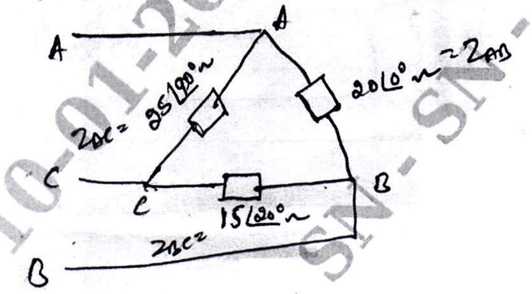
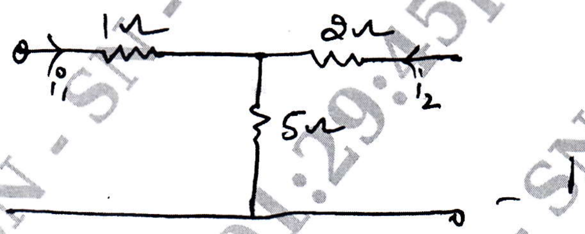
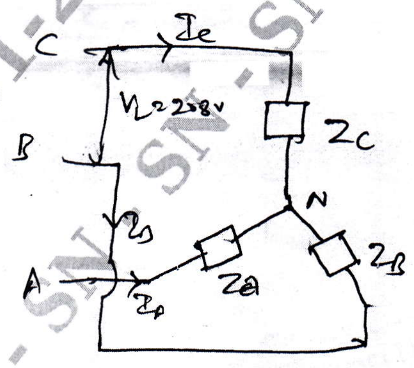
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Use source mobility of sources transformation to reduce the given network, shown in Fig Q1(a) into a single voltage source in series with a resistor between points a b.  Fig Q1(a)	6	L3	CO1
	b.	Determine the equivalent resistance between the terminals MN for the networks shown in Fig Q1(b).  Fig Q1(b)	6	L3	CO1
	c.	Use Mesh current analysis to find the power dissipated in the 80Ω resistor of circuit shown in Fig Q1(c).  Fig Q1(c)	8	L3	CO1

		OR			
Q.2	**a.**	Determine the circuit i_1, i_2, and i_3 in the circuit of Fig Q2(a), using mesh current method.  Fig Q2(a)	6	L3	CO1
	b.	Find the node voltages for the circuit of Fig Q2(b), using nodal analysis.  Fig Q2(b)	8	L3	CO2
	c.	Define Duality. Draw the dual of the network shown in Fig Q2(c).  Fig Q2(c)	6	L3	CO1
		Module – 2			
Q.3	**a.**	State and prove super position theorem.	8	L1	CO2
	b.	For the network shown in Fig Q3(b), find the current i though R = 2Ω using the Thevenin's theorem.  Fig Q3(b)	6	L3	CO2

	c.	Obtain the Norton's equivalent for the circuit shown in Fig Q3(c), between point a of b.  Fig Q3(c)	6	L3	CO2
		OR			
Q.4	a.	State and explain maximum power transfer theorem for DC circuit (Resistive Load).	6	L1	CO2
	b.	Find the current through 4Ω resistor using super position theorem for the circuit shown in Fig Q4(b).  Fig Q4(b)	8	L3	CO2
	c.	Determine the value of R for the circuit shown in Fig Q4(c) and also determine the maximum power transfer.  Fig Q4(c)	6	L3	CO2
		Module – 3			
Q.5	a.	Explain with circuit diagram how to determine of resonant frequency, bandwidth and Q of a series circuit.	10	L2	CO2
	b.	For the network elements R, L and C, write the equivalent circuit A + t = 0^+[initial condition] A + t = ∞ [find condition]	4	L2	CO4
	c.	A series RLC circuit has R = 4Ω, L = 1mH an C = 10μF, calculate Q-factor, bandwidth, resonant frequency and half frequencies.	6	L3	CO2

		OR			
Q.6	**a.**	In the network shown in Fig Q6(a), the switch K is closed at t = 0 with the capacitor uncharged. Find the values for i, di/dt and $\frac{d^2i}{dt^2}$ at $t = 0^+$.  Fig Q6(a)	**8**	**L3**	**CO4**
	b.	Determine $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, when the switch K is moved from position 1 to 2 at t = 0 for the Fig Q6(b) shown steady state having reached before switching.  Fig Q6(b)	**8**	**L3**	**CO4**
	c.	Find the value of R_L for the circuit shown in Fig Q6(c)  Fig Q6(c)	**4**	**L3**	**CO**
		Module – 4			
Q.7	**a.**	State and prove initial and final Value theorem.	**10**	**L1**	**CO5**
	b.	Find the laplace transform of the following : i) sinwt ii) coswt iii) e^{-at}sinwt iv) e^{-at} coswt.	**10**	**L2**	**CO5**
		OR			
Q.8	**a.**	Obtain the Laplace transform of i) u(t) ii) r(t) iii) δ(t).	**10**	**L2**	**CO5**
	b.	Apply the initial value and find and final valve theorem respectively to the S-domain equation of $I_1(s)$t of $I_2(s)$ given i) $I_1(s) = \frac{6.67(s+250)}{s(s+166.7)}$ ii) $I_2(s) = \frac{6.67}{s+166.7}$	**10**	**L2**	**CO5**

		Module – 5			
Q.9	**a.**	Determine the z-parameter of y-parameter for the circuit shown in Fig Q9(a).  Fig Q9(a)	**10**	**L3**	**CO3**
	b.	A 3ϕ supply with line voltage of 250V has a unbalanced delta connected load as shown in Fig Q9(b). Determine line currents active and reactive power for phase sequence ABC.  Fig Q9(b)	**10**	**L3**	**CO3**
		OR			
Q.10	**a.**	Find the transmission parameters for the circuit shown in Fig Q10(a)  Fig Q10(a)	**10**	**L3**	**CO3**
	b.	3ϕ, 4 wire 208V CBA system as shown in Fig Q10(b) has a star connected load with $Z_A = 5\angle 0^\circ\ \Omega$, $Z_B = \angle 30^\circ\ \Omega$ and $Z_c = 10\angle -60^\circ\ \Omega$. Obtain the phase current, line currents and current through neutral wire.  Fig Q 10(b)	**10**	**L3**	**CO3**

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