CBCS SCHEME

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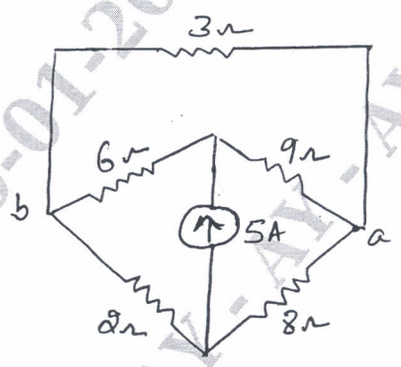
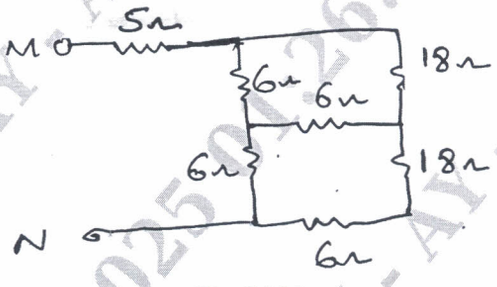
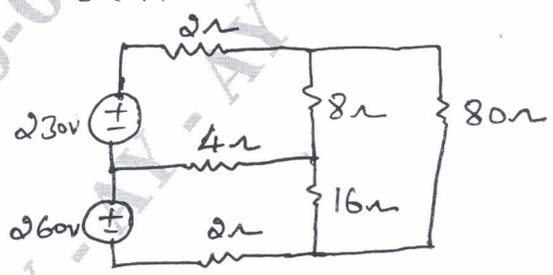
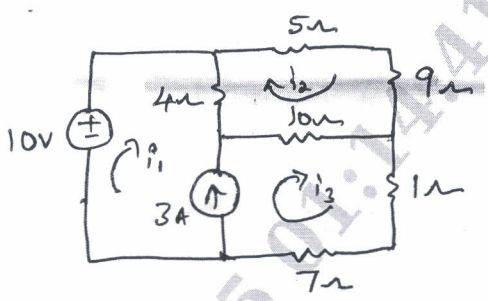
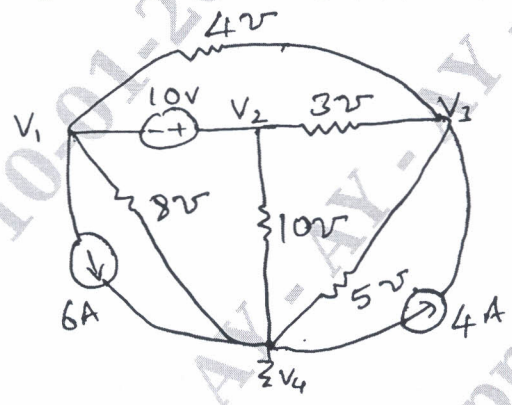
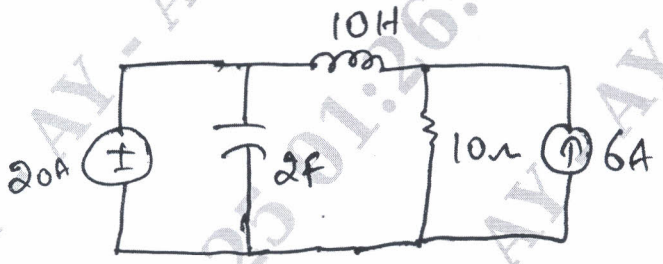
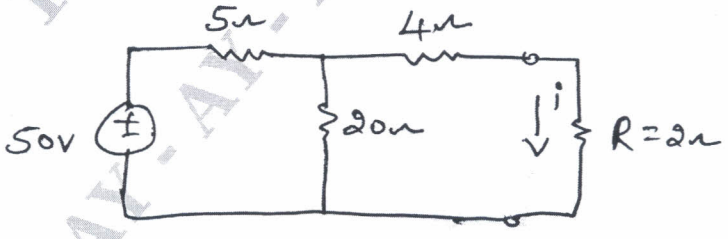
BEE302

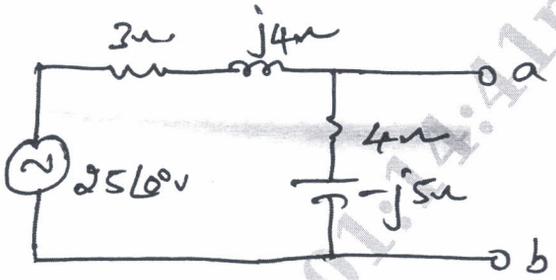
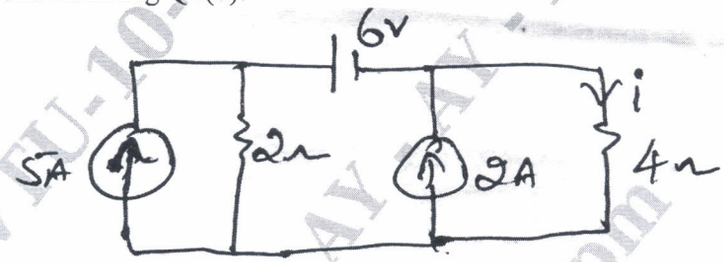
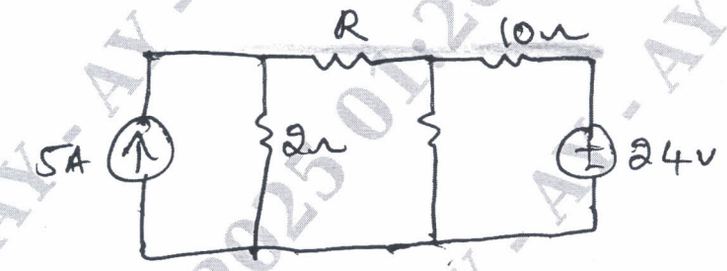
Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Electric Circuit Analysis

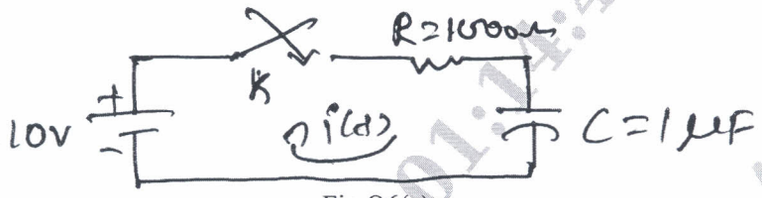
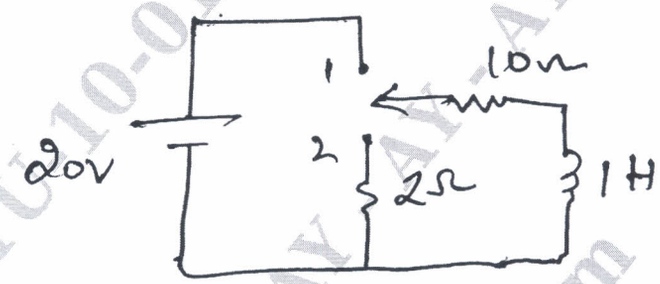
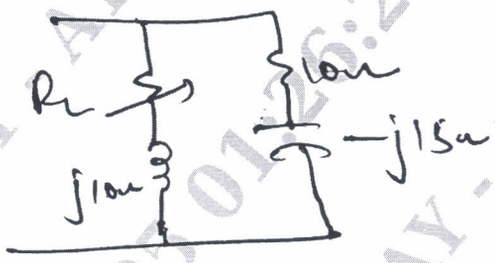
Time: 3 hrs. Max. Marks: 100

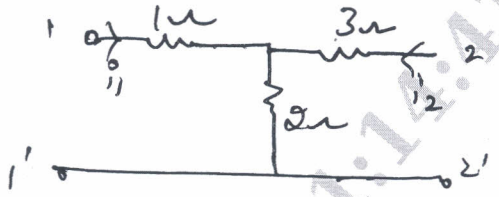
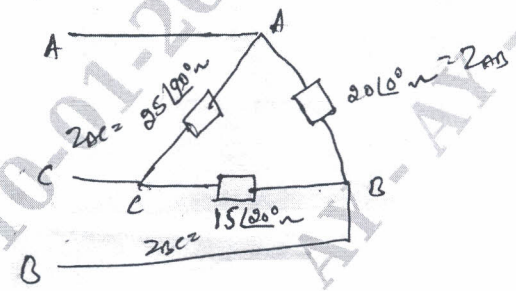
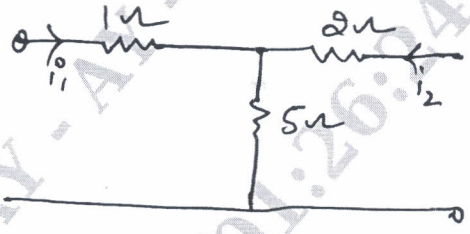
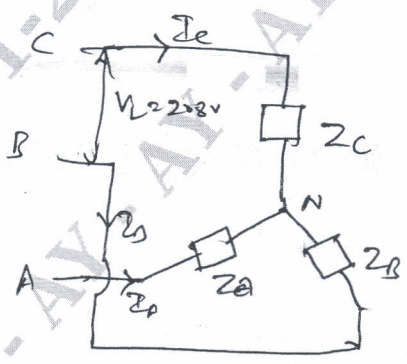
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		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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