CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

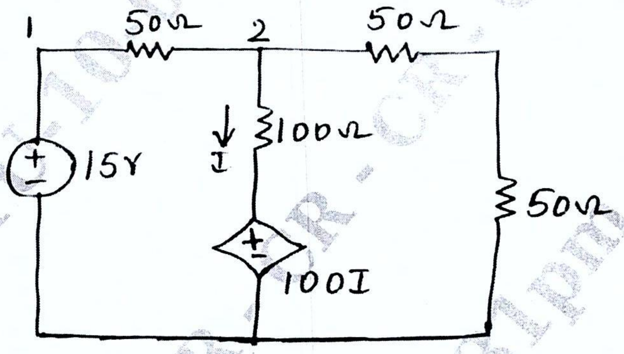
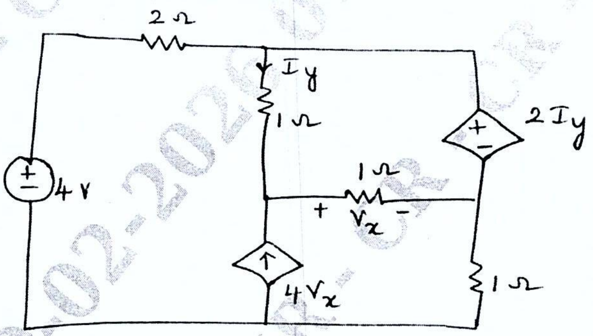
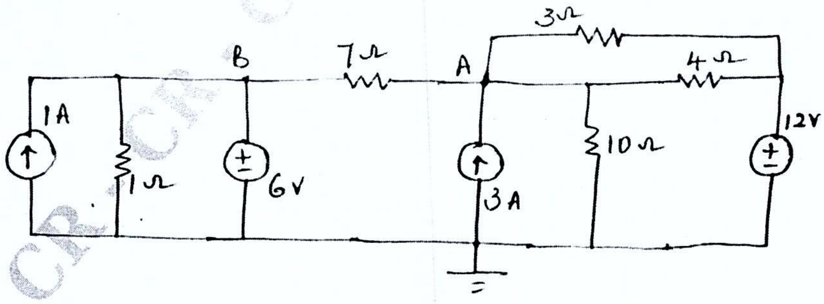
BEC304

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

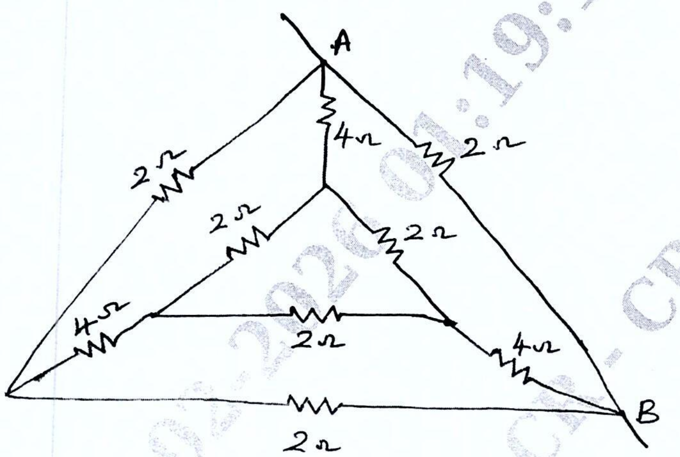
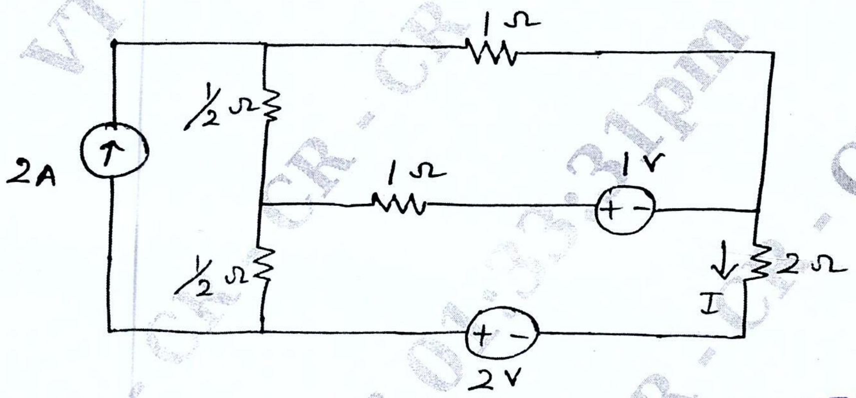
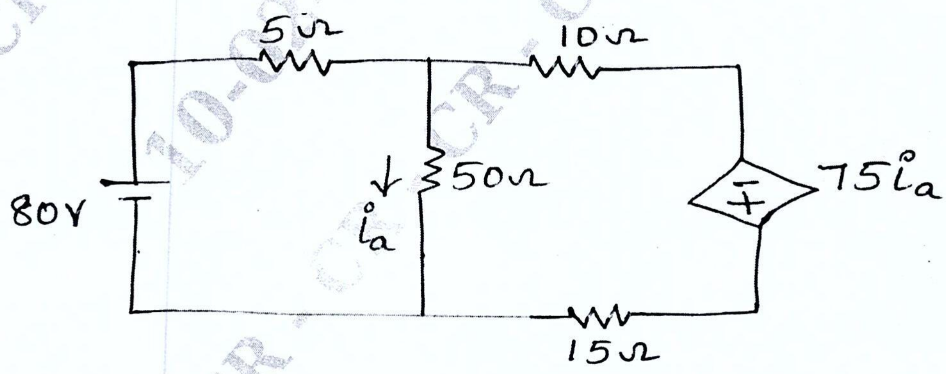
Network Analysis

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.**	Make use of source transformation technique, to find the voltage V_2 at node 2 in the circuit shown in Fig.Q1(a).  Fig.Q1(a)	5	L3	CO1
	b.	Using Mesh analysis, find the power absorbed by 2 Ω resistor in the circuit shown in Fig.Q1(b).  Fig.Q1(b)	8	L3	CO1
	c.	Apply node analysis to find V_A for the network shown in Fig.Q1(c).  Fig.Q1(c)	7	L3	CO1

OR

Q.2	**a.**	Find the equivalent resistance, between A and B using star – delta transformation for the circuit shown in Fig.Q2(a).  Fig.Q2(a)	7	L3	CO1
	b.	Reduce the network shown in Fig.Q2(b), to find the current 'I' using source shifting and source transformation.  Fig.Q2(b)	7	L3	CO1
	c.	Find the power delivered by the dependent voltage source in the network shown in Fig.Q2(c) using Node analysis.  Fig.Q2(c)	6	L3	CO1

Module – 2

Q.3 **a.** Use superposition theorem, to find the current 'i' for the circuit shown in Fig.Q3(a). — 6 | L3 | CO2

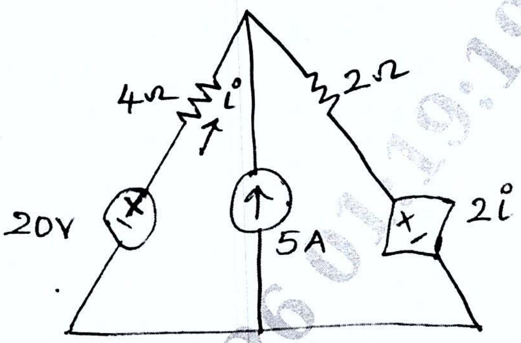


Fig.Q3(a)

b. Use Millman's theorem, to find current flowing through (2 + j3)Ω impedance, for the circuit given in Fig.Q3(b). — 6 | L3 | CO2

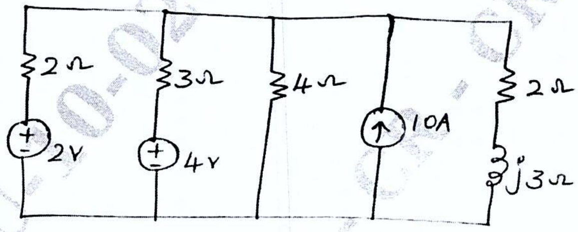


Fig.Q3(b)

c. State and find the condition for maximum power transfer in a AC circuit when load impedance is the invariable (Z_L). — 8 | L2 | CO2

OR

Q.4 **a.** Use Thevenin's theorem, to find the current through 'R_L' for the network shown in Fig.Q4(a). — 7 | L3 | CO2

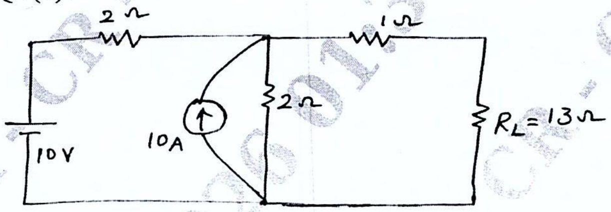


Fig.Q4(a)

b. Apply Norton's theorem to find the current through 16Ω resistor for the circuit shown in Fig.Q4(b). — 7 | L3 | CO2

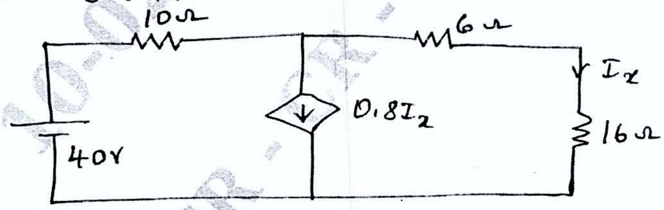


Fig.Q4(b)

c. Using Millman's theorem, find I_L through R_L for the network shown in Fig.Q4(c). — 6 | L3 | CO2

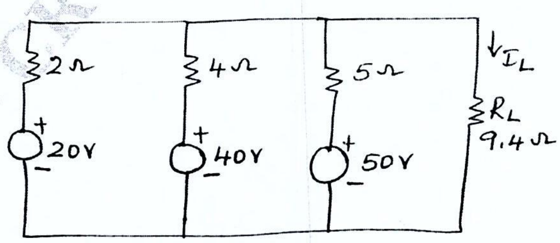
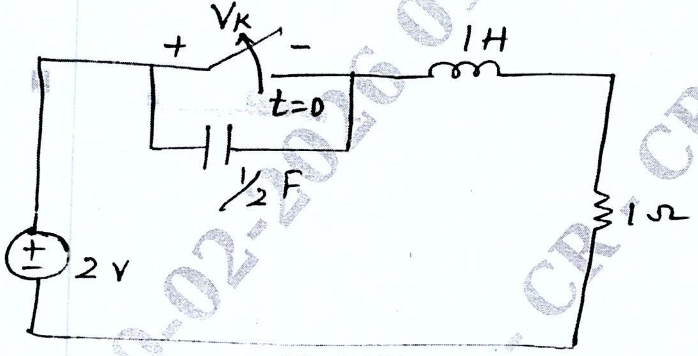
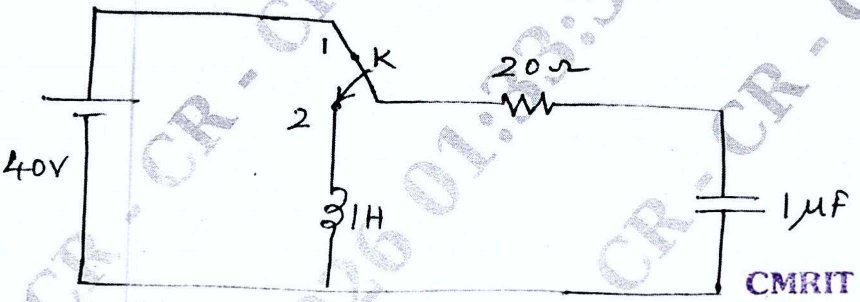
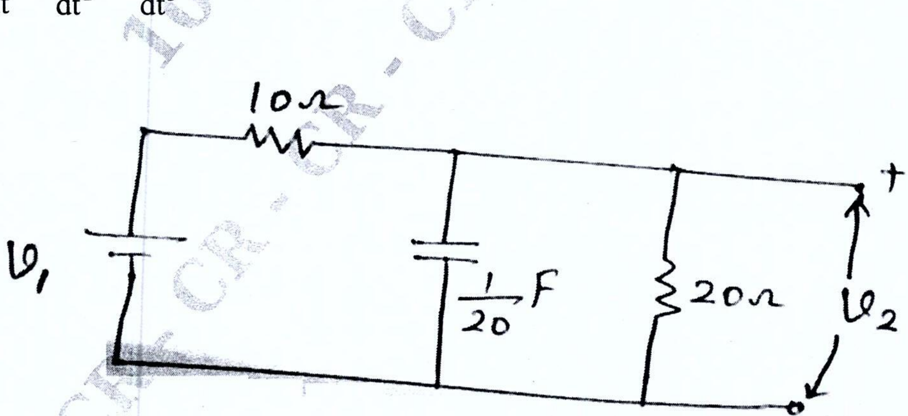


Fig.Q4(c)

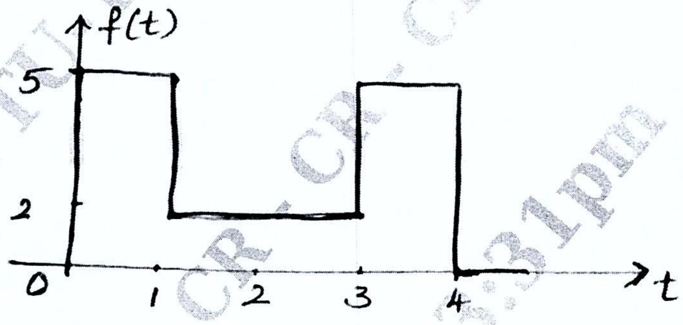
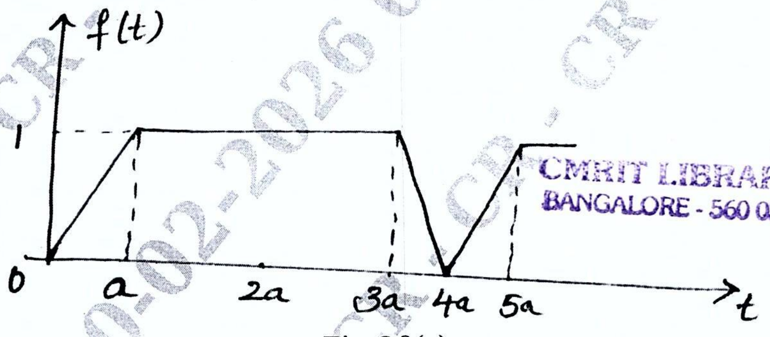
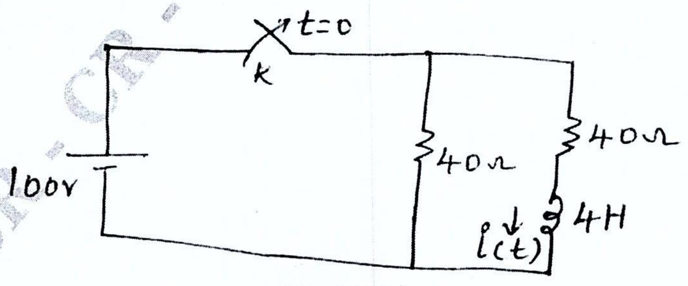
Module – 3

Q.5	**a.**	Explain the transient behavior of the Resistance, Inductance and Capacitor.	**10**	**L2**	**CO3**
	b.	The circuit is in steady state with switch K closed for the circuit shown in Fig.Q5(b). At t = 0, the switch is opened. Find the voltage across the switch V_K, $\frac{dV_K}{dt}$ at t = 0+.  Fig.Q5(b)	**10**	**L3**	**CO3**

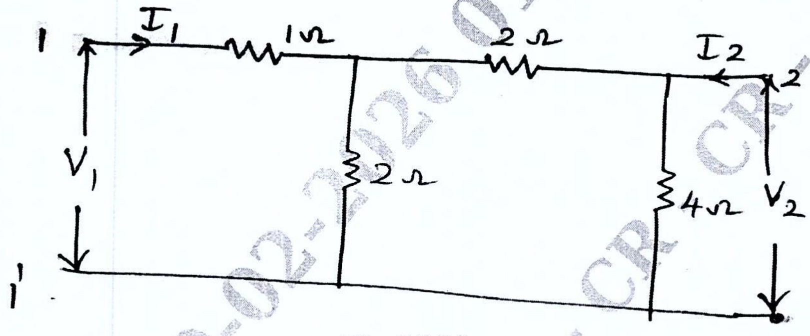
OR

Q.6	**a.**	In the circuit shown in Fig.Q6(a), the switch K is changed from Position-1 to Position-2 at t = 0, steady state having been reached before switching. Evaluate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0+.  Fig.Q6(a)	**10**	**L3**	**CO3**
	b.	In the circuit shown in Fig.Q6(b), $V_1(t) = e^{-t}$ for t ≥ 0 and is zero for all t < 0. If the capacitor is initially uncharged, determine the value of $\frac{dV_2}{dt}, \frac{d^2V_2}{dt^2}, \frac{d^3V_2}{dt^3}$ at t = 0+.  Fig.Q6(b)	**10**	**L3**	**CO3**

Module – 4

Q.7	**a.**	Find the Laplace transform of the following functions : i) $t.e^{-at}$ ii) $\cos^3 3t$ iii) $\frac{1}{2a^2}\sin h\, a\, t \sin a\, t$.	6	L3	CO3
	b.	Find the Laplace transform of the following functions : i. Unit step function ii. Ramp function.	6	L3	CO3
	c.	Obtain the Laplace transform of the f(t) shown in Fig.Q7(c).  Fig.Q7(c)	8	L3	CO3
		OR			
Q.8	**a.**	Find the Laplace transform of the periodic waveform shown in Fig.Q8(a).  Fig.Q8(a)	10	L3	CO3
	b.	Find the current i(t) when switch K is opened at t = 0 having reached steady state before the switching and the circuit is as shown in Fig.Q8(b). Also find the current at t = 0.5 sec.  Fig.Q8(b)	10	L3	CO3

Module – 5

Q.9	**a.**	Define Z and Y – parameters. Express Z-parameters in terms of Y.	**10**	**L2**	**CO4**
	b.	Obtain h – parameters for the network shown in Fig.Q9(b).  Fig.Q9(b)	**10**	**L3**	**CO4**
		OR			
Q.10	**a.**	Derive the expressions for Half-power frequencies for a series RLC circuit.	**10**	**L3**	**CO4**
	b.	A series RLC circuit has R = 10 Ω, L = 0.3H and C = 100 μF. The applied voltage is 230 V, find : i. The resonant frequency ii. The quality factor iii. Lower and upper cut-off frequency iv. Bandwidth.	**10**	**L2**	**CO4**

* * * * *