CBCS SCHEME

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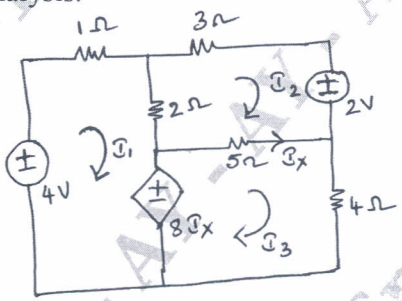
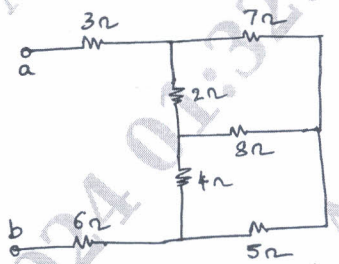
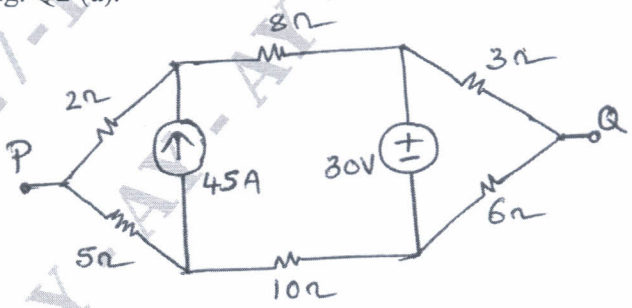
BEC304

Third Semester B.E./B.Tech. Degree Supplementary 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.	Compare the following : (i) Active and Passive elements (ii) Linear and Non-linear elements	4	L2	CO1
	b.	For the circuit shown below in Fig. Q1 (b), find the mesh currents and the value I_X using mesh analysis.  Fig. Q1 (b)	8	L3	CO1
	c.	For the circuit of Fig. Q1 (c), find the equivalent resistance between a and b using star to delta transformation.  Fig. Q1 (c)	8	L3	CO1
		OR			
Q.2	a.	Using source shift and source transformations, simplify the circuit between P and Q in Fig. Q2 (a).  Fig. Q2 (a)	10	L4	CO1

	b.	For the circuit in Fig. Q2 (b), find all the node voltages using node analysis.	10	L3	CO1

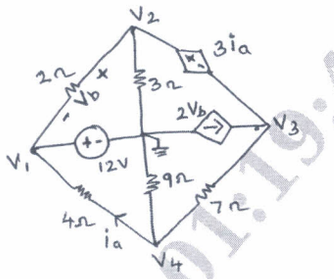


Fig. Q2 (b)

Module – 2

Q.3	a.	State and prove Thevnin theorem.	5	L2	CO2
	b.	For the circuit shown in Fig. Q3 (b), find the voltage V_X using superposition theorem.	8	L4	CO2

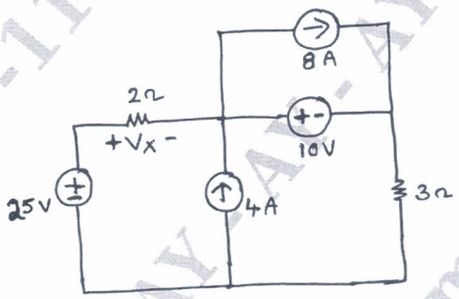


Fig. Q3 (b)

	c.	Find the current through the load of 1 KΩ, using Millman's theorem in Fig. Q3 (c).	7	L3	CO2

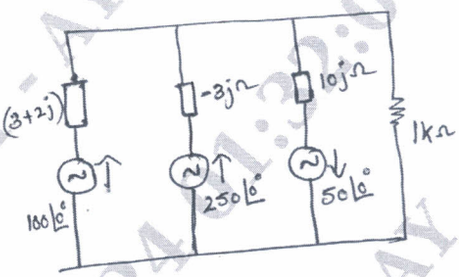


Fig. Q3 (c)

OR

Q.4	a.	State and prove maximum power transfer theorem for DC circuit with variable load R_L.	6	L2	CO2
	b.	For the circuit shown in Fig. Q4 (b). Find the Norton equivalent circuit across the terminal's a and b.	6	L3	CO2

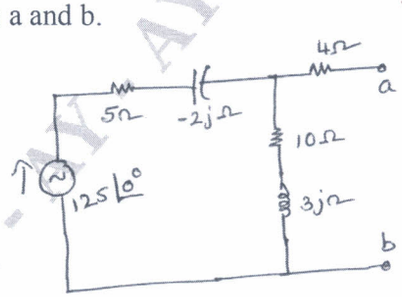
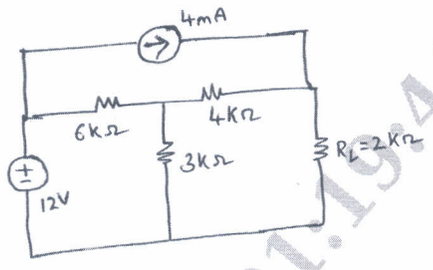
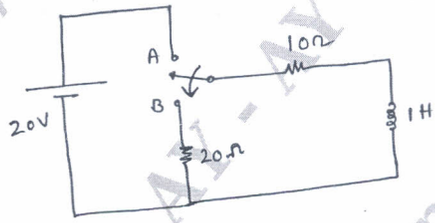
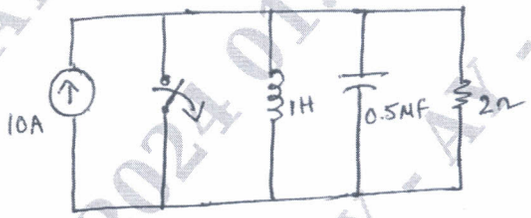
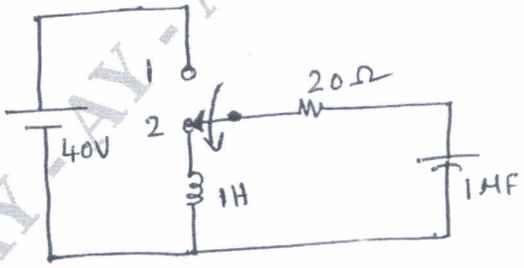
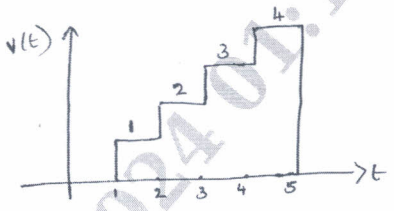
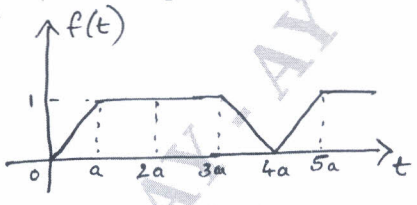
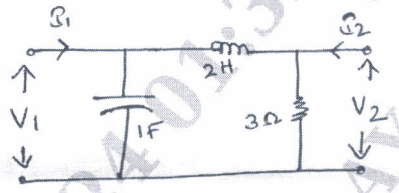
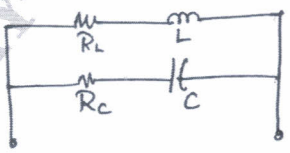


Fig. Q4 (b)

	c.	For the circuit shown in Fig. Q4 (c). Find the current through the load using Thevnin approach.  Fig. Q4 (c).	8	L3	CO2
		Module – 3			
Q.5	a.	Explain the importance of study of initial conditions in electric circuit analysis and also explain the behavior of R, L and C elements for transients.	10	L2	CO3
	b.	For the circuit shown in Fig.Q5 (b), steady state has been reached with the switch K on Position 'A'. The switch is moved to position B at t = 0. Determine the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t(0^+)$.  Fig. Q5 (b)	10	L3	CO3
		OR			
Q.6	a.	For the network shown in Fig. Q6 (a) at t = 0, switch is opened, calculate v, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t=0^+$.  Fig. Q6 (a)	10	L3	CO3
	b.	For the network shown in Fig. Q6 (b). Switch is changed from position 1 to position 2 at t = 0. Steady condition have reaced before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t=0^+$.  Fig. Q6 (b)	10	L3	CO3

		Module – 4			
Q.7	**a.**	Find the Laplace transform's of the following functions : (i) Unit step function (ii) $\sin \omega t$ (iii) $\cosh(at)$ (iv) $t.\cos(at)$	**10**	**L3**	**CO**
	b.	Find the Laplace transform of the staircase waveform shown in the Fig. Q7 (b).  Fig. Q7 (b)	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	State and explain the following : (i) STEP function (ii) Impulses responses	**10**	**L2**	**CO4**
	b.	Find the Laplace transform of the periodic waveform shown in Fig. Q8 (b).  Fig. Q8 (b)	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define the following : (i) Resonance (ii) Quality factor	**4**	**L1**	**CO5**
	b.	Obtain Z-parameters interms of Y-parameters.	**6**	**L3**	**CO5**
	c.	Find the H parameters for the circuit shown in the Fig. Q9 (c).  Fig. Q9 (c)	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	A series RLC circuit has R = 10 Ω, L = 0.01 H and C = 100 μF, which is connected across 100 V supply. Calculate (i) F_r (ii) Q (iii) B.W (iv) I_r (v) f_1 and f_2	**10**	**L3**	**CO5**
	b.	Derive the expression of resonating frequency for the parallel resonant circuit shown in Fig. Q10 (b)  Fig. Q10 (b)	**10**	**L3**	**CO5**

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