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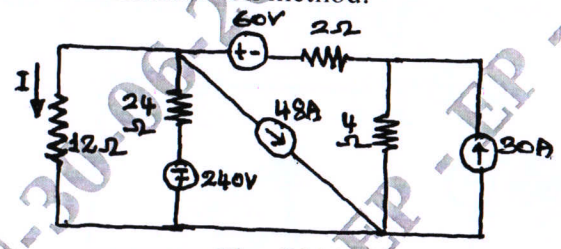
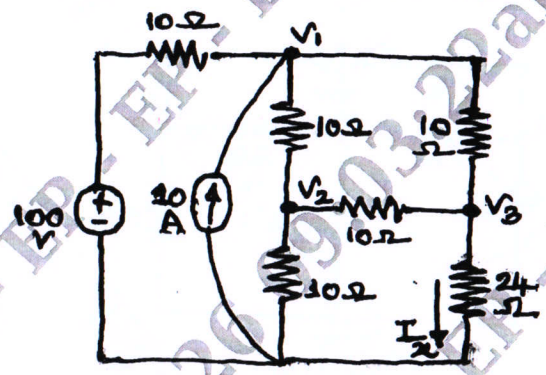
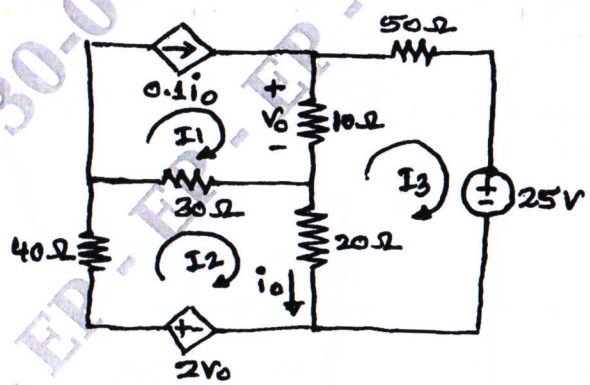
BEC304

Third Semester B.E./B.Tech. Degree Examination, June/July 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.	In the circuit shown in Fig. Q1(a), determine the current through 12Ω resister using source transformation method.  Fig. Q1(a)	6	L2	CO1
	b.	Refer the circuit shown in Fig. Q1(b). Determine all node voltages and current I_x.  Fig. Q1(b)	7	L3	CO1
	c.	In the circuit shown in Fig. Q1(c), find the value of 'Vo' , 'Io' and also all loop current using mesh analysis.  Fig. Q1(c)	7	L3	CO1

OR

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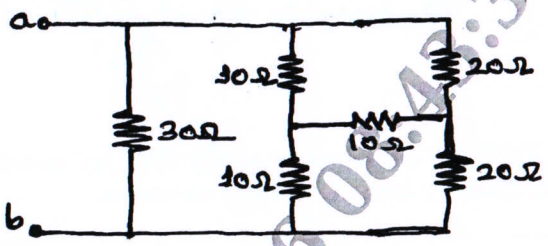
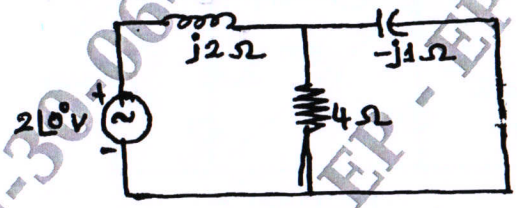
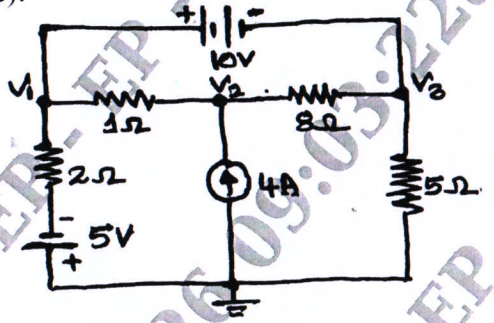
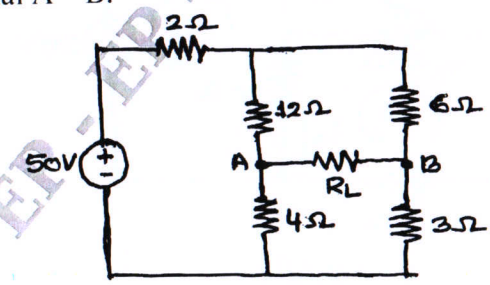
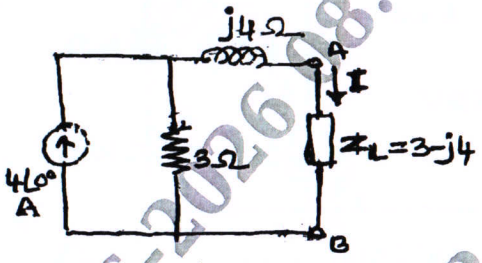
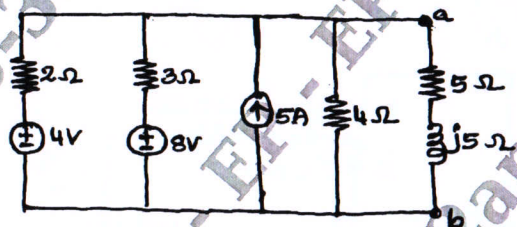
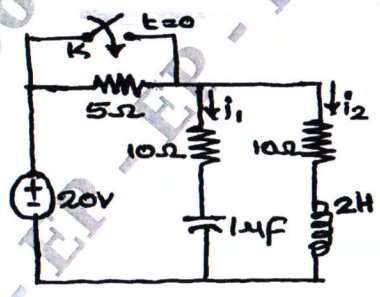
Q.2	**a.**	Determine the equivalent resistance between terminal a – b , for the network shown in Fig. Q2(a), using Star – Delta transformation.  Fig. Q2(a)	**6**	**L2**	**CO1**
	b.	Refer to network shown in Fig.Q2(b), determine loop current using Cramer's method.  Fig. Q2(b)	**7**	**L3**	**CO1**
	c.	Using super node concept, determine all node voltages for the network shown in Fig. Q2(c).  Fig. Q2(c)	**7**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	State the following theorems : i) Super position theorem ii) Norton's theorem. And procedure to evaluate the same.	**6**	**L2**	**CO2**
	b.	Refer to the network shown in Fig. Q3(b), find Thevenin's equivalent external to terminal A – B.  Fig. Q3(b)	**7**	**L3**	**CO2**

	c.	Refer to the network shown in Fig. Q3(b), find the value of R_L for which maximum power is delivered using Maximum power transfer theorem.	7	L3	CO2
		OR			
Q.4	a.	Find current 'I' using Norton's theorem for the Network shown in Fig. Q4(a).  Fig. Q4(a)	7	L3	CO2
	b.	Refer to the circuit shown in Fig. Q4(b), using Millman's Theorem , find current through (5 + j5)Ω.  Fig. Q4(b)	7	L3	CO2
	c.	State and prove maximum Power transfer theorem for DC circuits.	6	L3	CO2
		Module – 3			
Q.5	a.	Enlighten the behavior of R, L and C components at t = 0 + and t = ∞ with necessary proof.	5	L2	CO3
	b.	Refer to the circuit shown in Fig. Q5(b). Steady state is reached with switch 'K' open. The switch is closed at t = 0. Determine i_1 , i_2 , $\frac{di_1}{dt}$ and $\frac{di_2}{dt}$ at t = 0 +.  Fig. Q5(b)	10	L3	CO3
	c.	Describe the significance of initial condition theory with suitable example.	5	L2	CO3
		OR			

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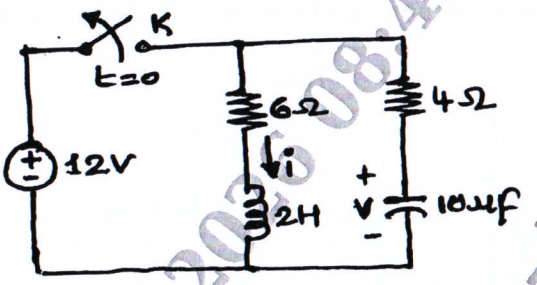
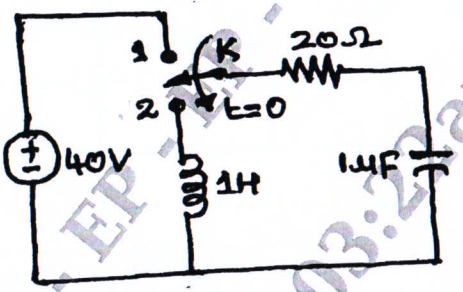
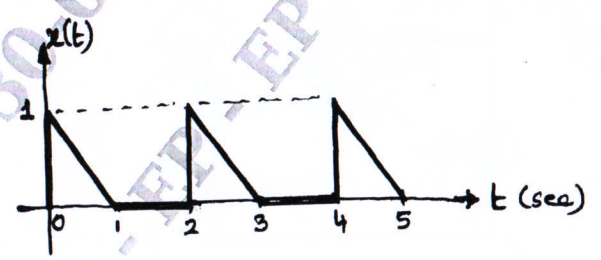
Q.6	a.	For the circuit shown in Fig. Q6(a). Find the following : i) i(0 +) and V(0 +) ii) $\frac{d_{i(0+)}}{dt}$ and $\frac{d_{v(0+)}}{dt}$.  Fig. Q6(a)	10	L3	CO3
	b.	Refer network shown in Fig. Q6(b). The switch 'K' is moved from position 1 to position 2 at t = 0. The steady state has been reached before switching. Calculate i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0 +.  Fig. Q6(b)	10	L3	CO3
		Module – 4			
Q.7	a.	Explain three important singularity functions and sketch the function and its mathematical definition.	5	L1	CO3
	b.	Prove the following Laplace transform properties : i) Linearity ii) Time shifting.	7	L2	CO3
	c.	Find the Laplace transform of periodic signal x(t) shown in Fig. Q7(c).  Fig. Q7(c)	8	L3	CO3
		OR			

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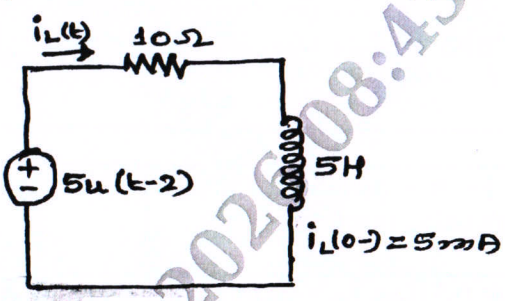
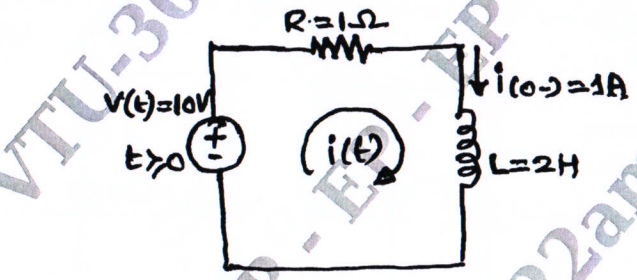
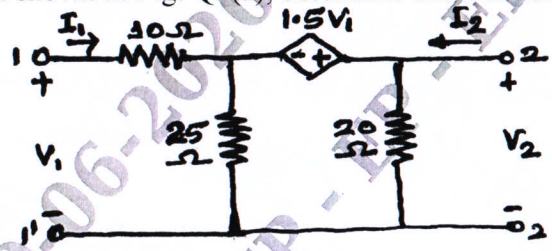
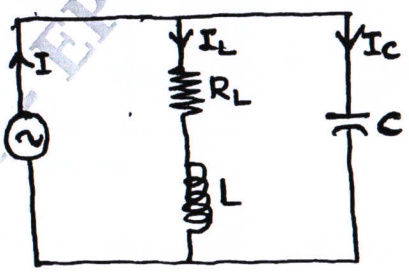
Q.8	**a.**	Refer to the RL circuit shown in Fig. Q8(a). i) Write a differentiate equation for the inductor current $i_L(t)$. ii) Find $I_L(s)$, the Laplace transform of $i_L(t)$ iii) Solve for $i_L(t)$.  Fig. Q8(a)	**8**	**L3**	**CO3**
	b.	For the circuit shown in Fig. Q8(b), find i(0) and i(∞) using initial and final value theorem.  Fig. Q8(b)	**8**	**L3**	**CO3**
	c.	Find the Laplace transform of Fundamental signals step , Ramp and Impulse.	**4**	**L1**	**CO3**
		Module – 5			
Q.9	**a.**	For the network shown in Fig. Q9(a), determine short circuit parameters.  Fig. Q9(a)	**10**	**L2**	**CO4**
	b.	Derive the resonant frequency "f_r" of network shown in Fig. Q9(b).  Fig. Q9(b)	**6**	**L3**	**CO5**

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	c.	Define the following terms : i) Selectivity ii) Quality factor iii) Half power frequencies iv) Bandwidth.	4	L1	CO5
		OR			
Q.10	a.	Derive an expression for h – parameters interms of Y – parameters and calculate h – parameters using results of Q9(a).	10	L4	CO4
	b.	Two coils, one of $R_1 = 0.51\Omega$, $L_1 = 32mH$, the other of $R_2 = 1.3\Omega$ and $L_2 = 15$ mH and two capacitors of 25 μF and 62 μF are all in series with a resistance of 0.24Ω. Determine the following for the circuit with supply voltage of 20V. i) Resonance frequency 'fo' ii) Q of each coil iii) Q of circuit iv) Bandwidth v) Current at resonance vi) Half power frequencies f_1 and f_2.	10	L3	CO5

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