

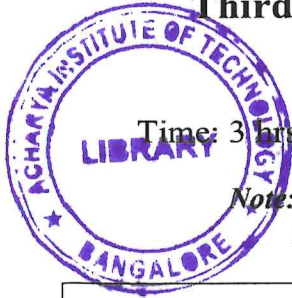
Third Semester B.E./B.Tech. Degree Examination, June/July 2026

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.*

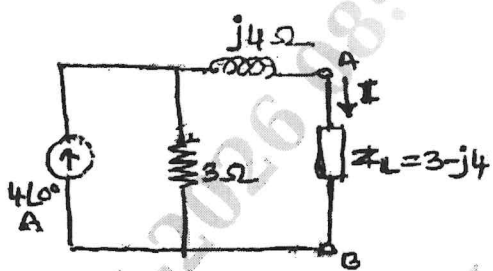
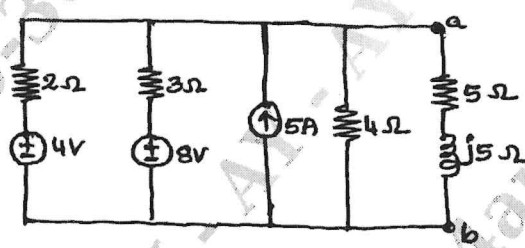
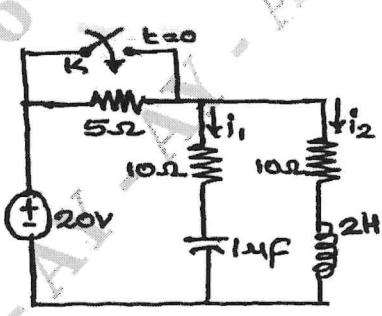


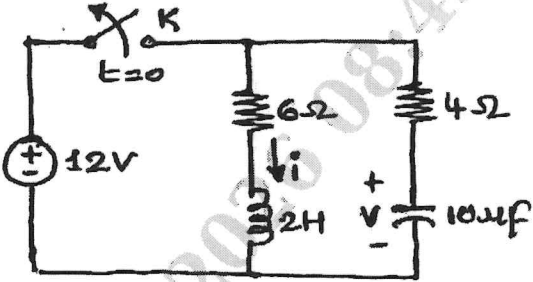
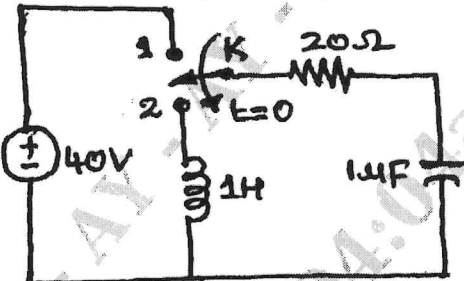
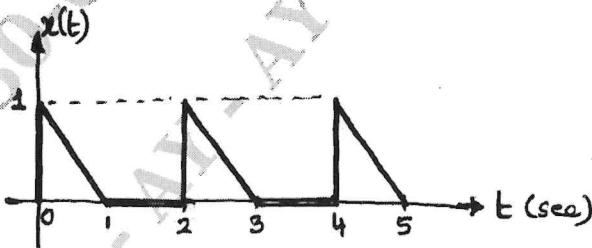
Module - 1				M	L	C
Q.1	a.	In the circuit shown in Fig. Q1(a), determine the current through 12Ω resistor using source transformation method. Fig. Q1(a)	6	L2	CO1	
	b.	Refer the circuit shown in Fig. Q1(b). Determine all node voltages and current I_x. Fig. Q1(b)	7	L3	CO1	
	c.	In the circuit shown in Fig. Q1(c), find the value of 'V_o', 'I_o' and also all loop current using mesh analysis. Fig. Q1(c)	7	L3	CO1	

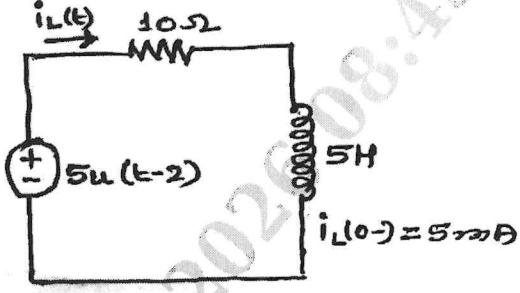
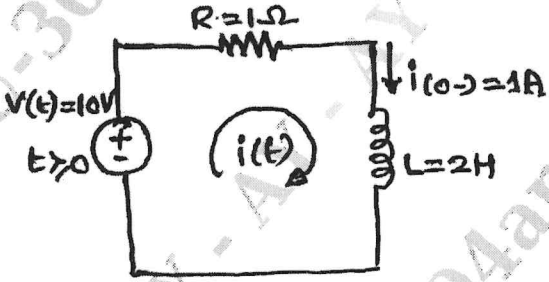
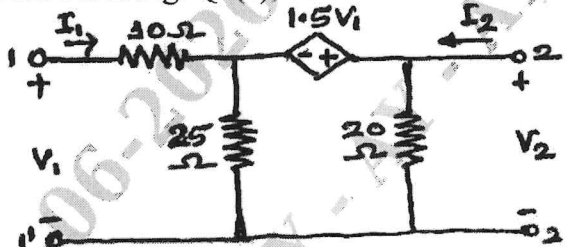
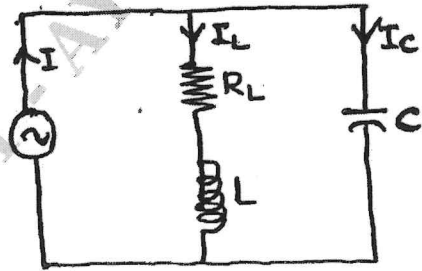
OR

OR

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).	7	L3	CO2
		 Fig. Q4(a)			
	b.	Refer to the circuit shown in Fig. Q4(b), using Millman's Theorem, find current through $(5 + j5)\Omega$.	7	L3	CO2
		 Fig. Q4(b)			
	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 $t = \infty$ 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 $t = 0 +$.	10	L3	CO3
		 Fig. Q5(b)			
	c.	Describe the significance of initial condition theory with suitable example.	5	L2	CO3
OR					

Q.6	a. For the circuit shown in Fig. Q6(a). Find the following : i) $i(0+)$ and $V(0+)$ ii) $\frac{di(0+)}{dt}$ and $\frac{dV(0+)}{dt}$  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				

Q.8	a. Refer to the RL circuit shown in Fig. Q8(a). - Write a differential equation for the inductor current $i_L(t)$. - Find $I_L(s)$, the Laplace transform of $i_L(t)$ - Solve for $i_L(t)$.  Fig. Q8(a)	8	L3	CO3
	b. For the circuit shown in Fig. Q8(b), find $i(0)$ and $i(\infty)$ 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

	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 in terms of Y – parameters and calculate h – parameters using results of Q9(a).	10	L4	CO4
	b.	Two coils, one of $R_1 = 0.51\Omega$, $L_1 = 32\text{mH}$, the other of $R_2 = 1.3\Omega$ and $L_2 = 15\text{mH}$ and two capacitors of $25\mu\text{F}$ and $62\mu\text{F}$ 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
