PVP 23

Code: 23EC3201

I B.Tech - II Semester – Regular / Supplementary Examinations
JUNE 2026

NETWORK ANALYSIS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

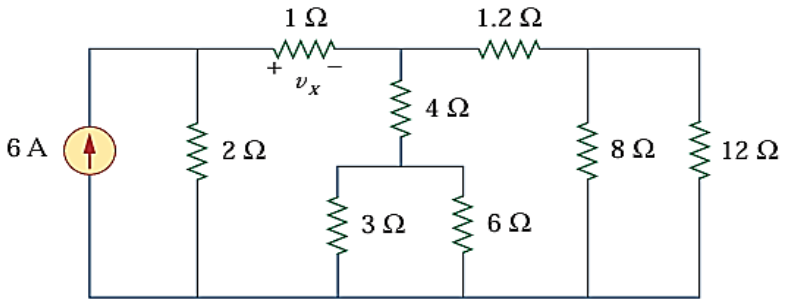
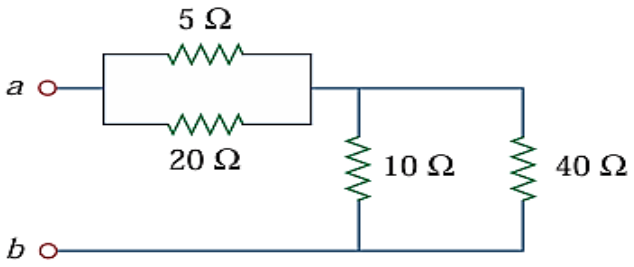
BL – Blooms Level CO – Course Outcome

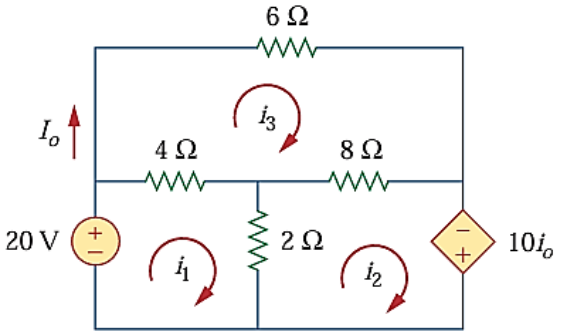
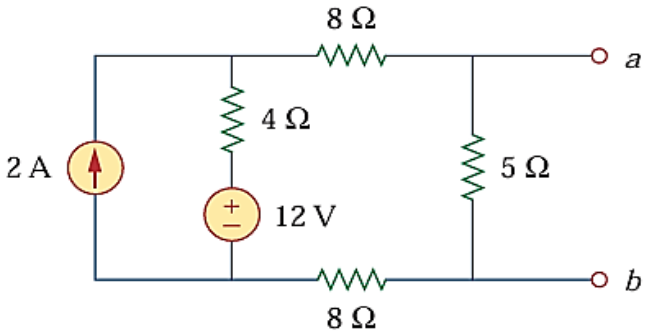
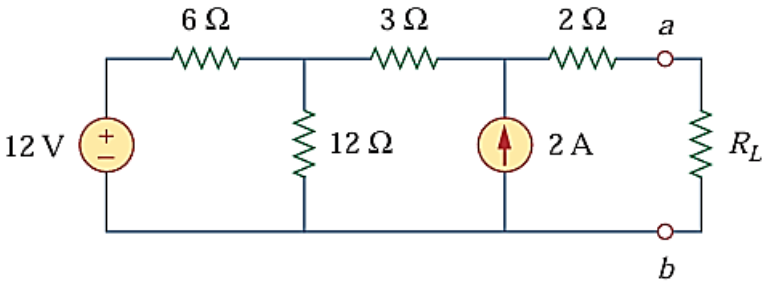
PART – A

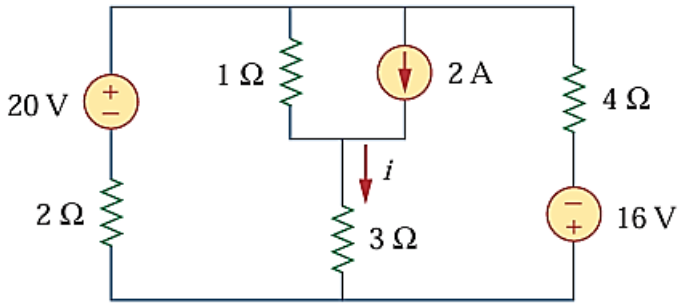
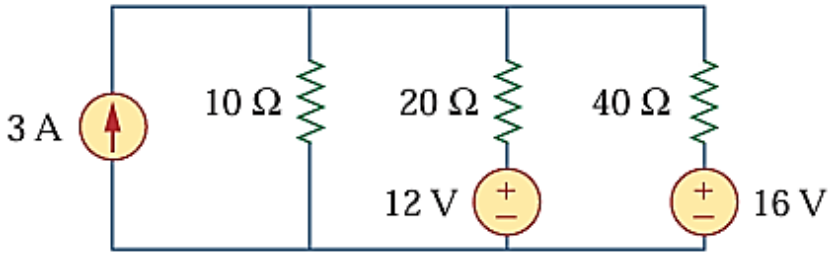
		BL	CO
1.a)	What is meant by Star–Delta (Y–Δ) transformation?	L1	CO1 CO2 CO3
1.b)	Define impedance and phase angle in AC circuits.	L2	CO1 CO2 CO3
1.c)	State the Superposition Theorem.	L2	CO1 CO2
1.d)	Define source transformation with an example.	L2	CO1 CO2
1.e)	Define resonance in an RLC circuit.	L2	CO1 CO4
1.f)	What is the Quality Factor (Q) of a resonant circuit?	L1	CO1 CO4
1.g)	Define the time constant of an series RC circuit.	L2	CO1 CO3

1.h)	What are initial and final conditions of a capacitor in transient analysis?	L1	CO1 CO3
1.i)	State the conditions for reciprocity and symmetry of a two-port network.	L2	CO1 CO5
1.j)	Define Y-parameters.	L2	CO1 CO5

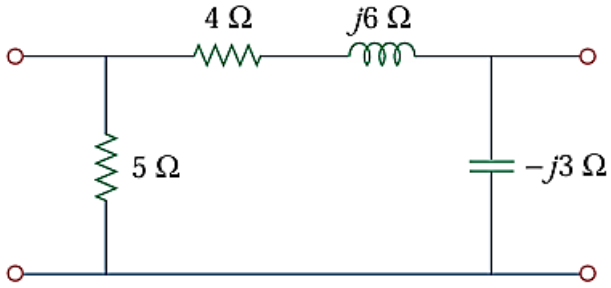
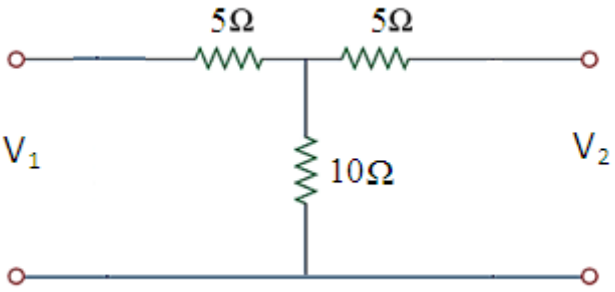
PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	In the circuit shown in Figure 1, determine the power absorbed by the 12Ω resistor.  Figure 1	L3	CO1 CO2 CO3	5 M
	b)	Calculate the equivalent resistance R_{ab} at terminals a-b for the circuit shown in Figure 2.  Figure 2.	L3	CO1 CO2 CO3	5 M
OR					
3	a)	Apply mesh analysis to find I_0 in the circuit of Figure 3.	L3	CO1 CO2 CO3	5 M

		 Figure 3			
	b)	Two impedances Z_1 = 10 + j12 and Z_2 = 12 – j10 are connected in parallel across a 230 V, 50 HZ supply. Calculate the current, power factor and power consumed.	L3	CO1 CO2 CO3	5 M
		UNIT-II			
4	a)	Find the Norton equivalent circuit for the circuit shown in Figure 4 at terminals a-b.  Figure 4	L3	CO1 CO2	5 M
	b)	Find the value of R_L for maximum power transfer in the circuit of Figure 5. Find the maximum power.  Figure 5	L3	CO1 CO2	5 M

		OR			
5	a)	For the circuit in Figure 6, use superposition theorem to find current i.  Figure 6	L3	CO1 CO2	5 M
	b)	Use source transformations to reduce the circuit in Figure 7 to a single voltage source in series with a single resistor.  Figure 7	L3	CO1 CO2	5 M
		UNIT-III			
6	a)	Explain parallel resonance and derive expressions for resonant frequency and bandwidth.	L2	CO1 CO4	4 M
	b)	A series RLC circuit has R=10Ω, L=0.2H, and C=50μF. Determine: (i) Resonant frequency (ii) Quality factor (iii) Bandwidth (iv) Voltages across L and C at resonance.	L3	CO1 CO4	6 M
		OR			

7	a)	Two magnetically coupled coils have inductances of 4 H and 9 H with a mutual inductance of 3 H. Find the coefficient of coupling and the equivalent inductance when connected in: (i) Series aiding (ii) Series opposing.	L2	CO1 CO4	6 M
	b)	A coil has a Quality Factor of 50 at a resonant frequency of 1 MHz. Determine its bandwidth.	L3	CO1 CO4	4 M
		UNIT-IV			
8		A series RL circuit with R=20Ω and L=0.5H is connected to a 100 V DC supply at t=0. Determine: (i) Time constant (ii) Expression for current (iii) Current at t=0.05s.	L3	CO1 CO3	10 M
		OR			
9		A series RLC circuit has R=5Ω, L=1H, and C=0.04F. Determine whether the circuit is overdamped, underdamped, or critically damped.	L3	CO1 CO3	10 M
		UNIT-V			
10	a)	For a two-port network where $V_1=10I_1+5I_2$, $V_2=5I_1+8I_2$. Determine the Z-parameters and verify whether the network is reciprocal and symmetric.	L3	CO1 CO5	5 M

	b)	Obtain the h parameters for the given two-port network shown in Figure 8.  Figure 8	L3	CO1 CO5	5 M
		OR			
11	a)	A symmetrical T-network has series arm of 5Ω each and a shunt arm of 10Ω. Determine its Z-parameters.  	L3	CO1 CO5	5 M
	b)	Given the transmission parameters $[\mathbf{T}] = \begin{bmatrix} 3 & 20 \\ 1 & 7 \end{bmatrix}$ obtain the Z and Y parameters.	L3	CO1 CO5	5 M