Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (R) (FT/WP) Examination November 2025 (2024 Scheme)

Course Code: PCEET302

Course Name: CIRCUITS & NETWORKS

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

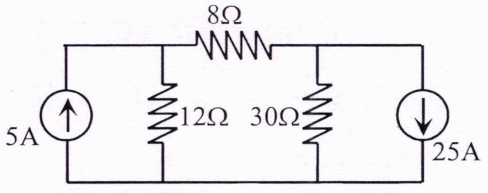
	(Answer all questions. Each question carries 3 marks)	CO	Marks
1	Write the conditions for maximum power transfer applied to DC and AC circuits.	CO1	(3)
2	What are super mesh and super node in electric circuit analysis? Write one example for each?	CO1	(3)
3	Define bandwidth and Q-factor in a series RLC circuit.	CO3	(3)
4	For an unbalanced delta connected load, $V_{AB} = 220\angle 0°V$, $V_{BC} = 220\angle 120°V$, $V_{CA} = 220\angle -120°V$, $I_{AB} = 44\angle 90°A$, $I_{BC} = 22\angle 30°A$ and $I_{CA} = 22\angle -120°A$. Find the total active power, reactive power and apparent power.	CO4	(3)
5	Draw the s-domain equivalent circuit (transformed circuit) of i) an R-L series circuit with initial current I_o and ii) an R-C series circuit with initial voltage V_o. Both circuits are supplied from a voltage source.	CO2	(3)
6	Explain the overdamped, underdamped and critically damped response of an RLC series circuit.	CO2	(3)
7	Derive the condition for symmetry in terms of Z-parameters in a two-port network.	CO5	(3)
8	Write a short note on the dot convention in coupled circuits.	CO6	(3)

PART B

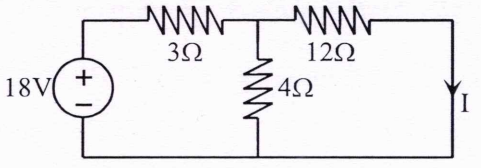
(Answer any one full question from each module, each question carries 9 marks)

Module -1

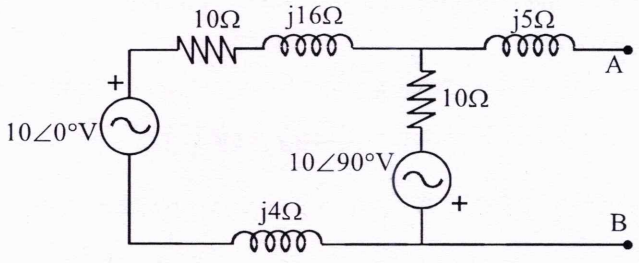
9 a) For the circuit shown in figure below, find the current through 8Ω resistor using superposition theorem. CO1 (5)



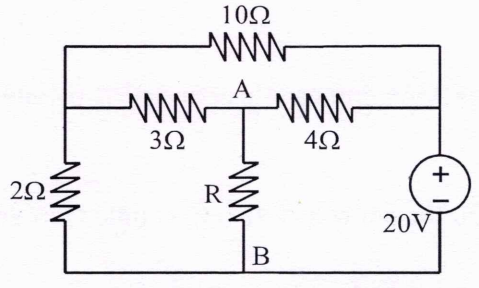
b) Verify the Reciprocity theorem using the circuit shown below. CO1 (4)



10 a) For the circuit shown in figure below, determine the Thevenin equivalent circuit between the terminals A and B. CO1 (5)



b) For the network shown in figure below, find the value of resistance R between A and B for maximum power transfer to R from the rest of the circuit. CO1 (4)

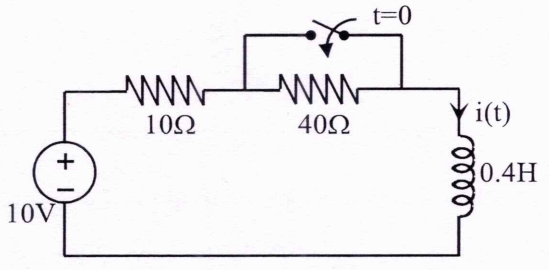


Module -2

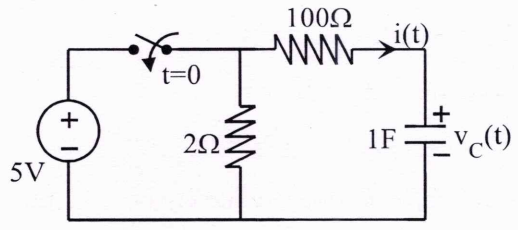
11	a)	Derive the expression for resonant frequency in Hz of a series RLC circuit. Also plot the impedance Vs frequency characteristics showing the lagging and leading power factor regions.	CO3	(4)
	b)	A series RLC circuit has the following parameter values: R = 10Ω; L = 0.014H, C = 100μF. Compute the following i) Resonant frequency ii) Quality factor of the circuit iii) Bandwidth iv) Lower and upper cut-off frequency points of the bandwidth.	CO3	(5)
12	a)	An unbalanced 3-phase 4-wire star-connected load is supplied from balanced voltages of 100 V (phase). Calculate the line currents and the neutral current. Take Z_A =15 Ω, Z_B=10 +j5 Ω, Z_C=6+j8 Ω. Assume ACB phase sequence. Also find the total active power.	CO4	(6)
	b)	An unbalanced 3-phase 3-wire star-connected load with load resistances 10Ω, 20Ω and 25Ω are connected to a 400V symmetrical system. Determine the displacement neutral voltage. Phase sequence is ABC.	CO4	(3)

Module -3

13	a)	Determine the time domain representation of the current through an RL series circuit excited by a DC voltage source at t = 0. Draw i(t) Vs t characteristics and define the time constant in RL series circuit.	CO2	(4)
	b)	The switch is kept open for a long time, as shown in the circuit. Then the switch is closed at t = 0. Find the expression for i(t) for t > 0.	CO2	(5)

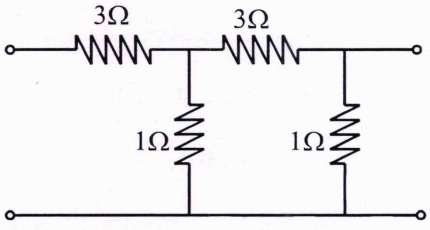


14	a)	An RLC series circuit with R = 9Ω; L = 1H and C = 0.05F is excited by a DC voltage source of 20V at t = 0. Find the expression for current i(t) for t > 0. Assume zero initial conditions.	CO2	(4)
	b)	For the network shown in figure below, the switch is closed at t = 0. Draw the transformed circuit and hence determine i(t) and $v_C(t)$ for t > 0.	CO2	(5)

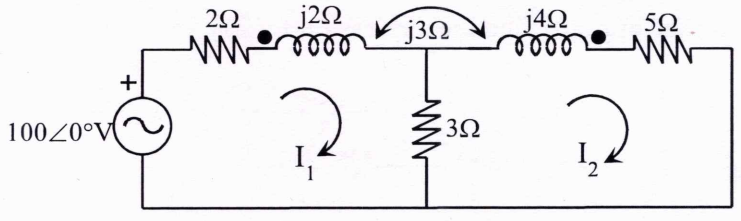


Module -4

15	a)	Define impedance (Z) and admittance (Y) parameters in the two-port network analysis and draw the equivalent circuits.	CO5	(4)
	b)	For the network shown in figure below, determine the h-parameters.	CO5	(5)



16	a)	For the network shown in figure below, write the steady state equations and hence find the currents I_1, I_2 and the power dissipated in the 5Ω resistor.	CO6	(6)



	b)	Two coils connected in series have an equivalent inductance of 1 H when connected in aiding, and an equivalent inductance of 0.5 H when connected in opposition. Calculate the mutual inductance of these coils.	CO6	(3)