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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S3 (R,S) / S3 (WP) (R,S) / S1 (PT) (S,FE) Examination November 2024 (2019 Scheme)

**Course Code: EET201**

**Course Name: CIRCUITS AND NETWORKS**

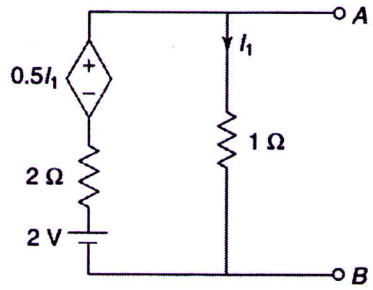
Max. Marks: 100 Duration: 3 Hours

**PART A**

***Answer all questions. Each question carries 3 marks*** Marks

1 State and explain Maximum Power transfer theorem. Also derive the condition for maximum power transfer for DC circuits. (3)

2 (3)




Find Norton's Equivalent of the circuit shown above.

3 Write the equations and plot the current responses of RL and RC circuits with DC excitation. (3)

4 A 30Ω resistance is connected to a 15H inductor in series. A 60 V DC source is connected to the above-mentioned combination at t=0 s. Find the current response i(t). (3)

5 State 'Dot rule' for coupled circuits. (3)

6 What is a transfer function? What are its four possible forms (3)

7 Explain the condition for resonance in a series RLC circuit? What is Quality factor? (3)

8 Determine the resonant frequency, bandwidth and Q factor for a series resonant circuit having R = 10Ω, L = 0.1H, and C = 10μF. (3)

9 Derive the condition for reciprocity of Z parameters. (3)

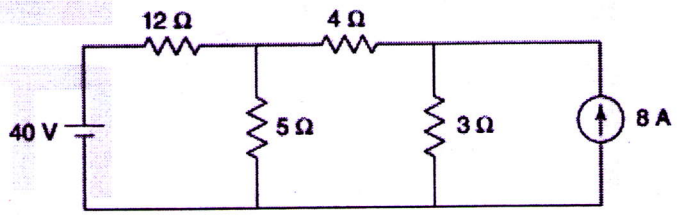
10 Prove that the resultant Z parameter matrix for the series -connected networks is the sum of Z matrices of each individual two-port network. (3)

## PART B

*Answer any one full question from each module. Each question carries 14 marks*

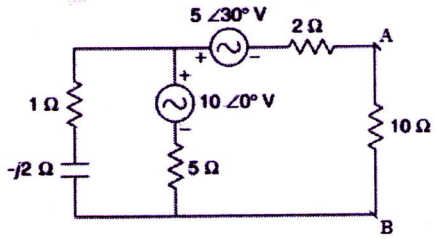
### Module 1

11a Find Current through 4 Ohm resistor using superposition theorem (12)




11b Also find the power dissipated across 4 Ω resistor in the above circuit. (2)

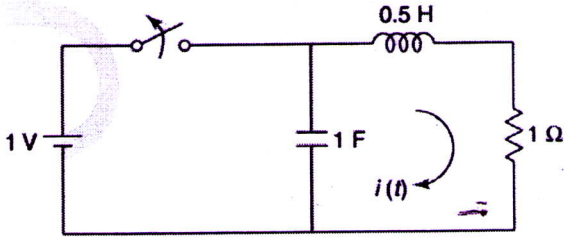
12a Determine the Thevenin's Equivalent across terminals A and B (10)




12b Calculate the current through 10 Ω resistor in the above circuit. (4)

### Module 2

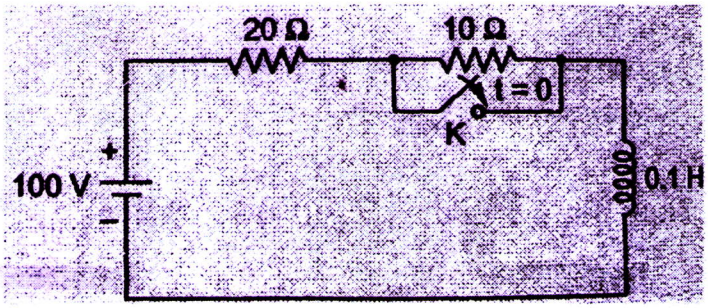
13a For the network shown in figure, switch is opened at t=0. Steady state condition is achieved before t=0. Find i(t) (10)




13b Explain the classification of series RLC circuits based on damping ratio. (4)

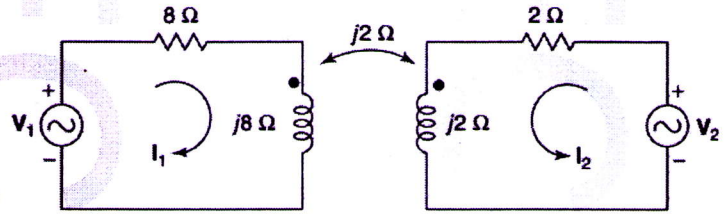
14a A sinusoidal voltage of 10sin100t is connected in series with a switch and R = 10Ω and L = 0.1H. If the switch is closed at t = 0, determine the transient current i(t). (7)

14b A DC voltage of 100V is applied in the circuit shown below. The switch was kept open for a long time and closed at t=0. Find the expression for resulting current. (7)



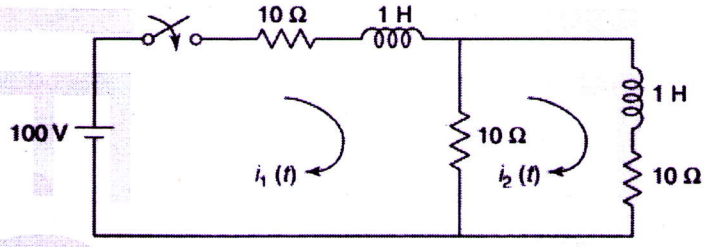

**Module 3**

15a Determine the ratio $V_2/V_1$ in the circuit if $I_1 = 0$ (10)




15b Draw the S domain equivalent circuit of an Inductor with and without initial conditions. (4)

16a For the below network, switch is closed at t=0. Determine transformed circuit for t > 0. Assuming zero initial conditions. (4)



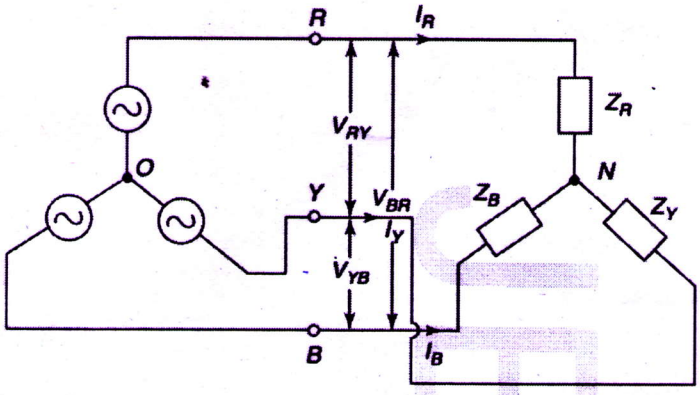

16b For the above circuit, determine currents $i_1(t)$ and $i_2(t)$ using mesh analysis (10)

**Module 4**

17a A 400V, 50 Hz, 3 phase supply of phase sequence ABC is supplied to a delta connected load consisting of 100Ω resistance between lines A and B, 318mH inductance between lines B and C and 31.8μF capacitance between lines C and A. Determine phase and line currents. (10)

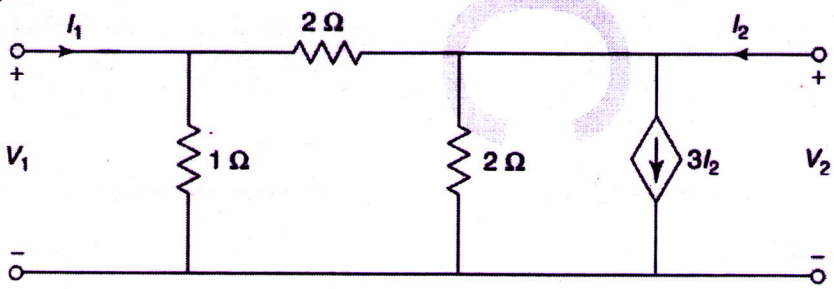
17b What is neutral shift in a three-phase unbalanced star connected load. (4)

18 A symmetrical 440 V, 3-phase system supplied a star-connected load with the branch impedances $Z_R = 10\ \Omega$, $Z_Y = j5\ \Omega$, $Z_B = -j5\ \Omega$ as shown in figure below. Calculate line currents and voltage across each phase impedance. The phase sequence is RYB. (14)

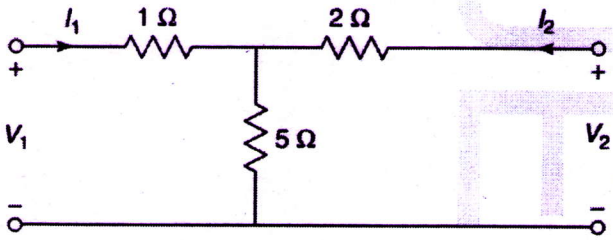



**Module 5**

19 For the network shown below find Z and Y parameters (14)




20a Find Transmission parameters for the network (8)




20b Derive the expression for h parameters in terms of z parameters. (6)

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