Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE) (FT/WP) / S1 (PT) Examination November/December 2025 (2019 Scheme)

Course Code: EET201

Course Name: CIRCUITS AND NETWORKS

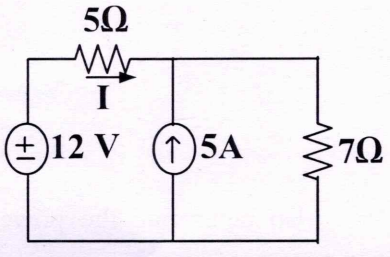
Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1 State and explain maximum power transfer theorem for a circuit containing an AC source with impedance feeding a load of variable impedance (3)

2 Using superposition theorem, determine the current I through 5Ω. (3)



3 Define time constant of a series RC circuit. Explain the effect of time constant in the current through capacitor. (3)

4 A resistance R and 5μF are connected in series across a 100V DC source at t=0. Calculate the value of R such that voltage across the capacitor reaches 50V at t=5 s after the switch is closed at t=0. (3)

5 Obtain the transfer function of a typical series RLC circuit. Take the voltage across the inductor as the output variable. (3)

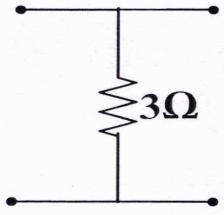
6 Define co-efficient of coupling. Explain the range of values of co-efficient of coupling. (3)

7 Explain the concept of neutral shift voltage in three phase 3 wire systems. (3)

8 Explain with waveforms the variation of impedance, current and power factor with respect to frequency in a series RLC circuit. (3)

9 What are h- parameters? Draw the equivalent circuit of a two port network with h- parameter representation. (3)

10 Find the transmission parameters of the given network. (3)

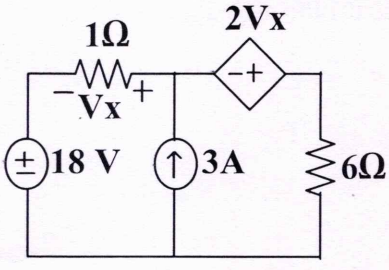


PART B

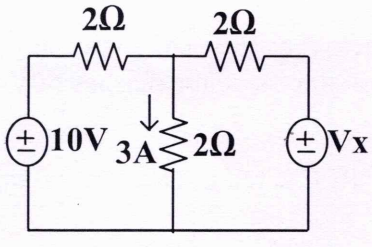
Answer any one full question from each module. Each question carries 14 marks

Module 1

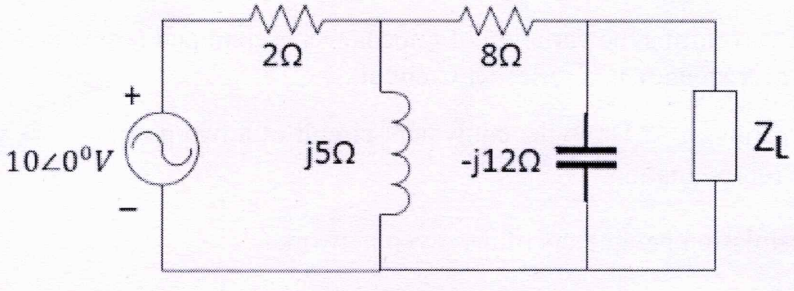
11 (a). Using Thevenin's theorem calculate the current in the 6Ω resistor of the following circuit. (9)



(b). Using superposition theorem determine Vx. Also determine the power delivered by Vx. (5)

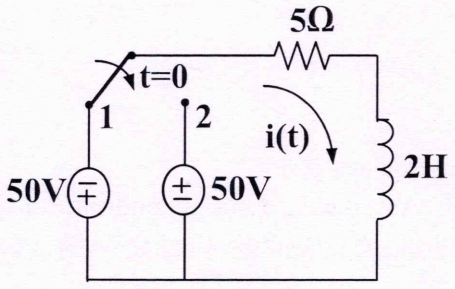


12 In the following circuit, determine the load impedance(Z_L) to be connected to transfer maximum power to it. Also determine the maximum power transferred to the load. (14)



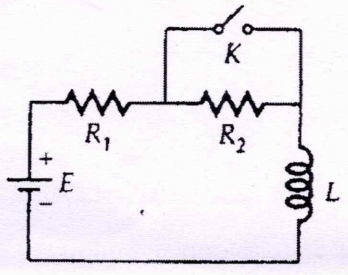
Module 2

13 (a) . In the RL circuit, the switch is in position 1 for a long time. Determine the expression for i(t) if the switch is moved to position 2 at t=0. (7)



(b) Derive the expression for current i(t) in a series RC circuit excited by an AC source, $e(t)= E_m \sin\omega t$. Assume no initial energy stored in the circuit (7)

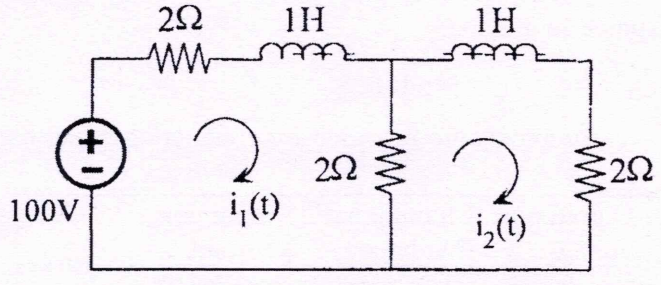
14 (a)In the given circuit the switch K is open for a long time. At time t=0, K is closed,find the expression for the current through the inductor for t>0. Given E=10V, R_1=1Ω, R_2=2 Ω, L= 2H. (7)



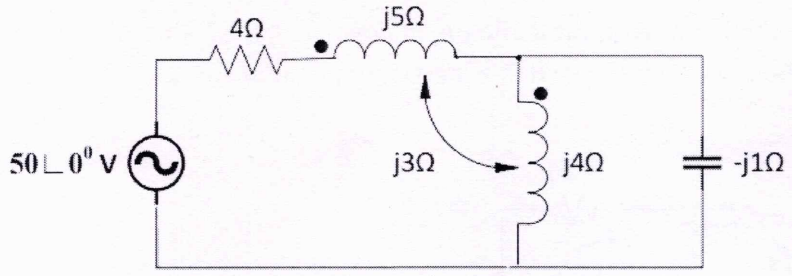
(b) A RLC series circuit is excited by a DC source of 18V at t=0. If there are no initial energy storage, determine the current through the circuit. Given R=20Ω, L=2H and C=0.02F. Also draw the initial and final state of the circuit. (7)

Module 3

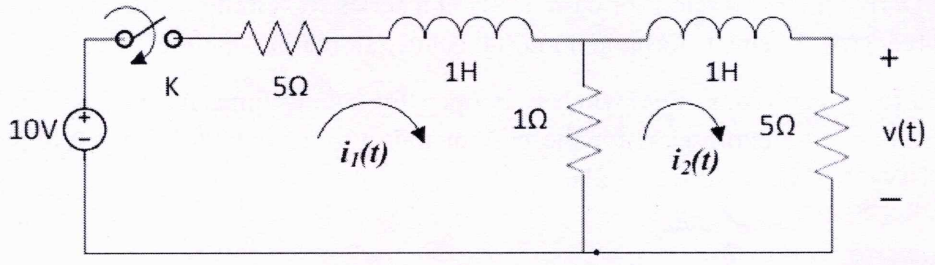
15 (a) Draw the transformed circuit of the following figure. Using the Laplace transform technique determine the mesh current $i_2(t)$. (8)



(b) Determine the current through –j1Ω of the following circuit. (6)



16 The switch K in the circuit given below is closed at $t = 0$. (14)
i.Determine the transformed circuit for $t > 0$. Assume zero initial conditions. (4)
ii. Find the time domain expression for the voltage v(t) across the 5Ω resistor for $t > 0$. Use mesh analysis. (10)



Module 4

17 A three phase delta connected load has $\bar{Z}_{RY} = 20 - j75\Omega$, $\bar{Z}_{YB} = 70.7 - j70.7\Omega$ and $\bar{Z}_{BR} = 100 + j50\Omega$ is connected to a a balanced 3-phase 400 V supply. Determine the phase currents, line currents, active and reactive power consumed by the load. (14)

18 A three phase four wire symmetrical 440V, RYB system supply power to a star connected load in which $\bar{Z}_R = 10\angle 0^o\ \Omega$, $\bar{Z}_Y = 10\angle -26.8^o\ \Omega$ and $\bar{Z}_B = 10\angle 26.8^o\ \Omega$. Find the line currents, neutral current, total active and reactive power consumed by the load. (14)

Module 5

19 (a). The following measurements are recorded by conducting experiments on a two port network. (7)

Output port terminals open circuited	Output port voltage	Input port voltage	Input port current
	$25\angle 0^o(V)$	$100\angle 0^o(V)$	$20\angle 0^o(A)$
Input port terminals open circuited	Output port voltage	Input port voltage	Output port current
	$100\angle 0^o(V)$	$50\angle 0^o(V)$	$10\angle 0^o(A)$

(i)Write the governing equation of the twoport network using the above details.

(ii)Determine the driving point and transfer impedances of the two port network
(iii)If two such identical networks are connected in series, find the overall open circuit impedance parameters of the combined network.

(b) The Z parameters of a two port network are $Z_{11}=10\Omega$, $Z_{12}= Z_{21}=5\Omega$ and $Z_{22}=15\Omega$. Find the equivalent T network and ABCD parameters. (7)

20 (a)Derive the conditions for symmetry and reciprocity in terms of hybrid parameters. (7)

(b) Derive the relationship between following parameters. (7)

(i) ABCD parameters in terms of Y parameters
(ii) Y parameters in terms of hybrid parameters.

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