Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE)/S1 (PT)(S) June 2024 (2019 Scheme)/S3 (WP)(R) December 2023 Examination

Course Code: ECT205

Course Name: NETWORK THEORY

Max. Marks: 100 Duration: 3 Hours

PART A

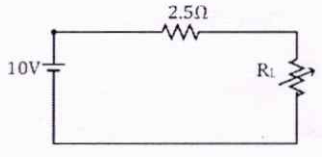
Answer all questions. Each question carries 3 marks Marks

1 Differentiate between independent and dependent sources. Write down various types of dependent sources. (3)

2 Explain super mesh and super node analysis. (3)

3 State and explain Norton's theorem. (3)

4 In the circuit shown find the maximum power transferred to the load. (3)



5 Find the inverse Laplace Transform of the function (3)

$$F(s) = \frac{s+2}{s^2+10s+9}$$

6 Find the final value of the current whose Laplace Transform is (3)

$$I(s) = \frac{0.42}{s(s^2+0.35s+0.816)}$$

7 Give the significance of poles and zeros. (3)

8 State whether the given function is a driving point function or not. (3)

$$F(s) = \frac{5s(s^2+4)}{(s^2+1)(s^2+3)}$$

9 Represent h parameter in terms of ABCD parameters. (3)

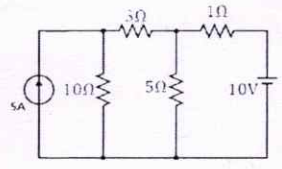
10 Define image impedance for a 2-port network. (3)

PART B

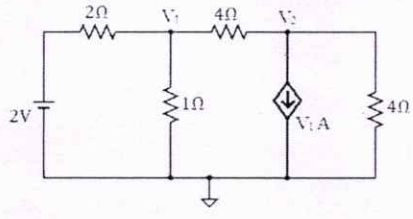
Answer any one full question from each module. Each question carries 14 marks

Module 1

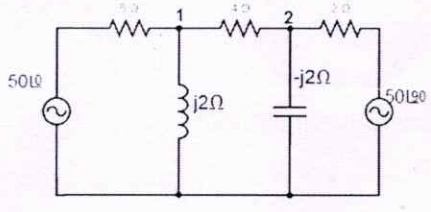
11.a) Write down the mesh equations and determine the current through 1Ω resistor for the network shown in figure. (6)



b) Determine the node voltages V_1 and V_2 by Nodal Analysis. (8)

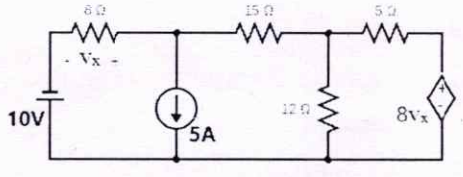


12. Determine the voltages at nodes 1 and 2 in the network shown in figure. (14)



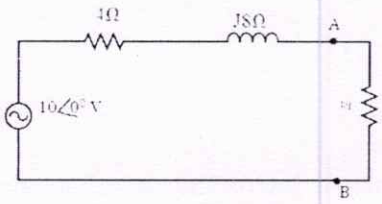
Module 2

13.a) Find the current I in 8 Ω resistor by Superposition theorem. (10)

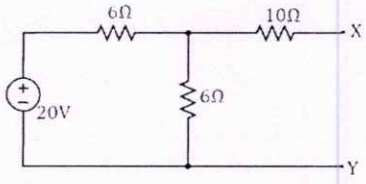


b) State and explain reciprocity theorem using an example. (4)

14.a) Find the value of load resistance for which the source delivers maximum power to it and also find the maximum power transferred. (7)

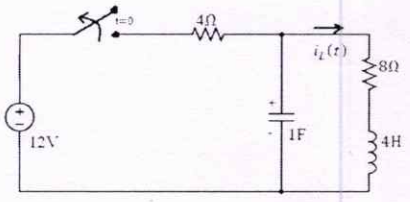


b) Draw the Thevenin's equivalent for the circuit shown in figure with respect to the terminals X-Y and find the voltage across a 4Ω resistor connected across the terminals. (7)

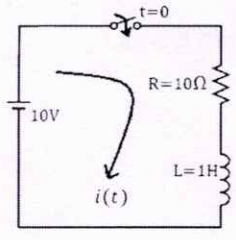


Module 3

15 Determine the current $i_L(t)$ for $t \geq 0$ for the circuit shown in figure. The switch is opened at time t = 0. (14)



16.a) For a series R-L circuit shown in figure, a constant voltage of 10V is applied at t = 0. Using Laplace Transform find $i(t)$ and at what time does the voltage across the resistor and inductor equals. (9)

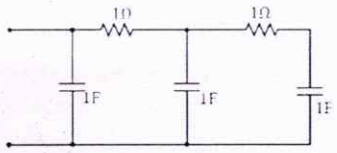


b) Find the impulse response for the transfer function F(s). (5)

$$F(s) = \frac{2s + 4}{s^2 + 4s + 13}$$

Module 4

17.a) For the network shown in figure, find the driving point impedance, Z(s) and plot the pole-zero diagram. (10)

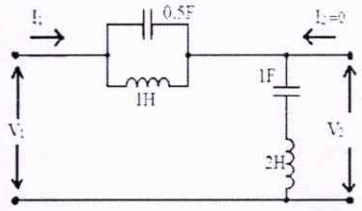


b) Write down the necessary conditions for the driving point functions. (4)

18.a) Draw the pole-zero diagram for the given network function and hence obtain $v(t)$ from the plot. (5)

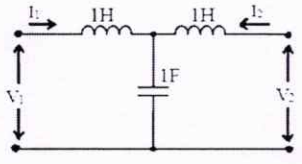
$$V(s) = \frac{4s}{(s+2)(s+3)}$$

b) For the network shown in figure determine the functions $Z_{11}(s)$ and $G_{21}(s)$. (9)



Module 5

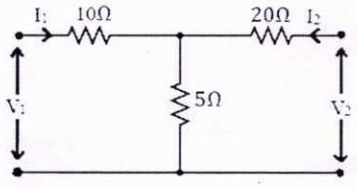
19.a) Find the Z parameters of the given two port network, (9)



b) Derive the condition for symmetry and reciprocity for Y parameters. (5)

20.a) The Z-parameters of a two-port network are $Z_{11} = 20\Omega$, $Z_{22} = 30\Omega$ and $Z_{12} = Z_{21} = 10\Omega$. Find ABCD parameters of the network. (8)

b) Find the image parameters of the network shown in figure. (6)



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