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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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

Course Code: ECT205

Course Name: NETWORK THEORY

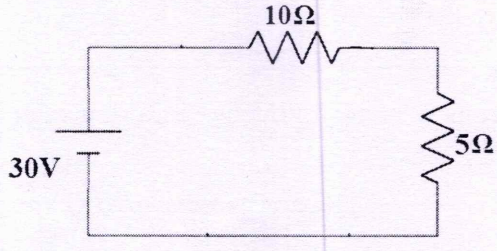
Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1 Explain the concept of super mesh. (3)

2 Find the current through 5Ω resistor by applying suitable source transformation. (3)



3 Explain the steps for determining the Thevenin equivalent network of a network having only dependent sources. (3)

4 State and prove maximum power transfer theorem. (3)

5 Obtain the Laplace Transform of the following signal. (3)

$$x(t) = 2t^2 - 3e^{-t}$$

6 Derive the time domain response of the RC circuit with pulse input. (3)

7 Obtain the pole-zero diagram of the following function. (3)

$$H(s) = \frac{s^2 + 2}{(s+3)(s^2 + s + 1)}$$

8 Write the necessary conditions for the driving point functions. (3)

9 Derive the condition of symmetry in terms of short circuit admittance parameters. (3)

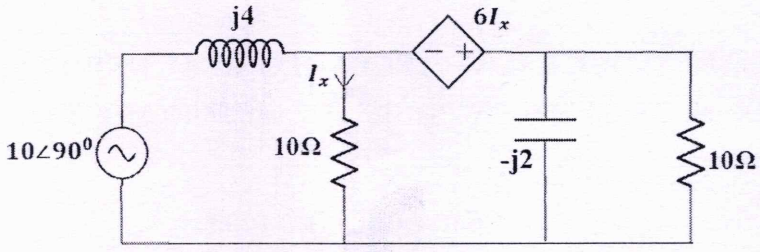
10 Define characteristic impedance, image impedance and propagation constant. (3)

PART B

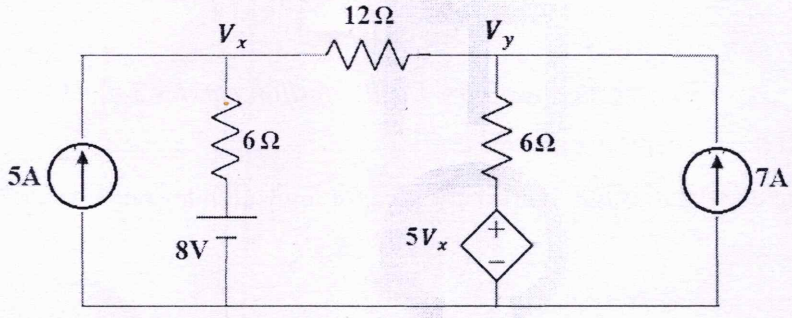
Answer any one full question from each module. Each question carries 14 marks

Module 1

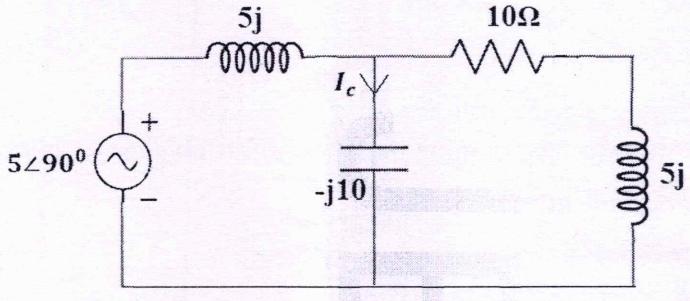
11 Find the current I_x using node analysis. (14)



12 (a) Determine the voltages V_x and V_y using node analysis (8)

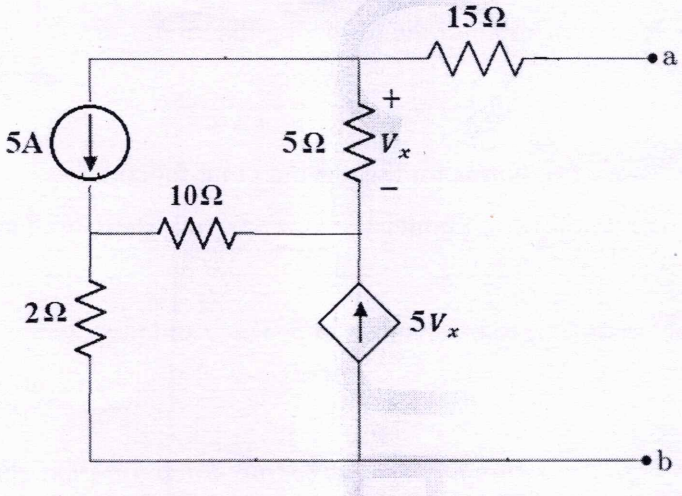


(b) Evaluate the current I_c in the following network using mesh analysis. (6)

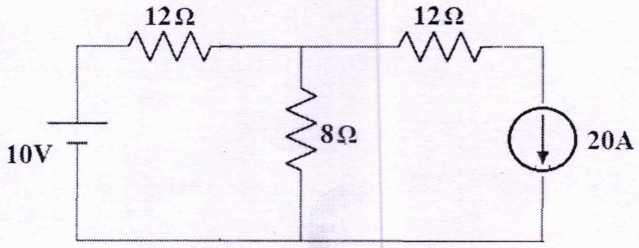


Module 2

13 Determine the Norton equivalent network of the following network. (14)



14 Evaluate the current through 8Ω resistor using Superposition theorem. (14)



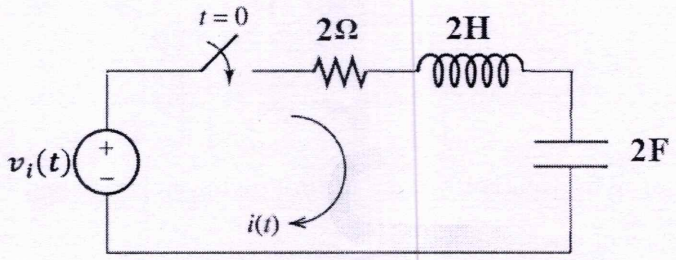
Module 3

15 (a) Determine the initial and final values of the transfer function given by (6)

$$F(s) = \frac{3s + 2}{s^3 + 7s^2 - 13s + 10}$$

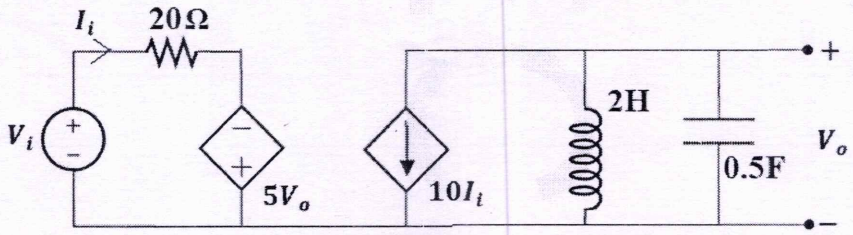
(b) Derive the time domain response of an RL network for a pulse input by assuming the initial condition as zero. (8)

16 Evaluate $i(t)$ in the network for $v_i(t) = e^{-t}u(t)$. Switch is closed at $t = 0$. Assume that the initial condition is zero. (14)



Module 4

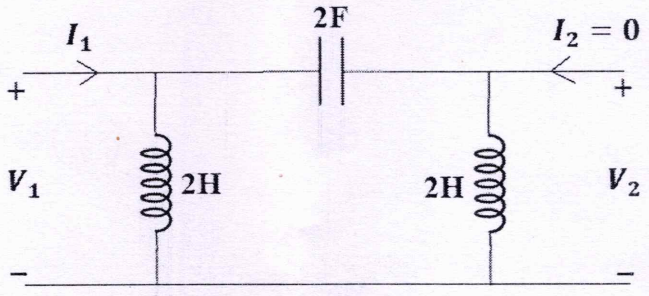
17 Draw the pole zero diagram of $\frac{V_0(s)}{V_i(s)}$ of the following network. (14)



18 (a) Evaluate the magnitude and phase of the following network function from the pole-zero diagram at $s = j3$. (8)

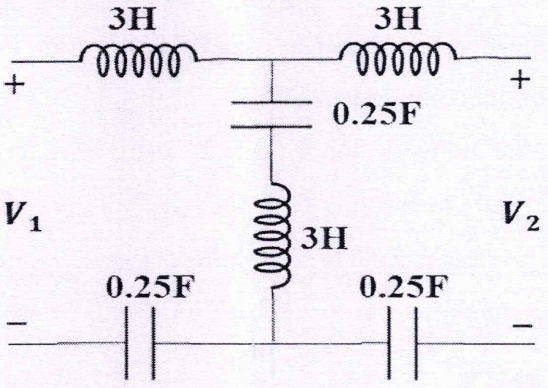
$$F(s) = \frac{4s}{s^2 + 4s + 8}$$

(b) Determine all the possible transfer functions of the following network. (6)

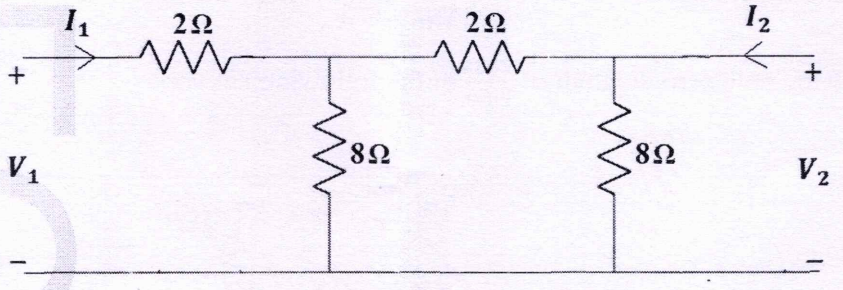


Module 5

19 Determine the Z-parameters of the following network (14)



20 Determine the hybrid parameters of the following network and check whether the network is reciprocal (14)



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