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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (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 super mesh analysis (3)

2 Differentiate ideal and practical voltage sources. (3)

3 State Reciprocity theorem (3)

4 What is the significance of Superposition theorem? (3)

5 State initial value and final value theorem (3)

6 Find expression for current when an unit impulse is given to a series RC circuit. (3)

7 Is $\alpha_{12} = \frac{2s^2+5s+1}{s+7}$ a valid function? Justify. (3)

8 What do you mean by open circuit natural frequency and short circuit natural frequency? (3)

9 What are image parameters? (3)

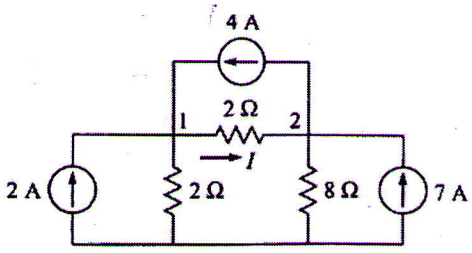
10 The impedance parameters of a two-port network are $\begin{bmatrix} 6 & 3 \\ 3 & 4 \end{bmatrix}$. Find its admittance parameters. (3)

PART B

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

Module 1

11 a) Find I in the network shown using nodal analysis (7)



b) Find voltage across 6Ω resistor using mesh analysis (7)

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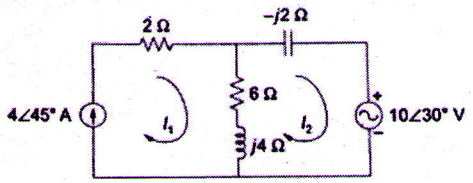
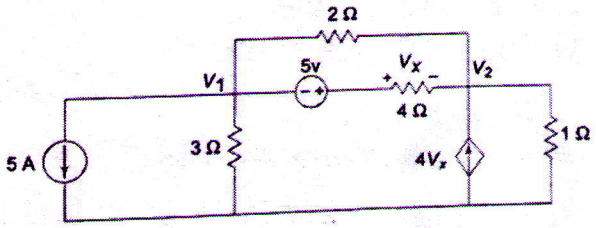
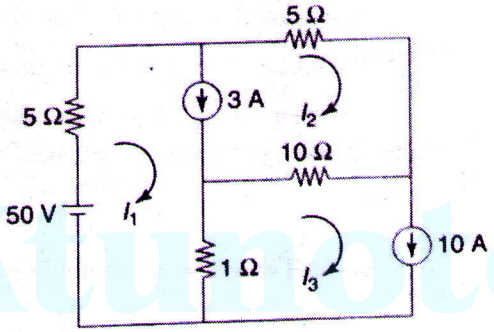


12 a) Find voltage across 4Ω resistor using nodal analysis (7)



b) Determine current through 10Ω resistor using mesh analysis (7)



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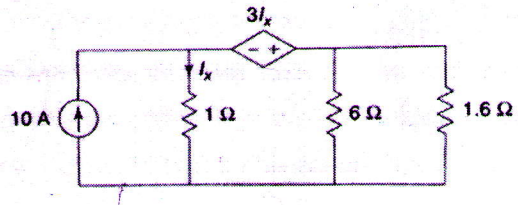
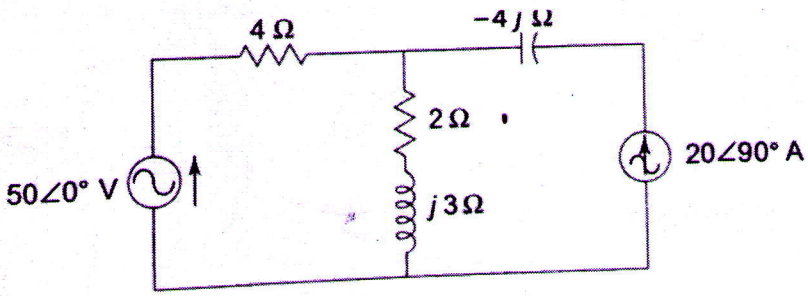
Module 2

13 a) Find current through 1.6Ω resistor using Thevenin's Theorem (7)



b) Determine current in (2 + j3)Ω impedance using superposition theorem (7)



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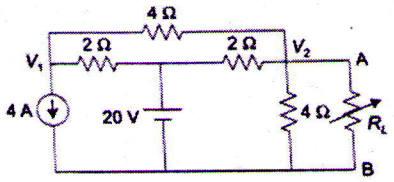
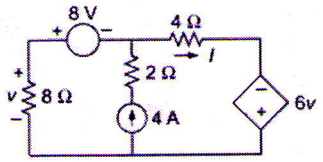
14 a) Find value of R_L for maximum power transfer. Also find the maximum power transferred. (7)

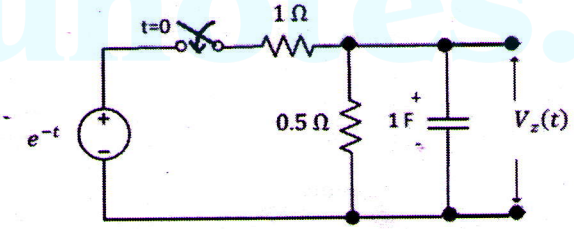


b) Determine current through 4Ω resistor using superposition theorem. (7)

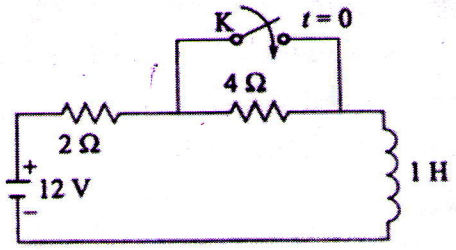


Module 3

15 a) In the circuit, the switch is closed at $t = 0$, connecting a source e^{-t} to the RC circuit. At time $t = 0$, it is observed that capacitor voltage has the value $V_c(0) = 0.5V$. For the element values given, determine $V_z(t)$ after converting the circuit into transformed domain. (8)



b) Determine current flowing through the circuit shown for $t \geq 0$ (6)



16 a) Find the expression for current through a series RL circuit when a pulse input of width T and amplitude A is applied across it (6)

b) For the circuit shown switch is closed at t = 0. Find currents $i_1(t)$ *and* $i_2(t)$ if initial current through inductor is zero and initial voltage on capacitor is 4V (8)

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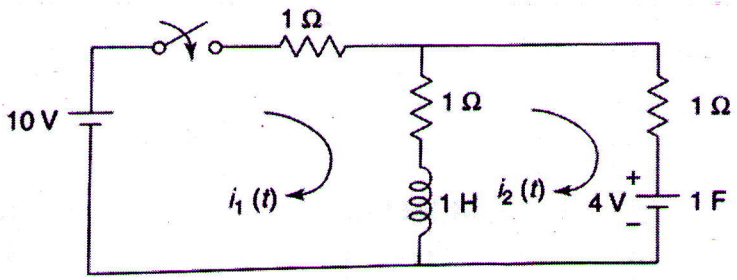


Module 4

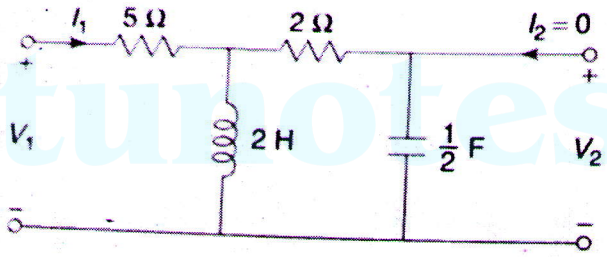
17 a) Obtain the time domain response of the given function using pole zero diagram (8)

$V(s) = \frac{(s+2)(s+6)}{(s+1)(s+5)}$

b) Explain the significance of poles and zeros with reference to driving point functions and transfer functions. (6)

18 a) What are the necessary conditions for transfer function? (6)

b) Determine driving point impedance $Z_{11}(s)$, transfer impedance $Z_{21}(s)$and voltage transfer ratio $G_{21}(s)$ for the network shown (8)



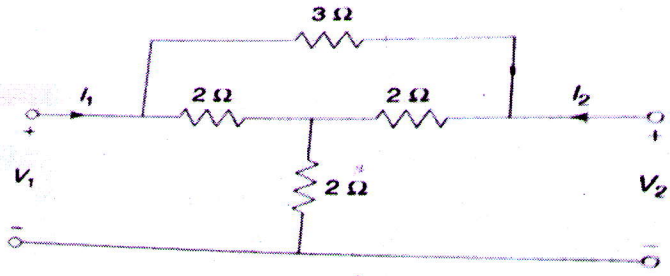
Module 5

19 a) Derive the conditions for reciprocity and symmetry for Z parameters and for ABCD parameters. (8)

b) Express g parameters in terms of h parameters and T parameters. (6)

20 a) Show that when two 2 port networks are connected in parallel, the resultant Y matrix is the sum of Y matrices of each individual network. (6)

b) Obtain short circuit admittance parameters of the circuit shown. (8)



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