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Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EE201
Course Name: CIRCUITS AND NETWORKS

Max. Marks: 100

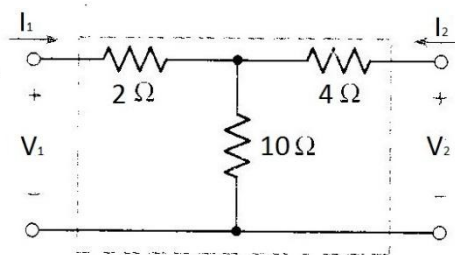
Duration: 3 Hours

PART A

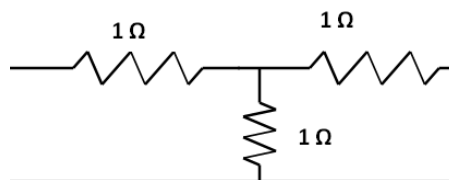
Answer all questions, each carries 5 marks.

Marks

- 1 State and prove maximum power transfer theorem as applied to ac circuits. (5)
 - 2 Find the possible number of trees of the given bus incidence. Also draw the oriented graph (5)
 oriented graph
- $$A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ -1 & 1 & 1 & 0 \end{bmatrix}$$
- 3 A series RL circuit has $R = 25 \Omega$, and $L = 5 \text{ H}$. A dc voltage of 100 V is applied at $t = 0$. Determine a) the time at which the voltage across resistor and inductor are equal and b) the current through the inductor at $t = 0.5 \text{ s}$. (5)
 - 4 The current through 2Ω resistor is $I(s) = \frac{5s+3}{s^2+5s+6}$. Find the voltage across the resistor, $v(t)$. (5)
 - 5 Determine the transmission parameters of the network shown in figure. (5)



- 6 Check for symmetry and reciprocity of a two port network in z parameter representation shown in figure (5)

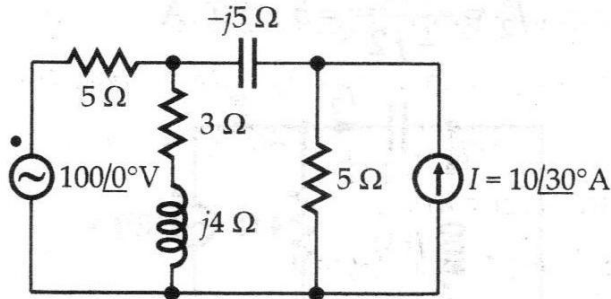


- 7 Explain the properties of a positive real function. (5)
- 8 Check whether the polynomial $s^4 + 7s^3 + 4s^2 + 18s + 6$ is Hurwitz. (5)

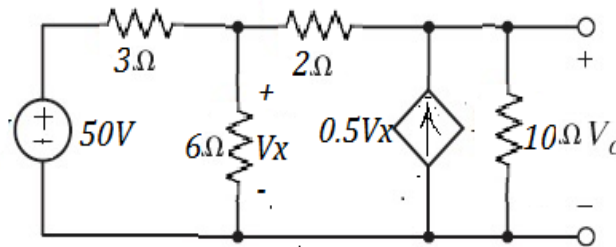
PART B

Answer any two full questions, each carries 10 marks.

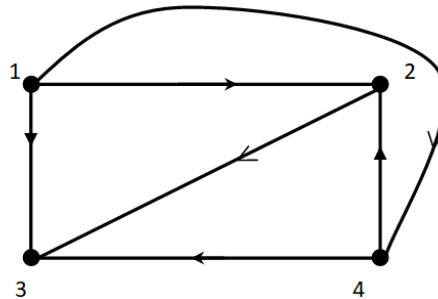
- 9 For the circuit shown in figure, determine the current through the capacitor, using (10) superposition theorem,



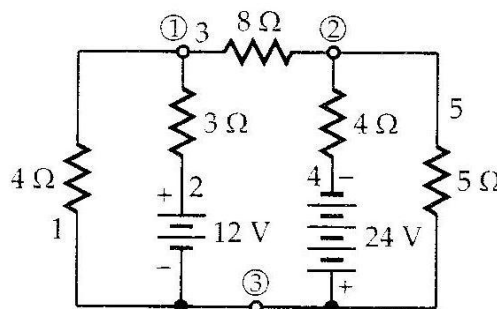
- 10 a) Determine the Norton equivalent circuit for the network shown in figure (5)



- b) The oriented graph of a network is shown in Figure. Obtain bus incidence matrix (5) and tie-set matrix with twigs (1-2, 2-3, and 3-4).



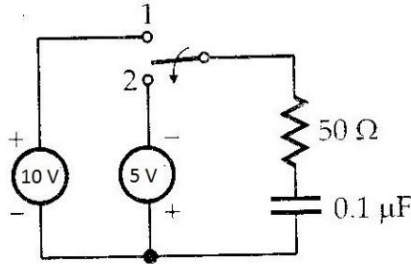
- 11 For the circuit shown in figure, determine all branch voltages, using cut set (10) analysis.



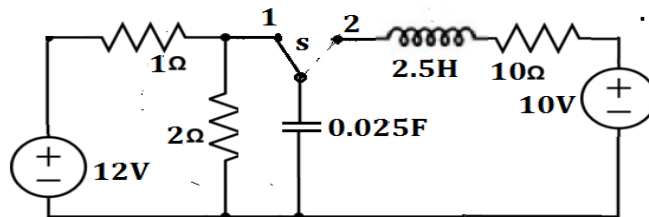
PART C

Answer any two full questions, each carries 10 marks.

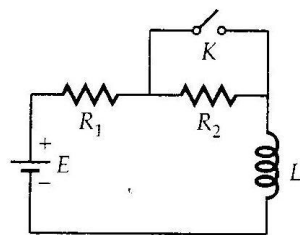
- 12 In the circuit shown in figure, steady state is reached, while the switch is in position 1. At $t=0$, the switch is moved to position 2. Determine the energy stored in the capacitor at $t = 0.1 \text{ ms}$. (10)



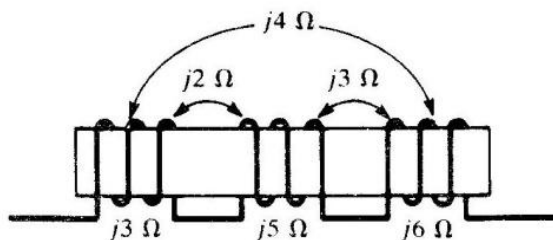
- 13 In the circuit shown in figure.(11) the switch S is in position 1 and the circuit attained its steady state .The switch S is transferred to position 2 at time $t=0$.Determine the current through the inductor $i(t)$ for $t>0$. Use s- domain approach (10)



- 14 a) For the circuit shown in figure, the switch was open for a long time. At $t = 0$, the switch is closed. Determine the current through the inductor for $t > 0$. Take $E = 10 \text{ V}$, $R_1 = 1\Omega$, $R_2 = 2\Omega$, $L = 1\text{H}$. (5)



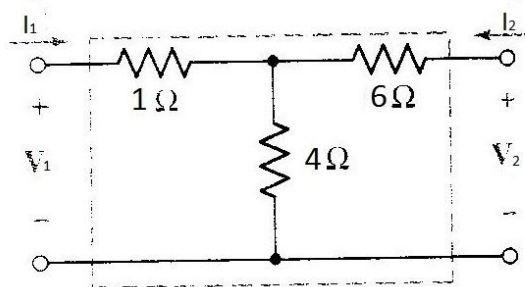
- b) Obtain the dotted equivalent circuit of the network shown in figure and then determine the net inductive reactance. (5)



PART D

Answer any two full questions, each carries 10 marks.

- 15 a) Determine the h parameters of the two port network shown in figure. (5)



- b) The Z parameters of a two port network are $Z_{11} = 10 \Omega$, $Z_{22} = 20 \Omega$, $Z_{12} = Z_{21} = 5 \Omega$. Determine a) The ABCD parameters of this network and b) Its equivalent T network. (5)
- 16 a) For a two port network, express a) z-parameters in terms of h-parameters and b) ABCD parameters in terms of y-parameters. (5)
- b) Find the first Cauer form of RC network $Z(s) = \frac{(s+3)(s+6)}{(s+1)(s+5)}$ (5)
- 17 a) The driving point impedance of a one port LC network is given by $Z(s) = \frac{(s^2+4)(s^2+25)}{s(s^2+4)}$. Obtain the first and second Foster form of equivalent networks. (10)
