

Reg No.: \_\_\_\_\_

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

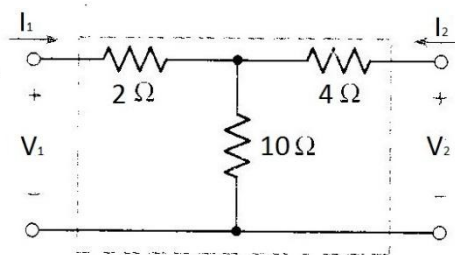
Duration: 3 Hours

**PART A**

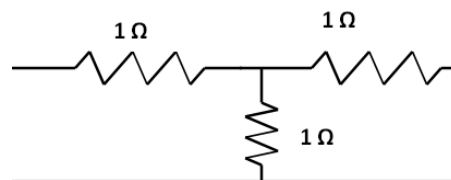
*Answer all questions, each carries 5 marks.*

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  $2 \Omega$  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)

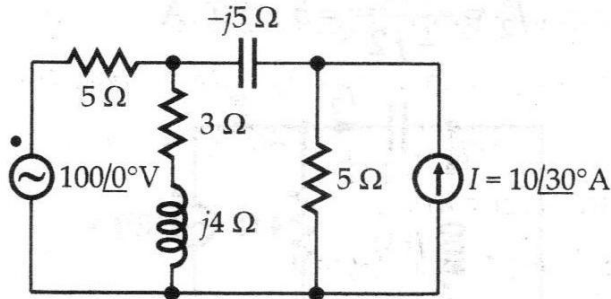


- 7 Explain the properties of a positive real function. (5)
- 8 Check whether the polynomial  $s^4 + 7s^3 + 4s^2 + 18s + 6$  is Hurwitz. (5)

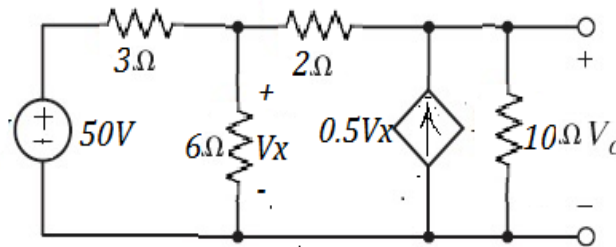
**PART B**

*Answer any two full questions, each carries 10 marks.*

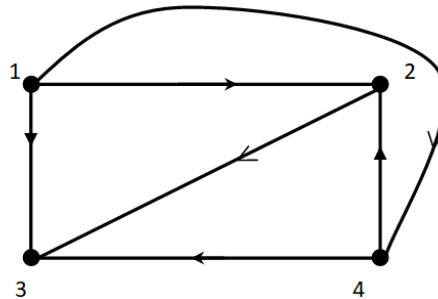
- 9 For the circuit shown in figure, determine the current through the capacitor, using (10) superposition theorem,



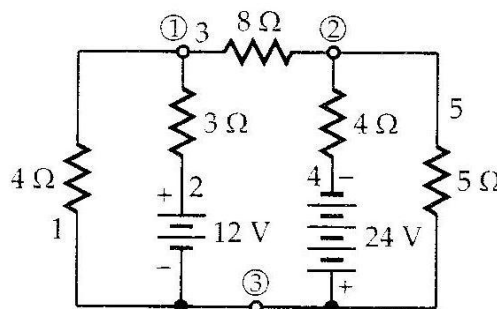
- 10 a) Determine the Norton equivalent circuit for the network shown in figure (5)



- 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).



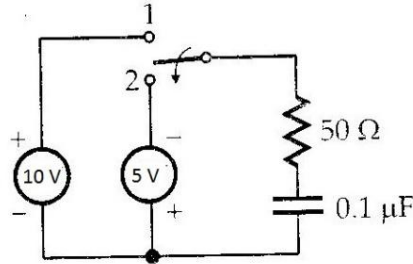
- 11 For the circuit shown in figure, determine all branch voltages, using cut set (10) analysis.



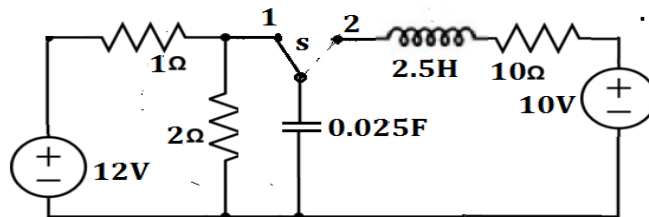
PART C

Answer any two full questions, each carries 10 marks.

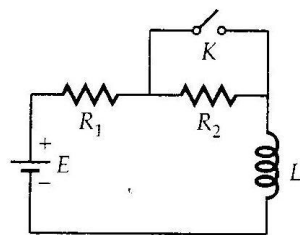
- 12 In the circuit shown in figure, steady state is reached, while the switch is in position 1. At  $t=0$ , the switch is moved to position 2. Determine the energy stored in the capacitor at  $t = 0.1 \text{ ms}$ . (10)



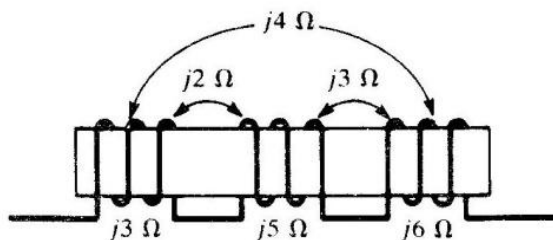
- 13 In the circuit shown in figure.(11) the switch S is in position 1 and the circuit attained its steady state. The switch S is transferred to position 2 at time  $t=0$ . Determine the current through the inductor  $i(t)$  for  $t > 0$ . Use s- domain approach (10)



- 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)



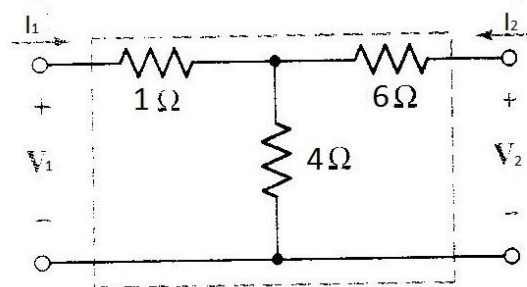
- b) Obtain the dotted equivalent circuit of the network shown in figure and then determine the net inductive reactance. (5)



## 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 Forster form of equivalent networks. (10)

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