

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

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017**

Course Code: **EE201**

Course Name: **CIRCUITS AND NETWORKS (EE)**

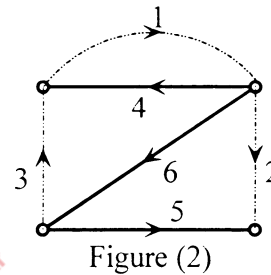
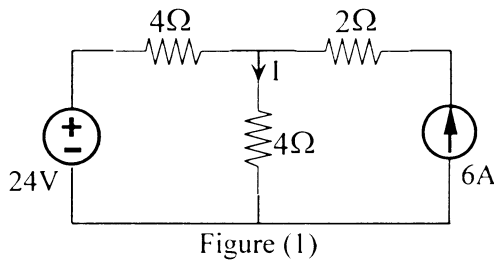
Max. Marks: 100

Duration: 3 Hours

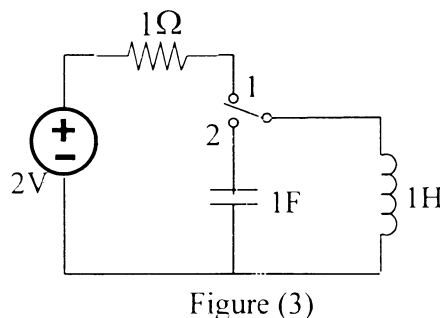
**PART A**

*Answer all questions. Each question carries 5 marks.*

1. Apply Superposition theorem to determine the current I in the circuit shown in figure (1). (5)



2. For the graph shown in figure (2), select {4,5,6} as tree and hence determine the fundamental cut-set matrix Q and tie-set matrix B. Also prove that Q and B are orthogonal. (5)
3. In the circuit shown in figure (1), steady state exists when switch is in position 1. At  $t = 0$ , it is moved to position 2. Determine the expression for current  $i(t)$  through the inductance for  $t \geq 0$ . (5)



4. The current through a 4F capacitance is given by the following s-domain equation  $I(s) = \frac{24(s+2)}{(s+1)(s+3)}$ . Find voltage across the capacitance  $v(t)$ . (5)
5. Determine the h-parameters of the network shown in figure (4) and hence check whether the network is symmetrical. (5)

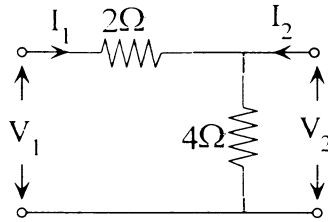


Figure (4)

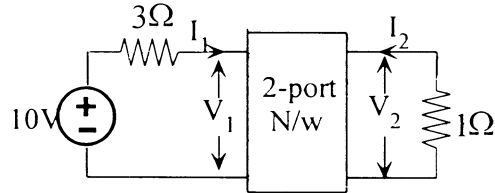


Figure (5)

6. If  $[z] = \begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$  for the two port network shown in figure (5), calculate the average power delivered to 1Ω resistor. (5)
7. Test whether the polynomial  $F(s) = s^4 + 3s^3 + 4s^2 + 3s + 1$  is Hurwitz. (5)
8. Test whether the following represents LC driving point immittance function  $F(s) = \frac{3(s^2 + 1)(s^2 + 9)}{s(s^2 + 3)}$ . (5)

**PART B**

*Answer any two questions. Each question carries 10 marks.*

9. Determine Norton equivalent circuit for the network shown in figure (6) and hence find the current  $I_L$  through 5Ω resistor.

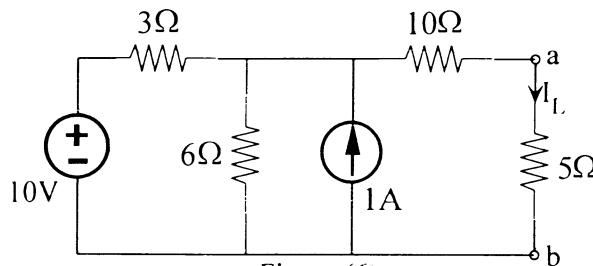


Figure (6)

10. In the network shown in figure (7). determine the value of  $R_L$  for maximum power transfer. Also, find the maximum power transferred.

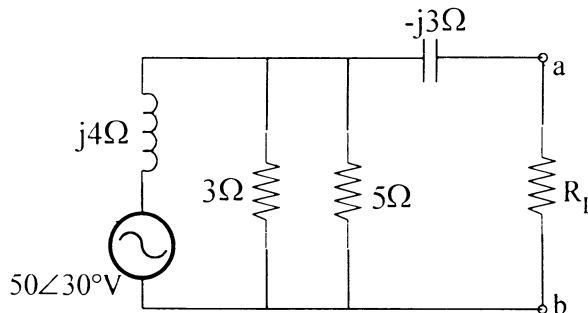


Figure (7)

11. Draw the oriented graph, select a suitable tree and find the tie-set matrix for the circuit shown in figure (9). Hence find the currents  $I_1$ ,  $I_2$  and  $I_3$  using mesh analysis.

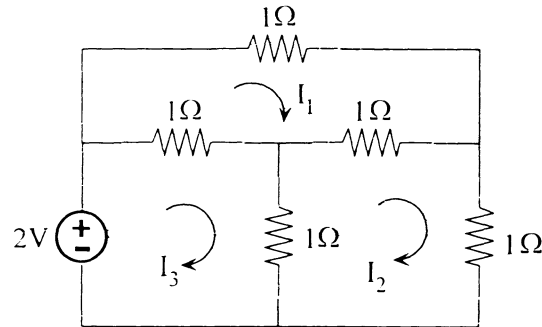


Figure (9)

PART C

Answer any two questions. Each question carries 10 marks.

12. In the circuit shown in figure (10), the switch is opened at  $t = 0$ , steady state conditions having been established earlier to the switching operation. Find the current  $i_L(t)$  for  $t \geq 0$ .

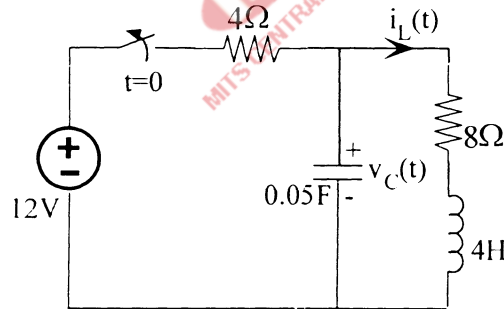


Figure (10)

13. In the circuit shown in figure (11), draw the transformed circuit and determine the current  $i_2(t)$  using mesh analysis. Assume the initial conditions as zeros.

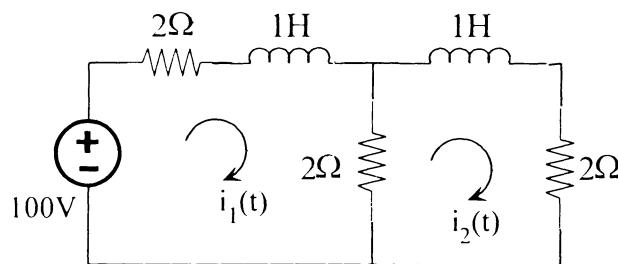


Figure (11)

14. In the circuit shown in figure (12), the switch is closed at  $t = 0$ . Determine the voltage  $v_o(t)$  for  $t \geq 0$ .

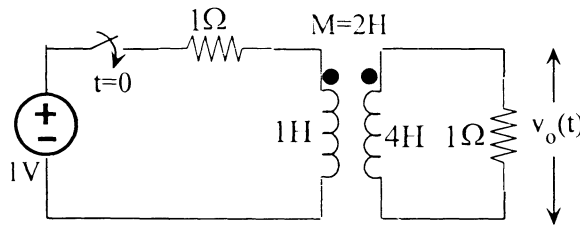


Figure (12)

**PART D**

*Answer any two questions. Each question carries 10 marks.*

15. For the network shown in figure (13), find a) z-parameters and b) ABCD parameters.

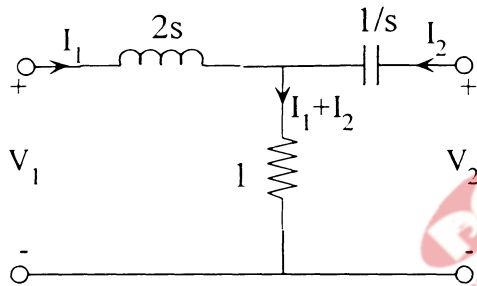


Figure (13)

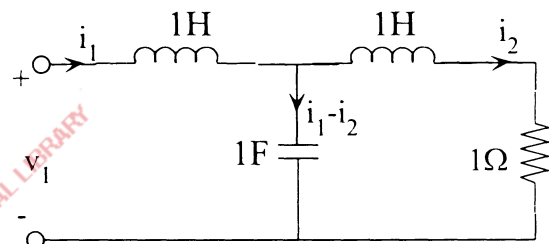


Figure (14)

16. For the network shown in figure (14), determine driving point admittance  $Y_{11}(s)$  at

port 1 and transfer admittance  $Y_{12}(s) = \frac{I_2(s)}{V_1(s)}$ .

17. Determine Foster I and II realizations of the driving point LC impedance function

$$Z(s) = \frac{4(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}$$

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