

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)

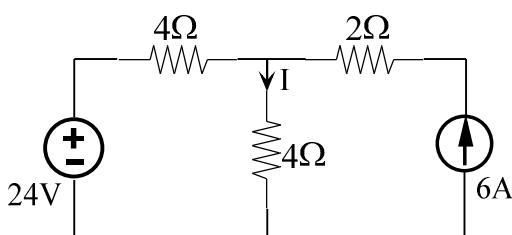


Figure (1)

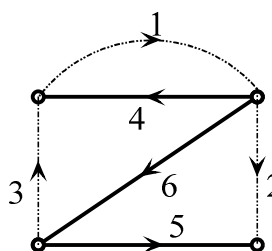


Figure (2)

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)

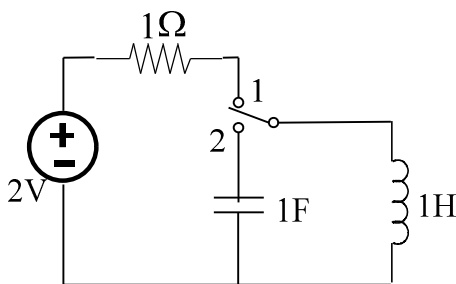


Figure (3)

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)

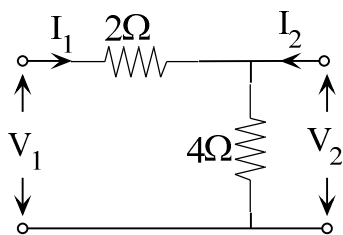


Figure (4)

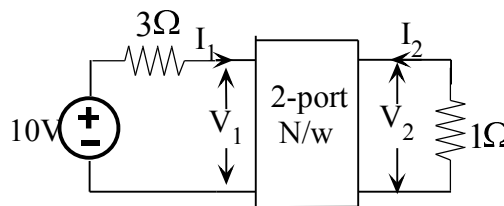


Figure (5)

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.

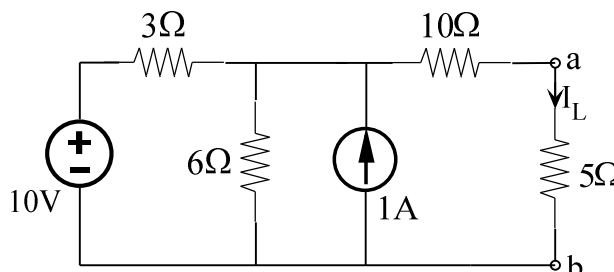


Figure (6)

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

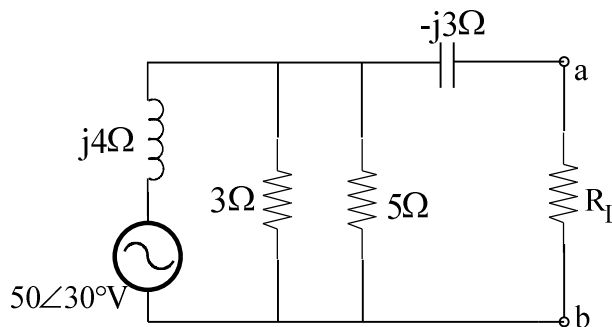


Figure (7)

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.

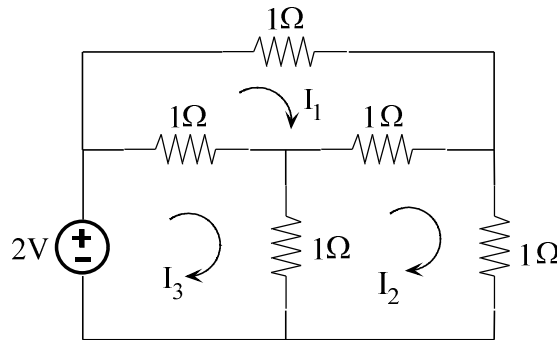


Figure (9)

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 $t \geq 0$.

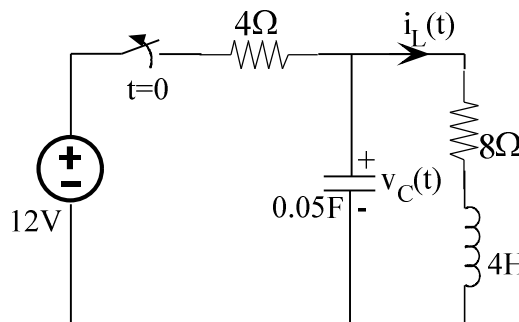


Figure (10)

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.

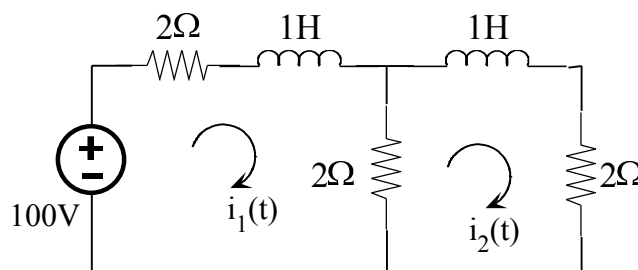


Figure (11)

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

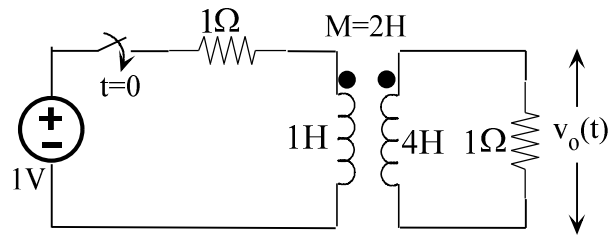


Figure (12)

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.

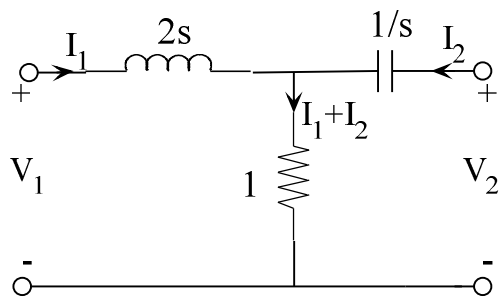


Figure (13)

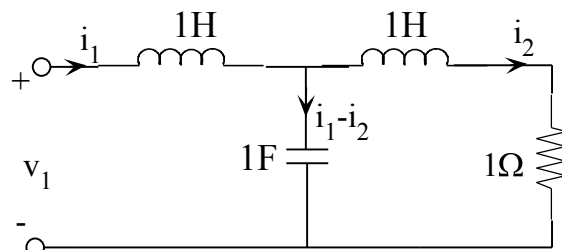


Figure (14)

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

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