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)

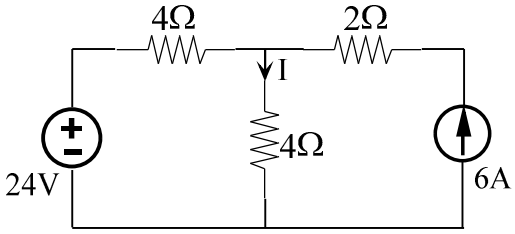

Figure (1)

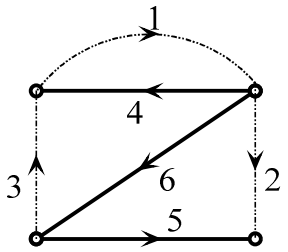

Figure (2)

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 ≥ 0. (5)

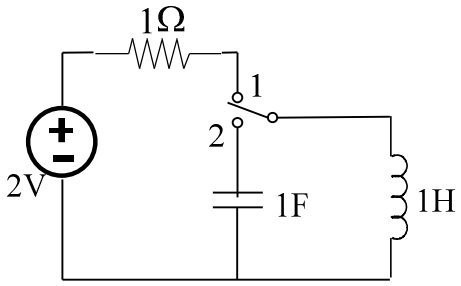

Figure (3)

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)

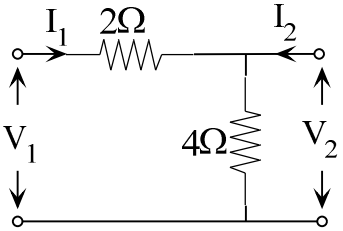

Figure (4)

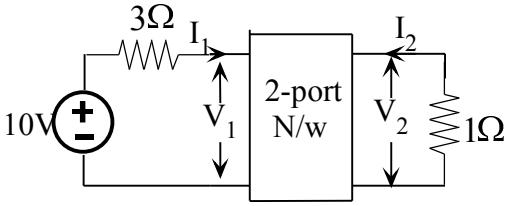

Figure (5)

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 $F(s)=\dfrac{3(s^2+1)(s^2+9)}{s(s^2+3)}$. (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.

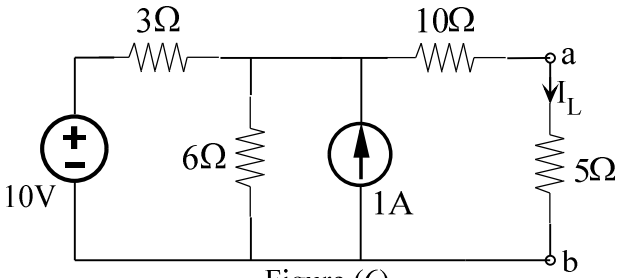

Figure (6)

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

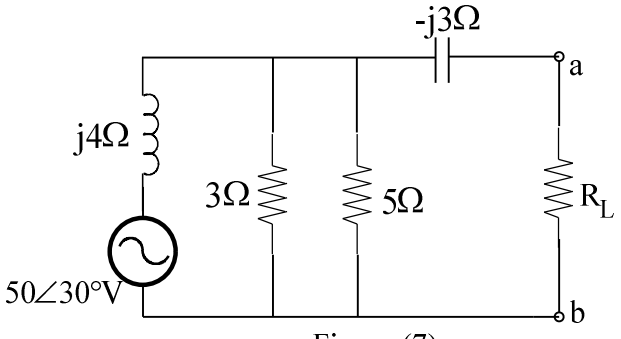

Figure (7)

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.

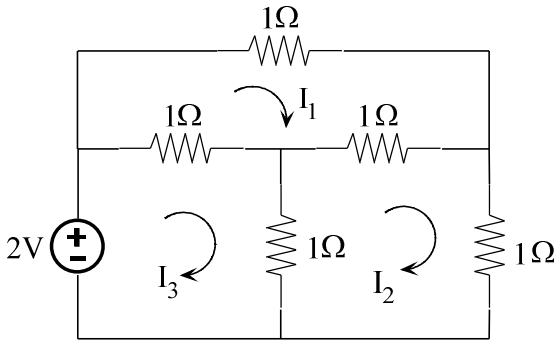

Figure (9)

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 $t \geq 0$.

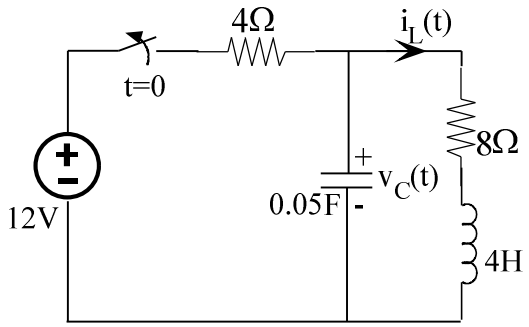

Figure (10)

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.

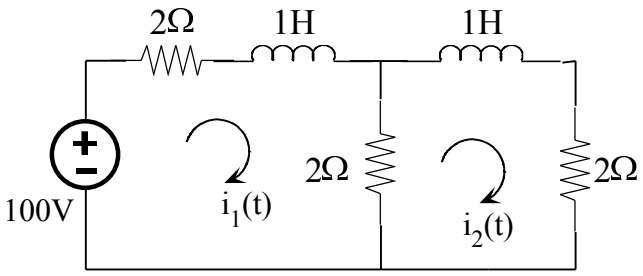

Figure (11)

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

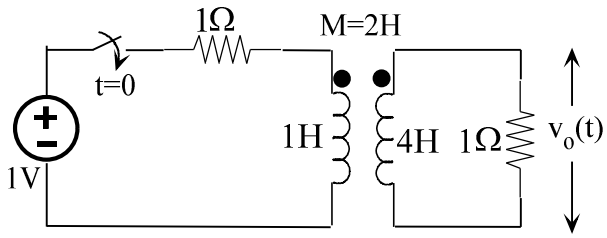

Figure (12)

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.

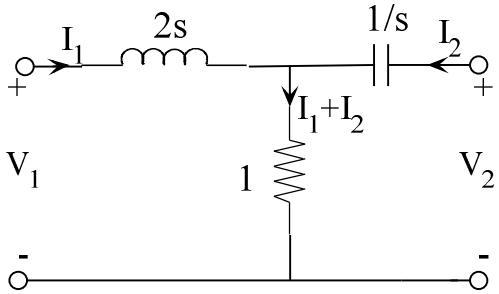

Figure (13)

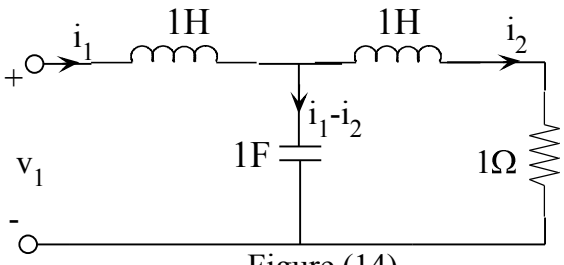

Figure (14)

16. For the network shown in figure (14), determine driving point admittance $Y_{11}(s)$ at port 1 and transfer admittance $Y_{12}(s) = \dfrac{I_2(s)}{V_1(s)}$.

17. Determine Foster I and II realizations of the driving point LC impedance function $Z(s) = \dfrac{4(s^2+1)(s^2+16)}{s(s^2+4)}$.

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