Assignment:-2, Unit-2: Graph Theory, Circuit Analysis by Classical Method

Q1. Determine all the tree and corresponding co-trees for the graph of the network. Then, consider the tree formed By branches (1, 2, 5) using this tree write A, B_f & Q_f. Fig.1

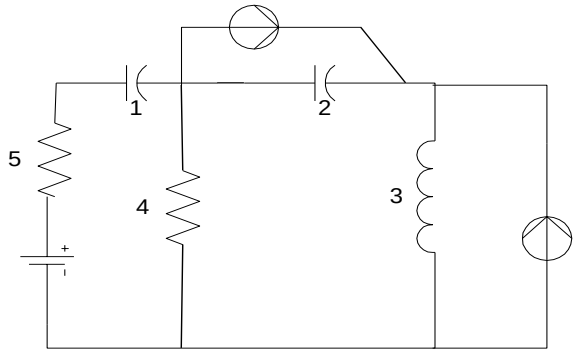

Fig.1

Q2. Draw the oriented graph of the following matrixes.

$$A = \begin{bmatrix} -1 & 0 & -1 & 1 & 0 & 0 & 1 \\ 0 & -1 & 0 & -1 & 0 & -1 & 0 \\ 1 & 1 & 0 & 0 & -1 & 1 & 0 \end{bmatrix}$$

$$Q_f = \begin{bmatrix} \overbrace{1 \quad 0 \quad 0 \quad 0}^{Twigs} & \overbrace{-1 \quad 0 \quad 0}^{Links} \\ 0 \quad 1 \quad 0 \quad 0 & +1 \quad 0 \quad 1 \\ 0 \quad 0 \quad 1 \quad 0 & 0 \quad 1 \quad 1 \\ 0 \quad 0 \quad 0 \quad 1 & 0 \quad 1 \quad 0 \end{bmatrix}$$

Q3. Draw the graph and find a tree for the network. Consider "O" as a datum node and assuming elements BD and BC as links (Rp & Capacitor), determine the tie-set schedule, branch impedance matrix and source voltage matrix. Obtain the loop equations using the above said matrices. Fig.3

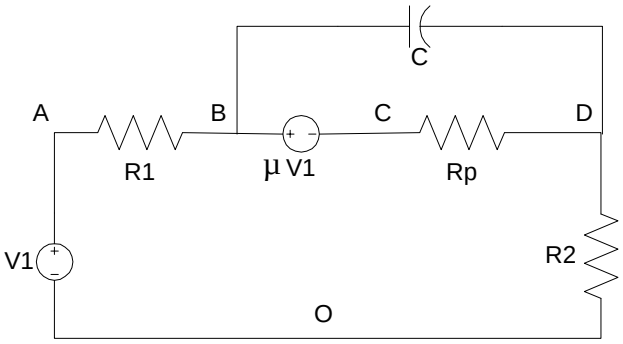

Fig.3

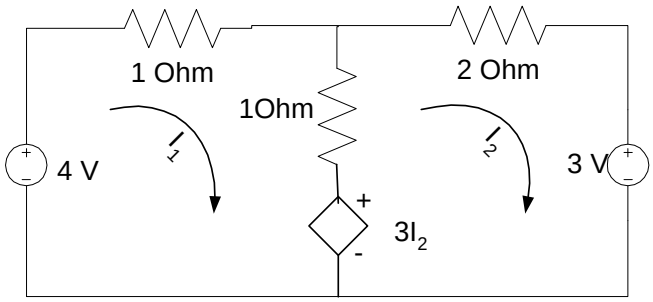

Fig.4

Q4. Using loop method of analysis, determine currents in all the branches, indicating their directions. Fig.4 (Ans:-3 A, -1 A, -4 A)

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Q5. Construct a tree in which 10 Ohm and 20 Ohm are tree branches. Using nodal analysis, solve for V_1 & V_2. Fig.5
(Hint: Assume a resistance parallel with 2 A And a resistance in series with 20 V source
Ans: - V_1=19.02 V, V_2=21.46 V)

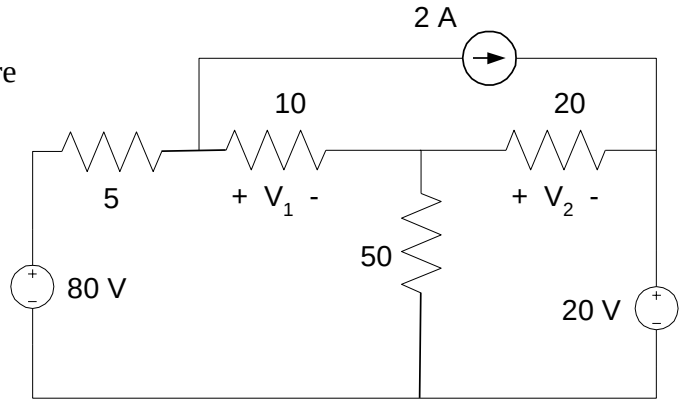

Fig.5

Q6. Write the node equation for the following network. Fig.6

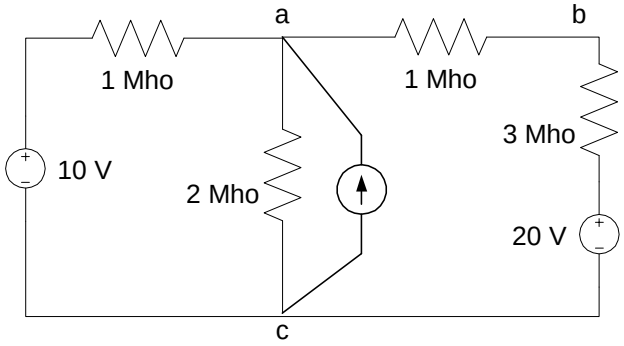

Fig.6

Q7. Draw the dual of the following networks. Fig.7(a & b)

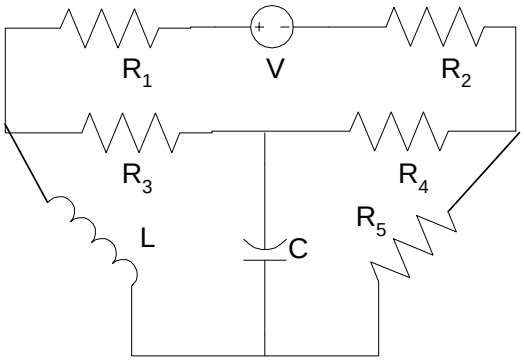

Fig.7.a

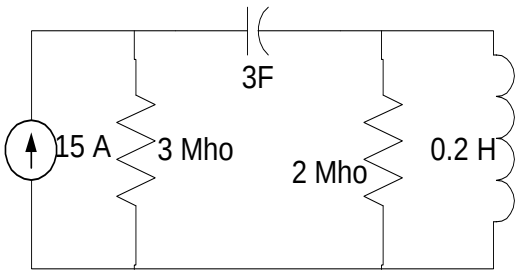

Fig.7.b

Q8. In the circuit shown in figure 8, switch is closed at t=0. Find $i_1, i_2, \frac{di_1}{dt}$ & $\frac{di_2}{dt}$ at t=0$^+$.

Q9. In the circuit shown in figure 9, the switch K is changed from position 1 to position 2 at time t=0. Steady sate condition having reached before switching. Find out $i_1, \frac{di_1}{dt}$ & $\frac{di_1^2}{dt}$.

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Q10. Figure 10 represents a parallel RLC circuit where R = 0.1 Ohm, L = 0.5 H and C = 1 Micro Farad. Capacitor has an initial voltage of 10 V, polarity as shown in figure. The switch K is closed at time t = 0. Obtain v(t).

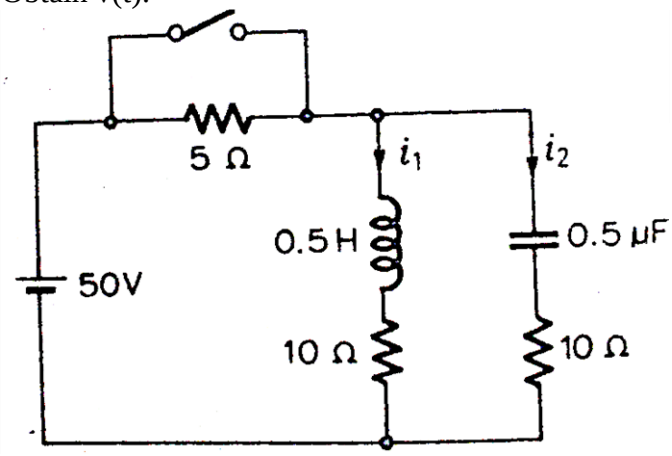

Figure 8

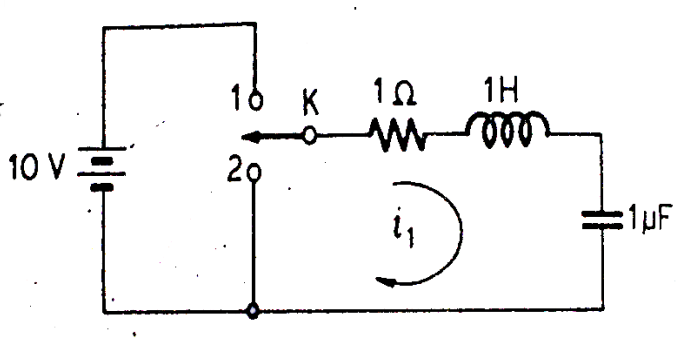

Figure 9

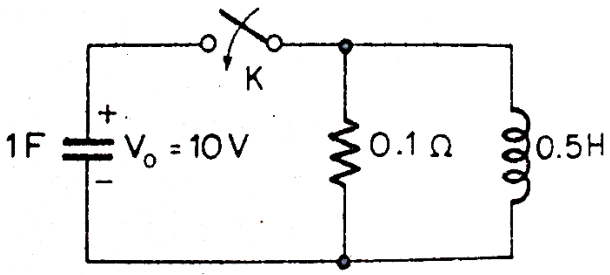

Figure 10