**[Time: 3 Hours]** **[Marks:80]**

**Please Check whether you have got right question paper**

**N.B.:** **1. Question one is Compulsory.**

**2. Answer any three questions from the remaining five.**

**3. Assume suitable data if required.**

1. (a) Currents $I_1$ and $I_2$ entering at port 1 and port 2 respectively of a two-port network are given by the following equations. 5.

$$I_1 = 0.5V_1 - 0.2V_2$$

$$I_2 = -0.2V_1 + V_2$$

Find Y, Z and ABCD parameters for the network.

(b) Test whether the following function is Hurwitz or not. 5.

$$S^5 + 3s^4 + 3s^3 + 4s^2 + s + 1$$

(c) Find poles and zeros of the impedance of the network shown in Fig. 1 and plot them on s-plane. 5.

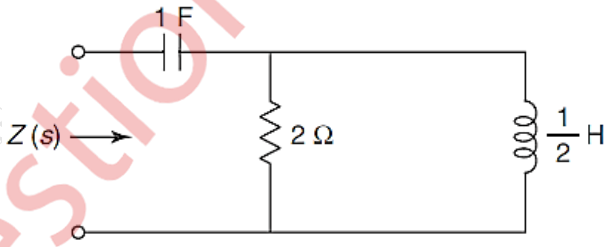


Fig. 1

(d) For the network of Fig. 2, find the current through the 8 Ω resistor. 5.

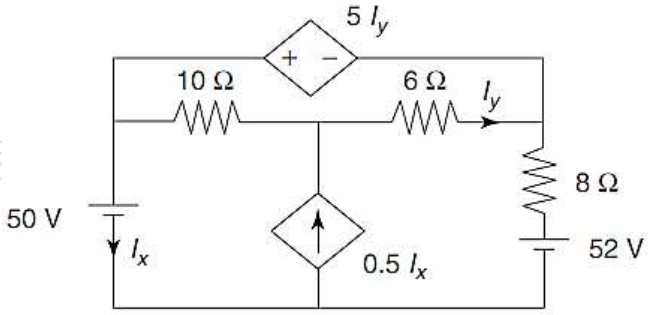


Fig. 2

2. (a) For the network shown in Fig. 3, write down the tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate the loop currents and branch currents. 10.

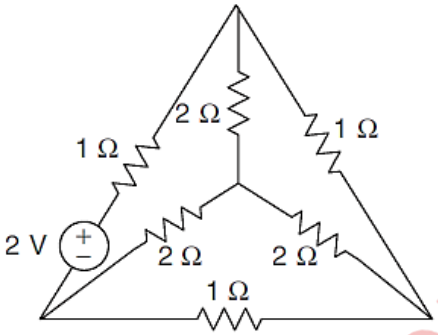


Fig. 3

(b) In the network shown in Fig. 4, the switch is changed from the position 1 to the position 2 at $t = 0$, steady condition having reached before switching. Find the values of $i$, $\frac{d_i}{d_t}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. 10.

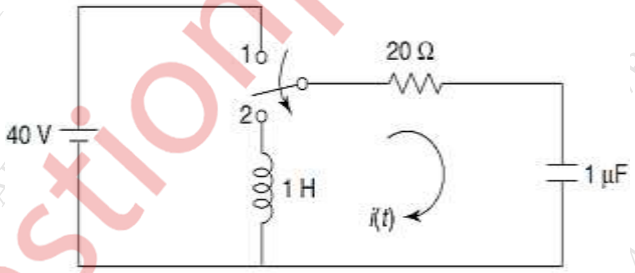


Fig. 4

3. (a) Find the current $I_y$ in Fig. 5 10.

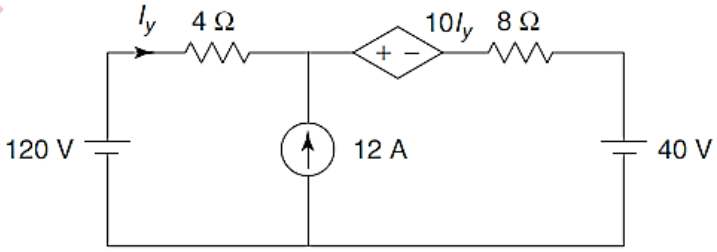


Fig. 5

(b) Find the network function $\frac{I_2}{I_1}$ for the network shown in Fig. 6 10.

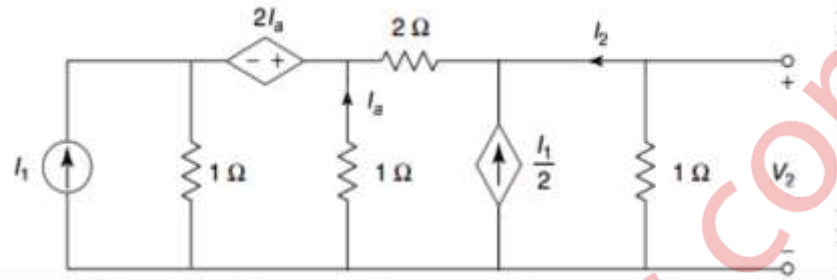


Fig. 6

4. (a) Find Z and h-parameters for the network shown in Fig. 7 10.

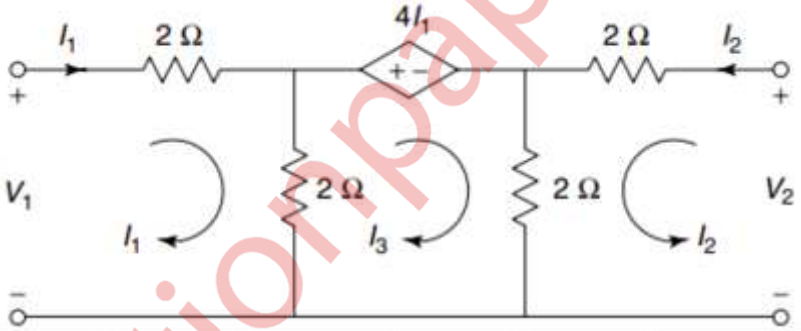


Fig. 7

(b) Realise the RC impedance in *Cauer I* and *Foster I* forms 10.

$$Z(s) = \frac{s+4}{(s+2)(s+6)}$$

5. (a) Find the voltage across the 5 Ω resistor in Fig. 8 using mesh analysis. 10.

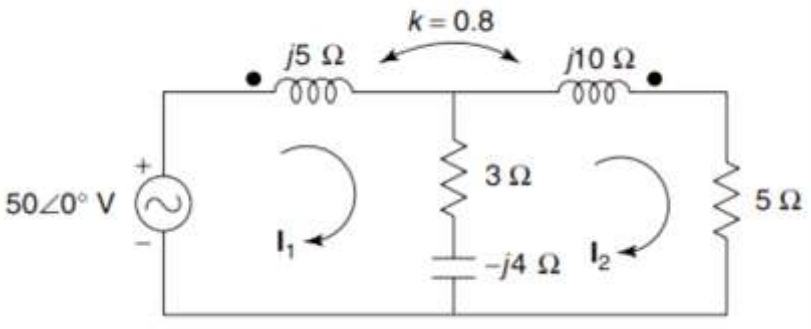


Fig. 8

(b) For the network shown in Fig. 9, find the current $i(t)$ when the switch is changed from position 1 to 2 at $t = 0$ 5.

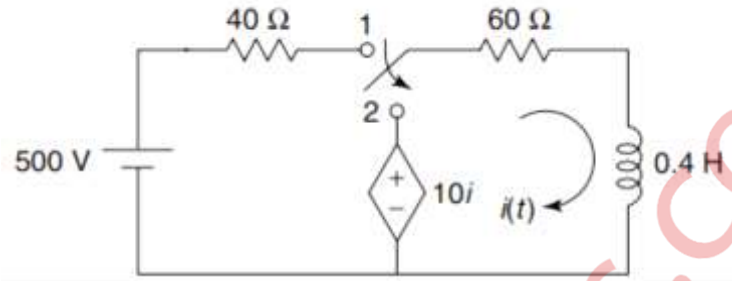


Fig. 9

(c) Realise the network having impedance function 5.

$$Z(s) = \frac{s^2 + 2s + 10}{s(s + 5)}$$

6. (a) Two identical sections of the network shown in Fig. 10 are connected in cascade. Obtain the transmission parameters of the overall connection. 10.

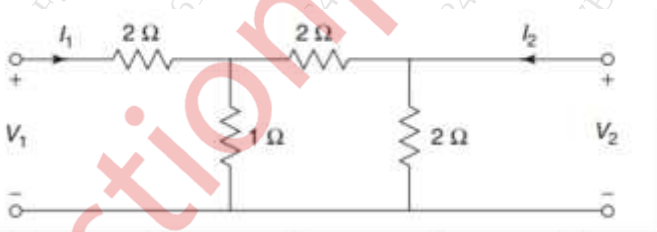


Fig. 10

(b) The graph of a network is shown in Fig. 11. Write the (a) incidence matrix (b) tieset matrix. 5.

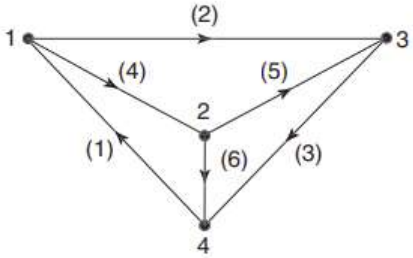


Fig. 11

(c) Test whether $F(s) = \frac{s^2+1}{s^3+4s}$ is positive real function 5.

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