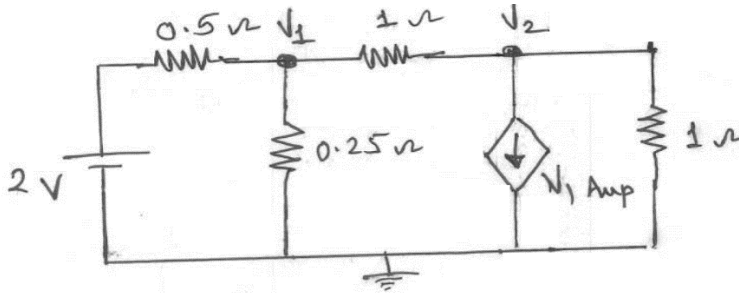


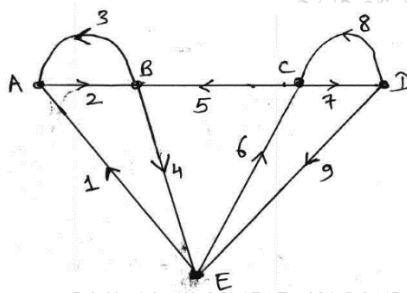
N.B.: 1. Question no.1 is compulsory.

2. Attempt any three from remaining 5 questions.

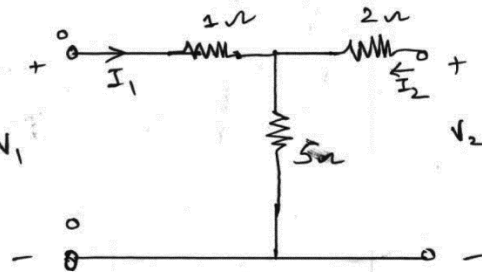
Q1 a) Determine the node voltages V1 and V2 by Nodal Analysis. 5



b) Find incidence Matrix (A) for the graph shown in figure. 5



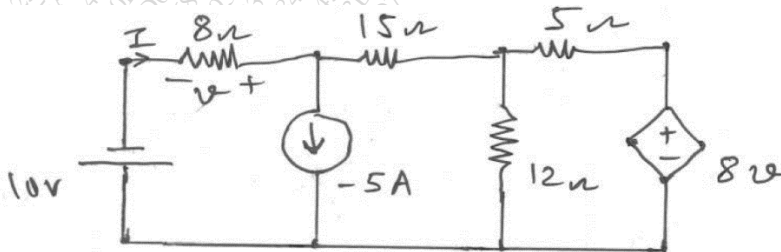
c) Find the transmission parameters [A, B, C, D] for the network shown in the fig. 5



d) Test whether F(s) is a positive real function 5

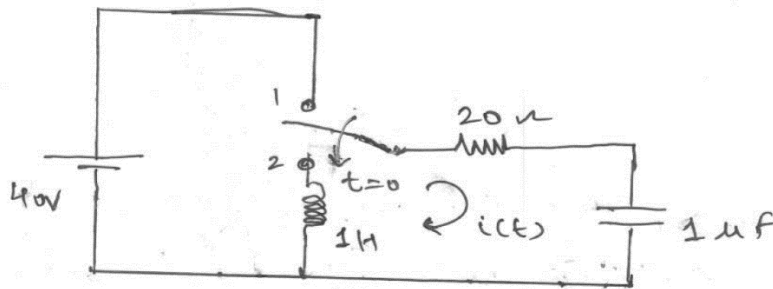
$$F(s) = \frac{s^3 + 6s^2 + 7s + 3}{s^2 + 2s + 1}$$

Q2 a) Find the current 'I' in 8Ω resistor by superposition theorem. 10

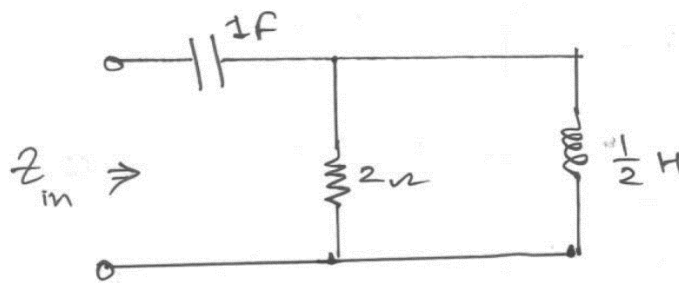


- b) The switch in the circuit shown is changed from position '1' to position '2' at  $t=0$ . Steady state conditions having reached before switching. Find the values of

$$i, \frac{di}{dt} \text{ and } \frac{d^2i}{dt^2} \text{ at } t = 0^+$$



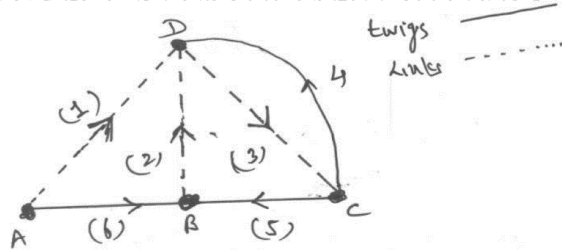
- c) Determine the driving point impedance function  $z_{in}(s)$  for the Network shown in fig. and also draw pole-zero plot.



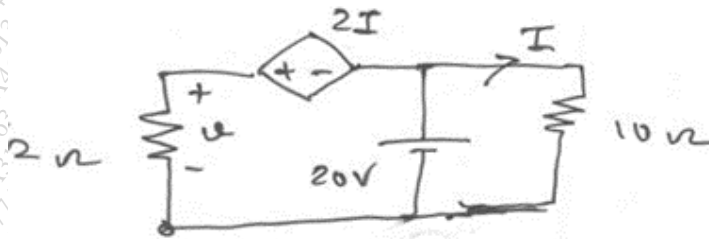
- Q3 a) Synthesize  $z(s)$  into Foster -1 and cauer-1 forms. 10

$$z(s) = \frac{s^2 + 12s^2 + 32s}{s^2 + 7s + 6}$$

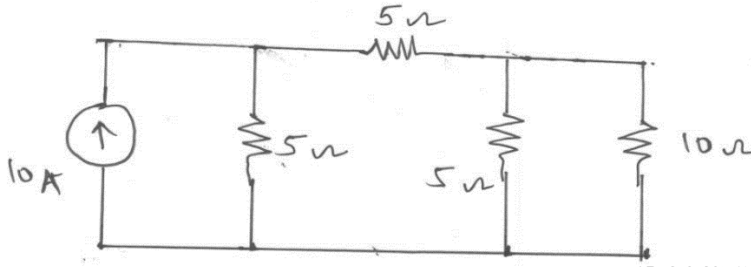
- b) Determine f-loop matrix for the graph shown in fig. 5



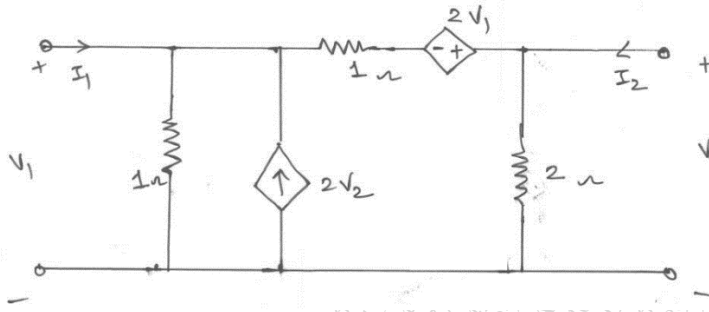
- c) Find voltage across  $2\Omega$  resistor. 5



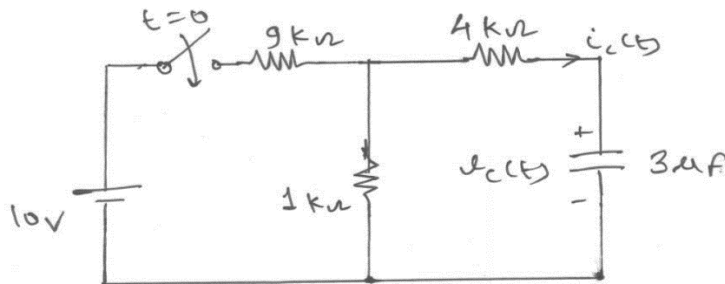
- Q4 a)** Write f-cut set matrix for the circuit shown and hence obtain matrix Node equation using Graph Theory. **10**



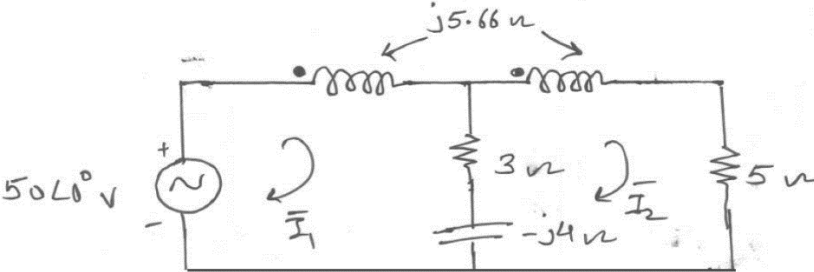
- b)** For the Network shown in the figure determine z and y parameters. **10**



- Q5 a)** In the figure shown the switch is closed at  $t=0$  with no initial charge on the capacitor. Determine  $v_c(t)$  and  $i_c(t)$  for  $t \geq 0$ . **10**



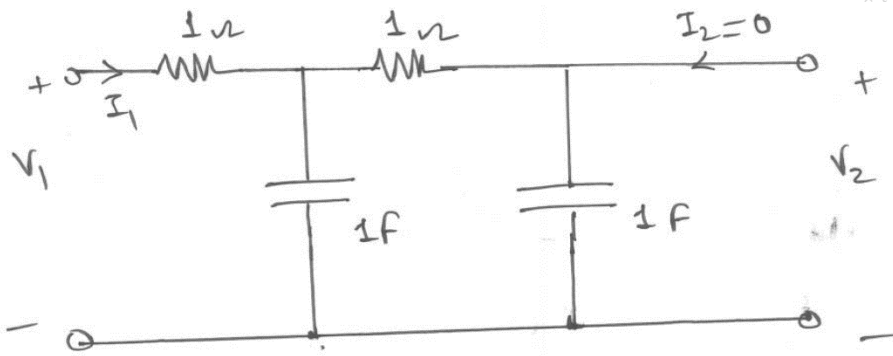
- b)** Test the following for Hurwitz polynomial **5**
- $P(s) = s^6 + 3s^5 + 8s^4 + 15s^3 + 17s^2 + 12s + 4$
  - $P(s) = s^5 + s^3 + s$
- c)** Write Mesh equations for the magnetically coupled circuit shown in fig. **5**



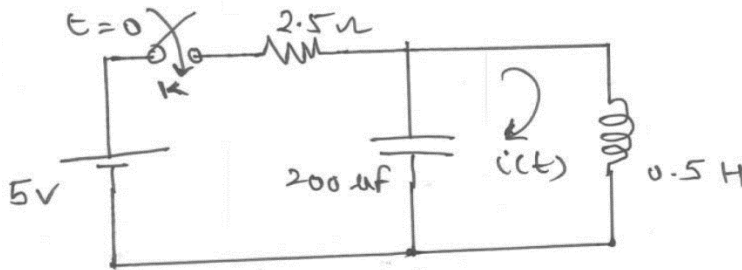
Q6 a)

10

Determine  $\frac{V_2}{I_1}$ ,  $\frac{V_2}{V_1}$  for the network shown in the figure.



- b) For the circuit shown in the figure, the switch 'K' is closed at  $t=0$  and steady state is attained before closing the switch. By using 'Laplace Transform' techniques determine  $i(t)$  for  $t \geq 0$ .



- c) Derive the condition of Reciprocity and symmetry for ABCD parameters.