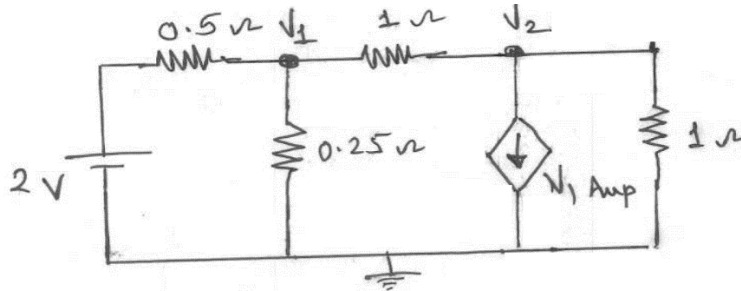


N.B.: 1. Question no.1 is compulsory.

2. Attempt any three from remaining 5 questions.

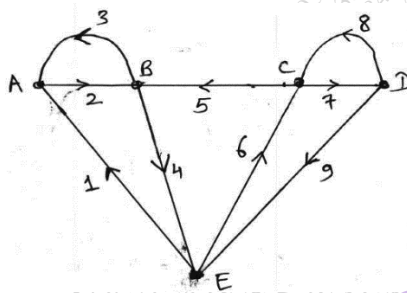
Q1 a) Determine the node voltages V_1 and V_2 by Nodal Analysis.

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



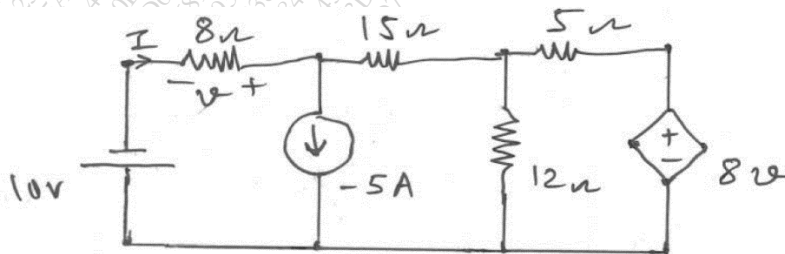
d) Test whether $F(s)$ is a positive real function

5

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

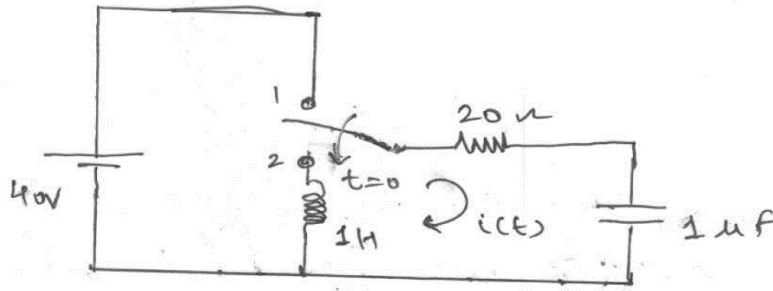
Q2 a) Find the current 'I' in 8Ω resistor by superposition theorem.

10

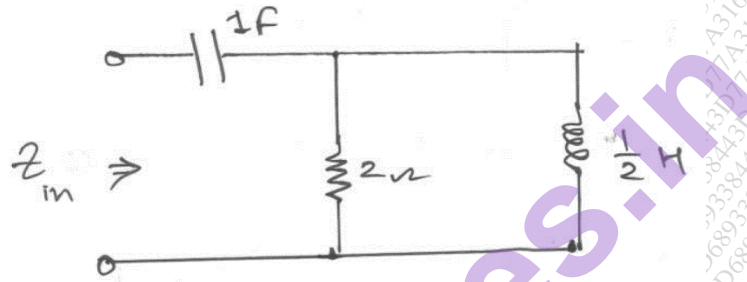


- b) The switch in the circuit shown is changed from position '1' to position '2' at $t=0$. Steady state conditions having reached before switching. Find the values of

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



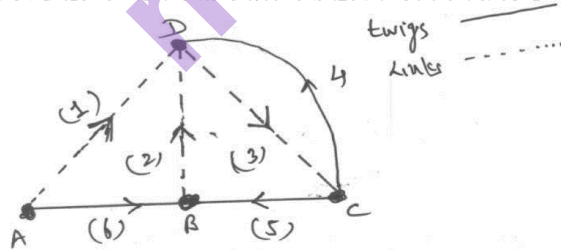
- c) Determine the driving point impedance function $z_{in}(s)$ for the Network shown in fig. and also draw pole-zero plot.



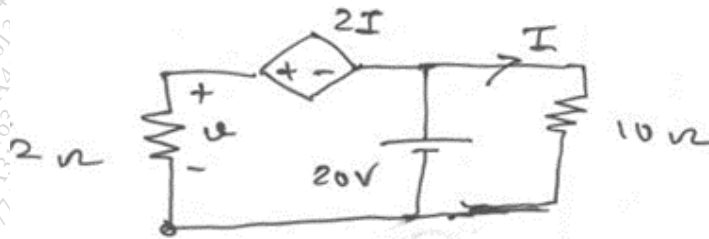
- Q3 a) Synthesize $z(s)$ into Foster -1 and cauer-1 forms. 10

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

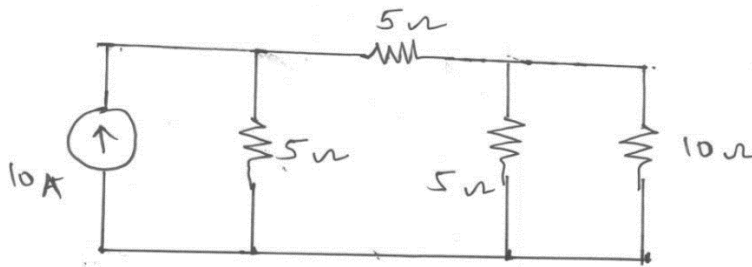
- b) Determine f-loop matrix for the graph shown in fig. 5



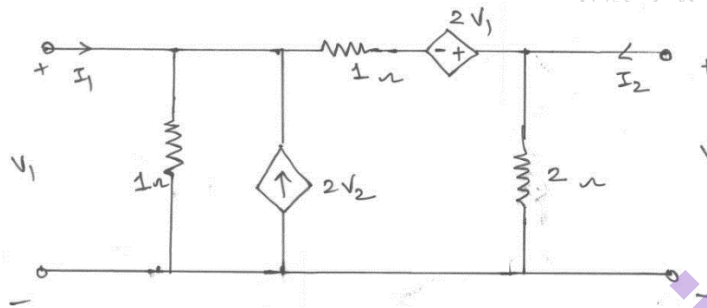
- c) Find voltage across 2Ω resistor. 5



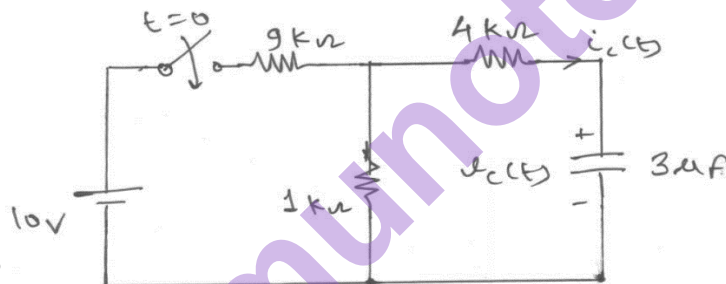
- Q4 a)** Write f-cut set matrix for the circuit shown and hence obtain matrix Node equation using Graph Theory. **10**



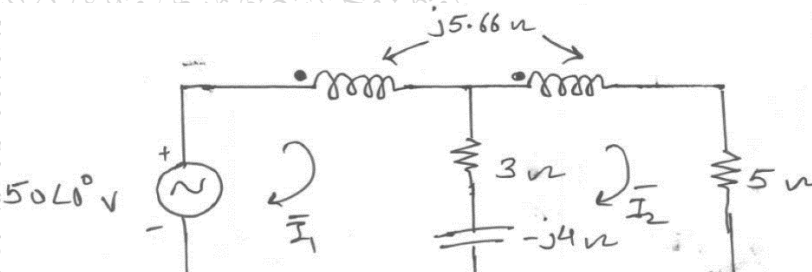
- b)** For the Network shown in the figure determine z and y parameters. **10**



- 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**

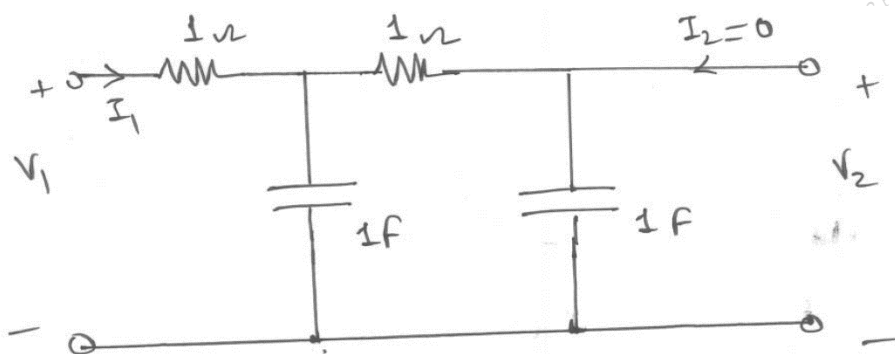


Q6 a)

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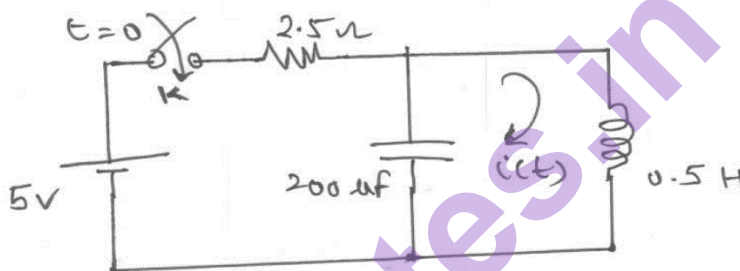
10

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 $t \geq 0$.

5



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

5