Time: 3 Hrs **Marks: 80**

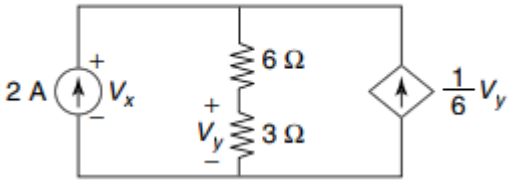
Note:

- Question No. 1 is compulsory.
- Answer any **three** from the remaining five questions.
- Assume suitable data if necessary and justify the same.

Q1 Each question carries five marks 20M

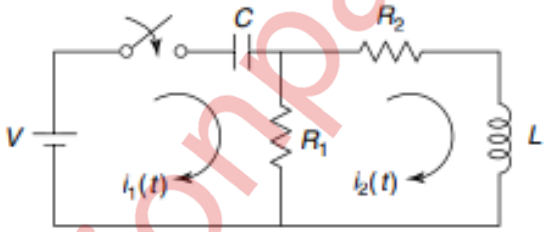
a The voltage V(s) of a network is given by $V(s)=\frac{(s+8)(s+10)}{(s+4)(s^2+2s+2)}$ Plot its pole-zero diagram

b Find the voltage 'V_x' in the following circuit



c The Z-parameters of a two-port network are: Z_{11} = 12 Ω, Z_{12} = Z_{21} = 8 Ω, Z_{22} = 20 Ω. Find the equivalent T-network.

d In the network shown, the switch is closed at t = 0, assuming all initial conditions as zero, determine the current $i_1(0^+)$ and $i_2(0^+)$.

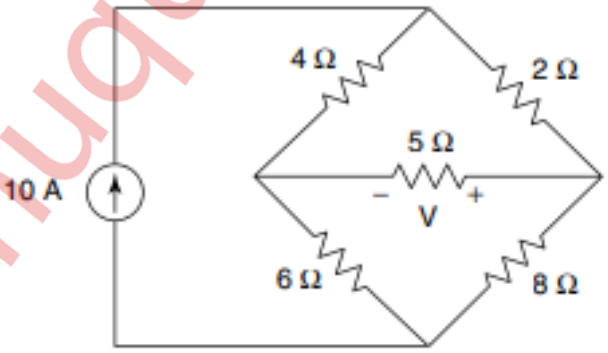


Q2 a The reduced incidence matrix of an oriented graph is 10M

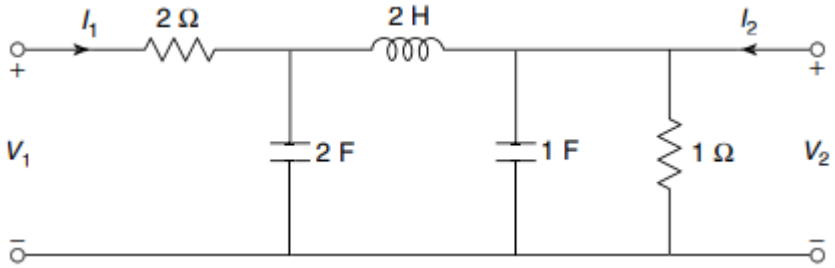
$$A=\begin{bmatrix} 1 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 1 & 0 \end{bmatrix}$$

(a) Draw the graph. (b) How many trees are possible for this graph? (c) Write the tieset and cutset matrices.

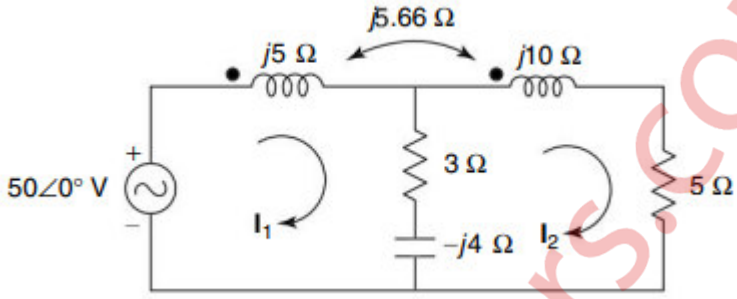
b Find the voltage V and verify reciprocity theorem for the network shown. 10M



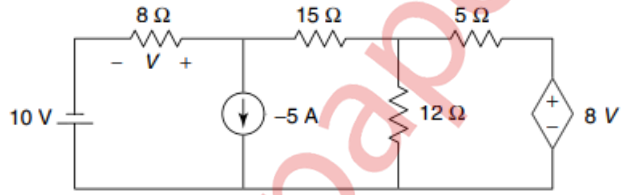
Q3 a Obtain h-parameters of the network shown 10M



b Determine the voltage across the 3Ω resistor using mesh analysis. 10M

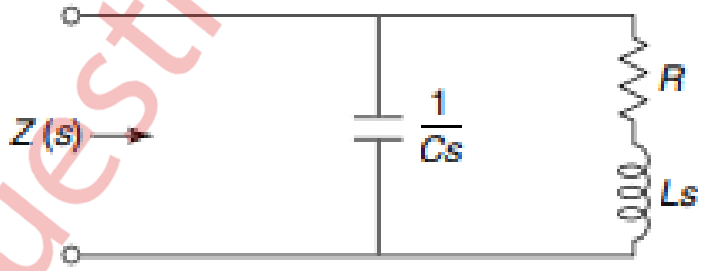


Q4 a Find the voltage V using Thevenin's theorem. 10M

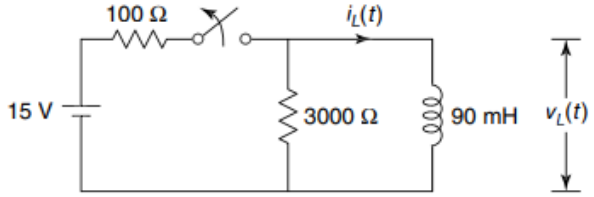


b Derive the condition for reciprocity and symmetry for Y-parameters. 10M

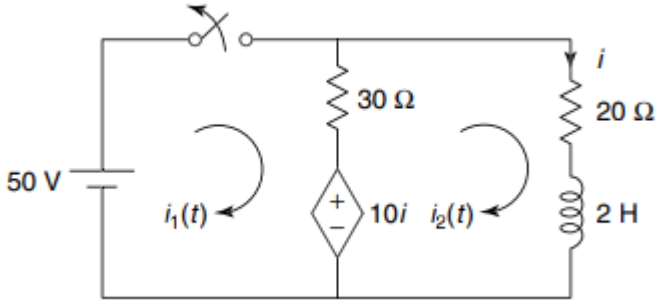
Q5 a For the given network, poles and zeros of driving point function Z(s) are, poles: (–1 ± j2); zero: –4. If Z (j0) = 1, find the values of R, L and C. 10M



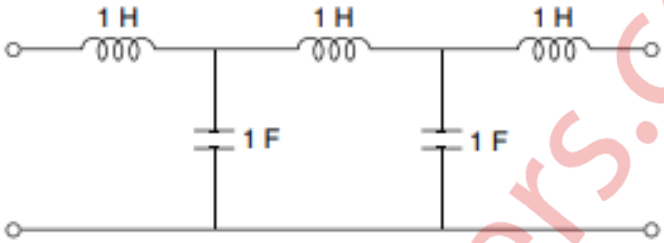
b For the following network, steady state is reached with the switch closed. The switch is opened at t = 0. Obtain expressions for i_L (t) and v_L (t). 10M



Q6 a For the network shown, find the current in the 20 Ω resistor when the switch is opened at t=0. 10M



b Determine the transmission parameters of the following network. 10M



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