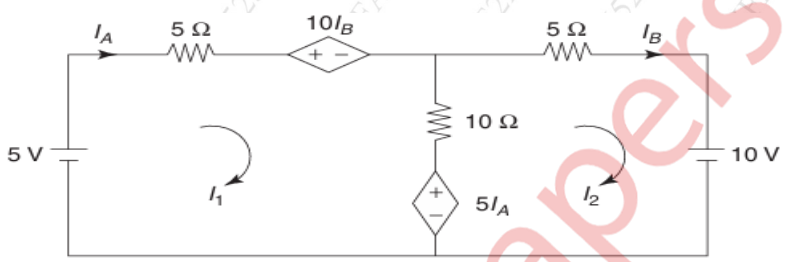
10/06/2025 SE EXTC SEM-III C-SCHEME NT QP CODE: 10083018

Time: 3 Hours **Max. Marks: 80**

Question No. 1 Compulsory
Question No. 2 to Question No. 6 Solve any Three

Q1 Solve any Four out of Five **5 marks each** **(20)**

A Determine the branch currents in the network shown



B Derive condition of symmetry and reciprocity for h parameters

C Obtain the pole zero plot of the following function

$$\frac{(S+1)^2(S+5)}{(S+2)(S+3+j2)(S+3-j2)}$$

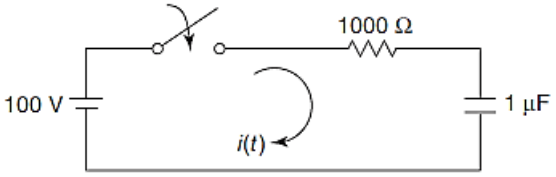
D Test whether the polynomial P(s) = $S^4+S^3+3S^2+2S+12$ is Hurwitz.

E The reduced incidence matrix of an oriented graph is given below. Draw the oriented graph and write fundamental tiset matrix and cutset matrix.

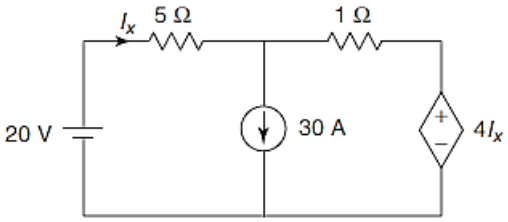
$$A=\begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Q2 **10 marks each**

A In the network, the switch is closed at t = 0. With the capacitor uncharged, find value for i, di/dt , d^2i / dt^2 at $t = 0^+$

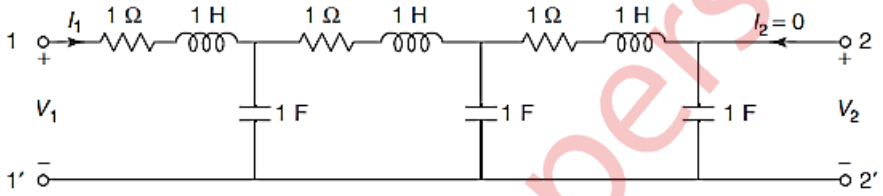


B Find the current Ix using superposition theorem:



Q3. **10 marks each**

A For the ladder network of Fig, find the driving point-impedance at the 1 – 1'terminal with 2 – 2' open.



B Synthesize in Cauer –I and Cauer – II form

$$Z(s) = \frac{(s+2)(s+6)}{2(s+1)(s+3)}$$

Q4. **10 marks each**

A Test if $F(s) = \frac{S^3 + 6S^2 + 7S + 3}{S^2 + 2S + 1}$ is a positive real function.

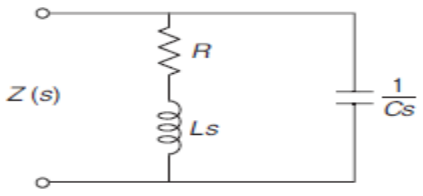
B Currents I_1 and I_2 entering at Port 1 and Port 2 respectively of a two-port network are given by the following equations:

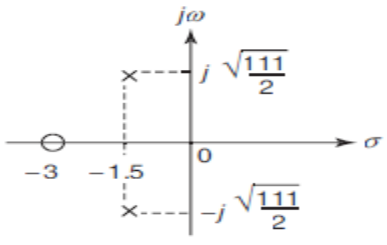
$$I_1 = 0.5V1 - 0.2\ V2$$
$$I_2 = -0.2V1 + V2.$$

Find Y, Z and ABCD parameters for the network.

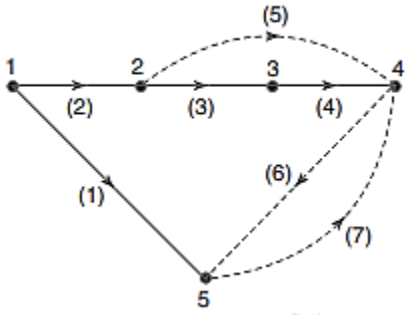
Q5. **10 marks each**

A A network and its pole- zero configurations are shown. Determine the values of R,L and C if $Z(j0) = 1$



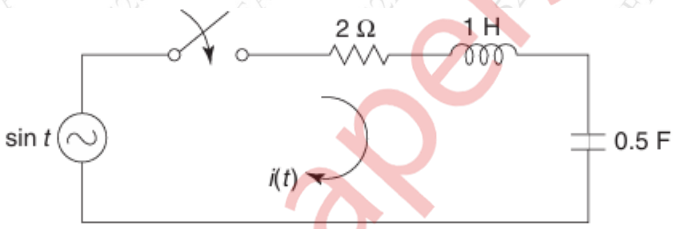


B Find reduced incidence matrix, Tie set matrix and Cutset matrix of given graph-



Q6. **10 marks each**

A For the network shown switch is closed at t = 0. Determine the current i(t) assuming zero initial conditions.



B Find the value of resistance R_L in network for maximum power transfer and calculate the maximum power.