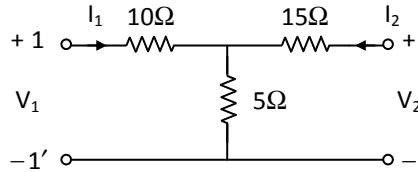


Prelim Paper

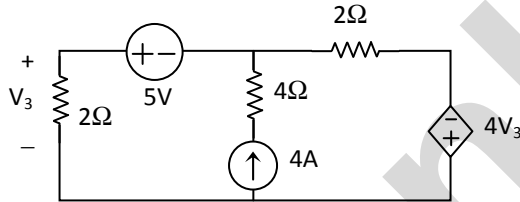
Electrical Network Analysis and Synthesis

- N.B.:** (1) Question No. 1 is compulsory.
 (2) Attempt any three questions from Q.2 to Q.6.
 (3) Assume Suitable data with justification if missing.

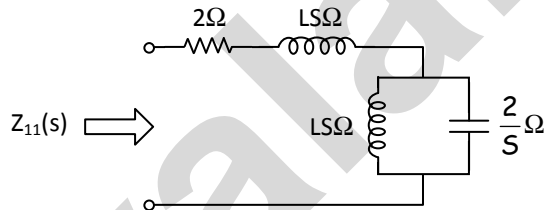
1. (a) Determine the z-parameters of the network shown in the following figure. [5]



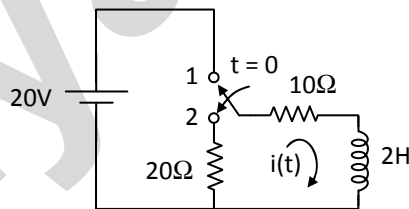
- (b) By mesh analysis determine the current through 2Ω resistor [5]



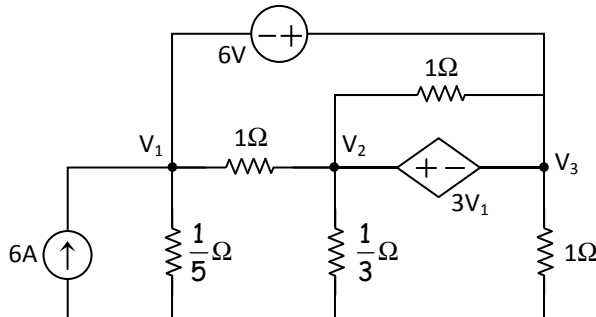
- (c) Determine the driving point impedance function of the one-port network. [5]



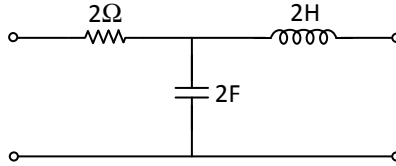
- (d) Find i , $\frac{di}{dt}$ at $t = 0t$. [5]



2. (a) Find nodal voltages for the given circuit. [10]



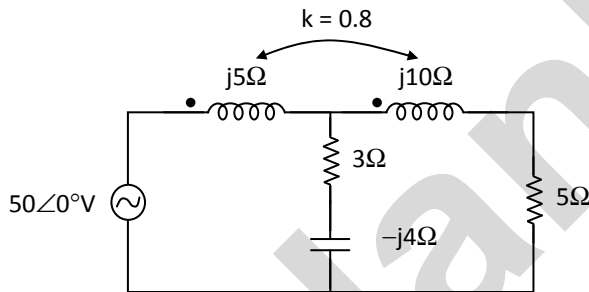
(b) Determine transmission parameter or the following network. [5]



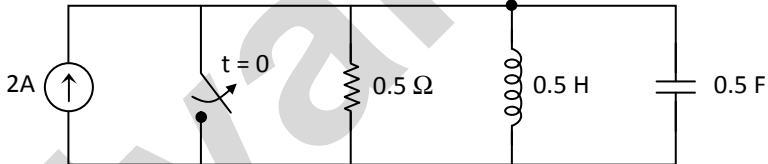
(c) Draw oriented graph and find number of trees. [5]

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

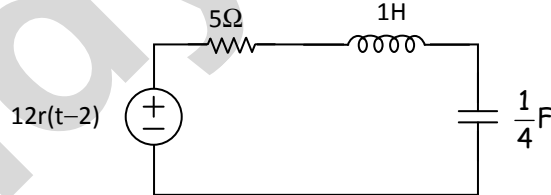
3. (a) Find the voltage across the 5Ω resistor using mesh analysis. [10]



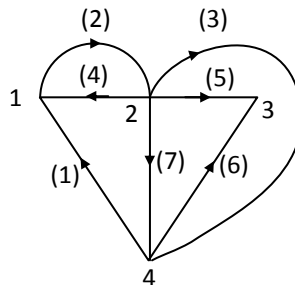
(b) Determine $V(t)$ for time $t > 0$ [10]



4. (a) Determine current in a circuit for time $t \geq 0$. [10]



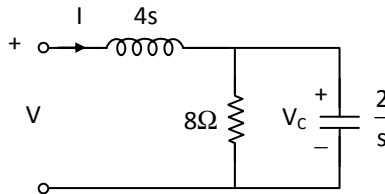
(b) For given graph find
 (i) Incidence matrix
 (ii) tie set matrix
 (iii) f-cut set matrix [10]



5. (a) Realize the foster I and foster II forms of the following impedance function [10]

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

- (b) For the given circuit, determine $\frac{V_c}{V}$ & draw the pole-zero plot. [5]



- (c) Check if the following function is a positive real function. [5]

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

6. (a) Check whether the following functions are prf or not : [10]

$$F(S) = \frac{2S^4 + 7S^3 + 11S^2 + 12S + 4}{S^4 + 5S^3 + 9S^2 + 11S + 6}$$

- (b) The network shown in Figure reaches a steady state with switch at position 1. [10]

At $t = 0$, the switch is changed from the position 1 to the position 2, Find the

value of i , $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$.

