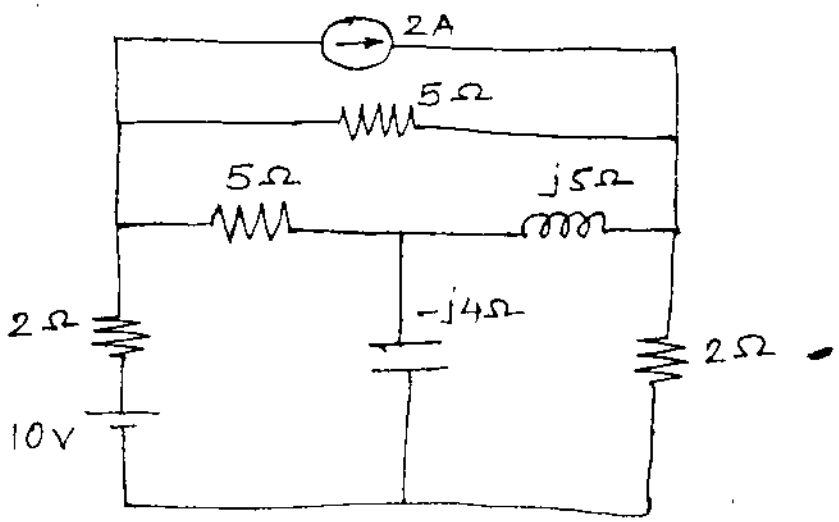
(REVISED COURSE)

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data *if* **necessary**.

1. (a)



10

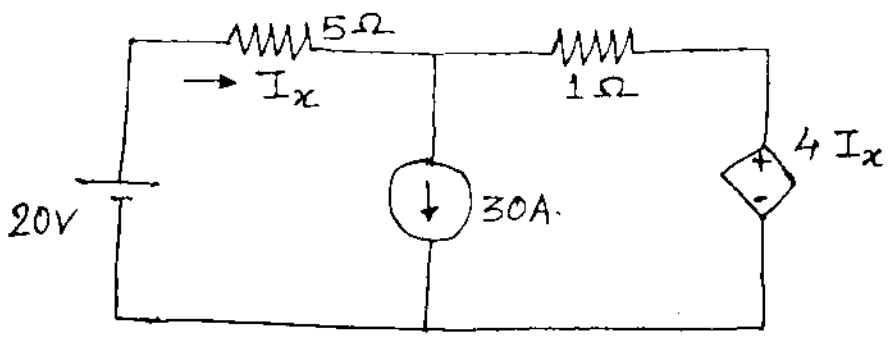
(i) Write down Tie-Set matrix
(ii) Network equilibrium equation in matrix form using KVL.

(b) The reduced incidence matrix of an oriented graph is— 10

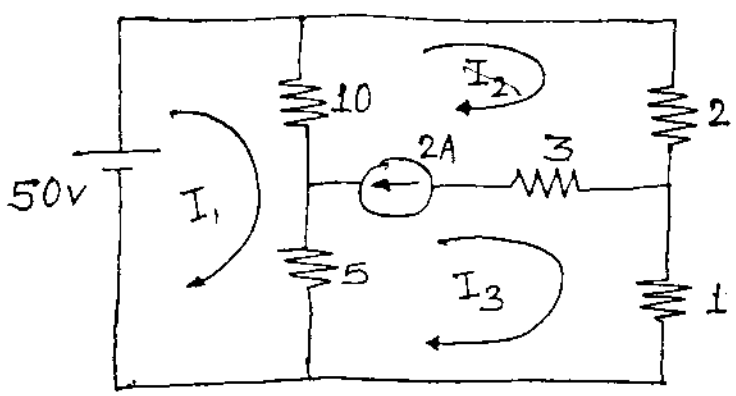
$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(i) Draw the graph
(ii) Write Tie-set and cut-set matrix.
(iii) How many no. of trees are possible ?

2. (a) Using superposition Theorem, Find I_x. 10



(b) Using Mesh Analysis, Find current in 5 Ω resistance. 10



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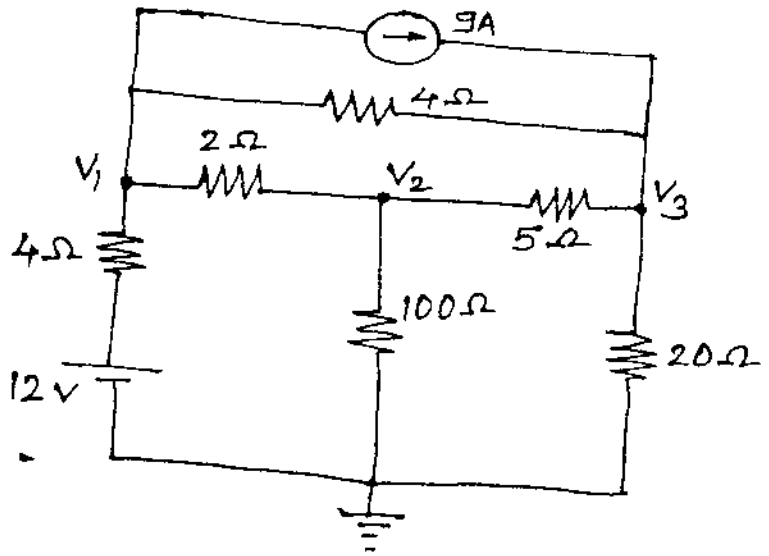
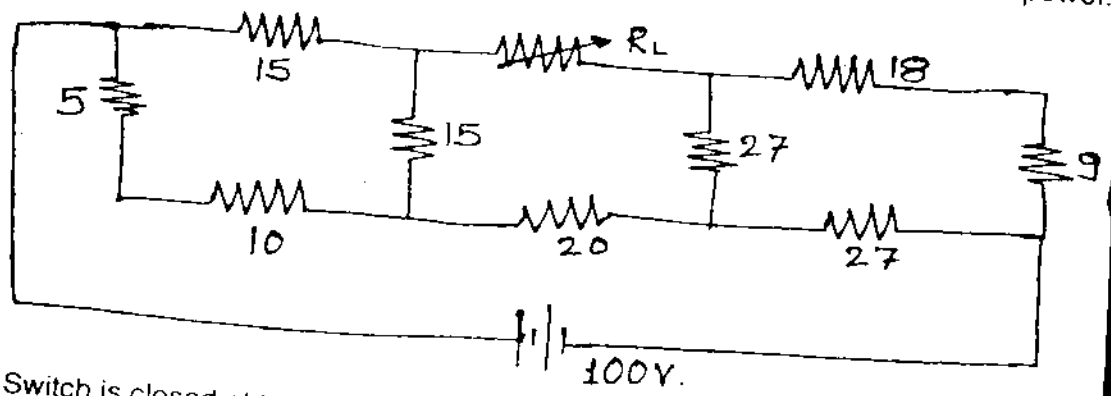
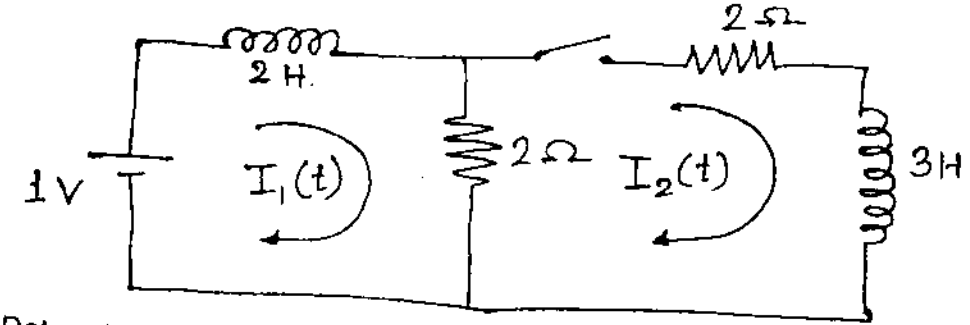
3. (a) Using nodal analysis, find voltage across 5 Ω resistance.



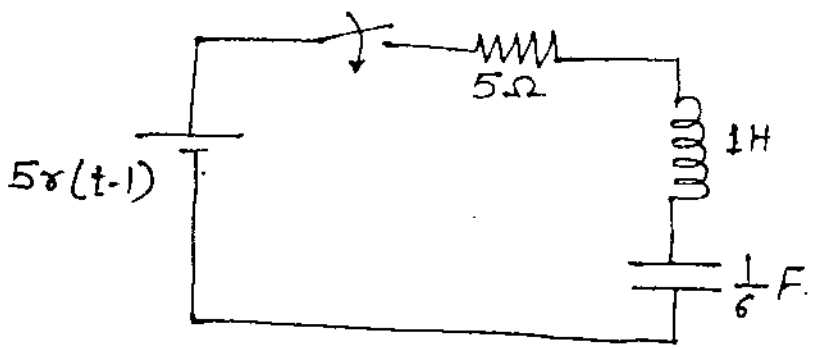
(b) Find the value of R_L for maximum power and calculate the maximum power.



4. (a) Switch is closed at $t = 0$, the steady state being reached before $t = 0$. Determine current through the inductor of 3 H.



(b) Determine the current i(t), when the switch is closed at $t = 0$ with zero initial condition.

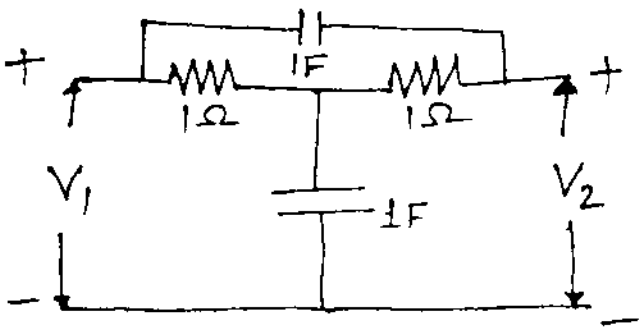


5. (a) Test whether $F(s) = \frac{2s^3+2s^2+3s+2}{s^2+1}$ is positive real function. **10**

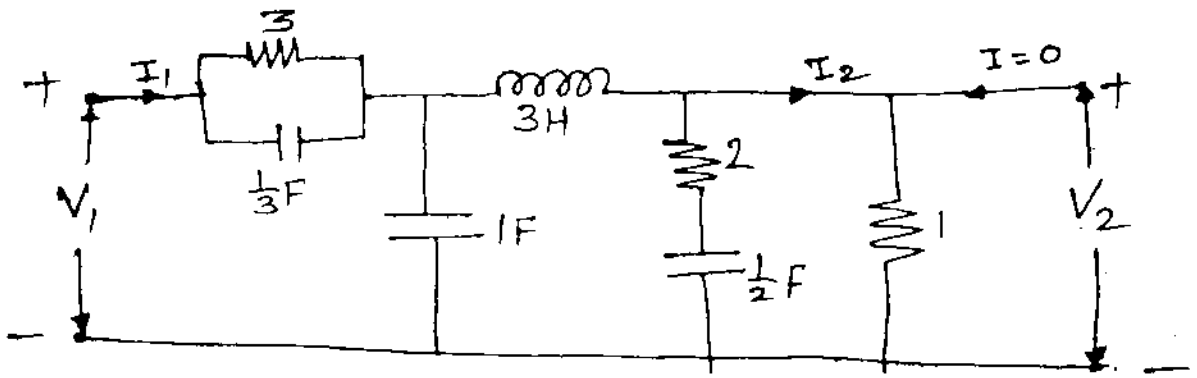
(b) State Maximum power transfer theorem and give the proof. **5**

(c) Explain the terms : (i) Time constant (ii) Initial condition. **5**

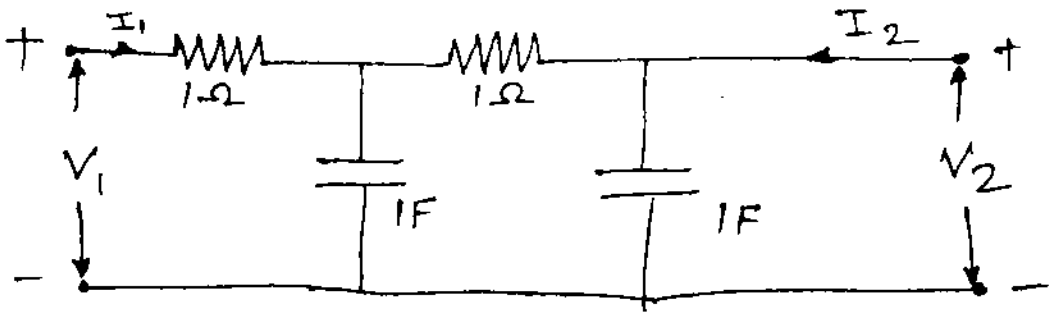
6. (a) Determine $Z_{11}(s)$, $Z_{12}(s)$, $G_{12}(s)$. **10**



(b) Determine $\frac{V_2}{V_1}, \frac{I_2}{I_1}, \frac{V_2}{I_1}, \frac{V_1}{I_1}$ **10**



7. (a) Determine short-circuit admittance parameters (Y_{11}, Y_{12}, Y_{21}, Y_{22}), **10**



(b) Currents I_1 and I_2 entering at Port 1 and Port 2 respectively of two port network are given by following equations. **10**

$$I_1 = 0{\cdot}5\ V_1 - 0{\cdot}2\ V_2$$
$$I_2 = -\ 0{\cdot}2\ V_1 + V_2.$$

Find Y, Z and ABCD parameters.