SE (ETRX) SEM-III (R)
Electrical Network Analysis and Synthesis

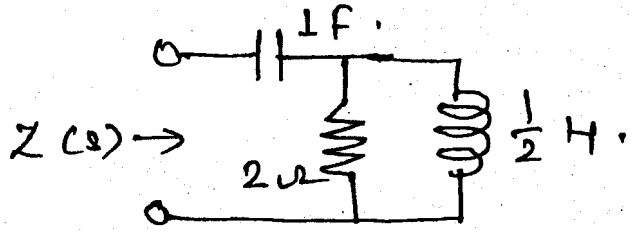
Karu-upq kl-11 94

Con. 3379–11. **RK–1245**

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

N.B. : (1) Question No. **1** is **compulsory**
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume **suitable** data wherever **required** but justify the **same**.
(4) **Figures** to the **right** indicate **full** marks.

1. Solve the following — **20**
   (a) State the properties of positive real function.
   (b) Find poles and zeros of the impedance of the following network and plot it on s-plane.



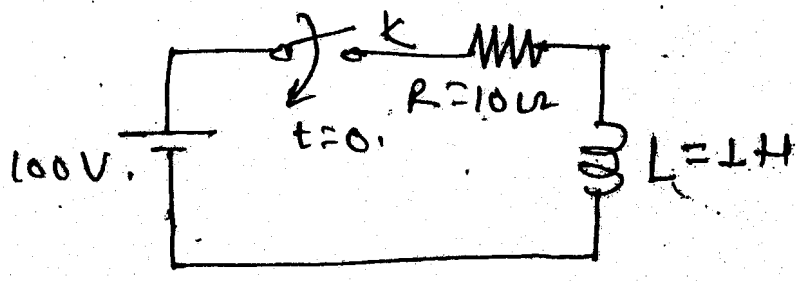
   (c) Explain Y-parameters interms of Z-parameters.
   (d) State the properties of Hurwitz polynomial.

2. (a) The reduced incidence matrix of an oriented graph is. **10**

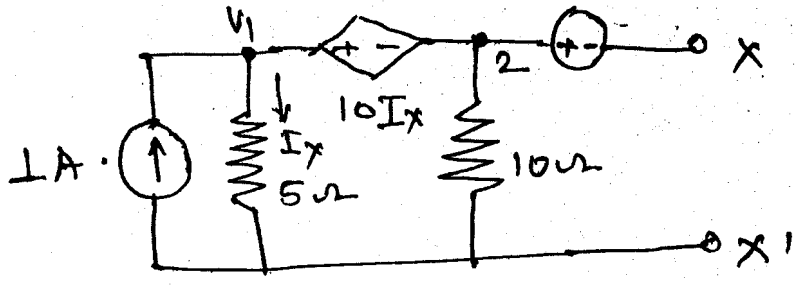
$$A=\begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

   (i) Draw the graph.
   (ii) How many trees are possible for this graph ?
   (iii) Write TIE set and Cut set.

   (b) The switch is closed at t = 0. Find value of I, di/dt, d^2i/dt^2 at $t = 0^+$. Assume initial current of inductor to be zero for circuit given below. **10**



3. (a) Find Thevenin's equivalent of circuit shown below to the left of X–X'. **10**



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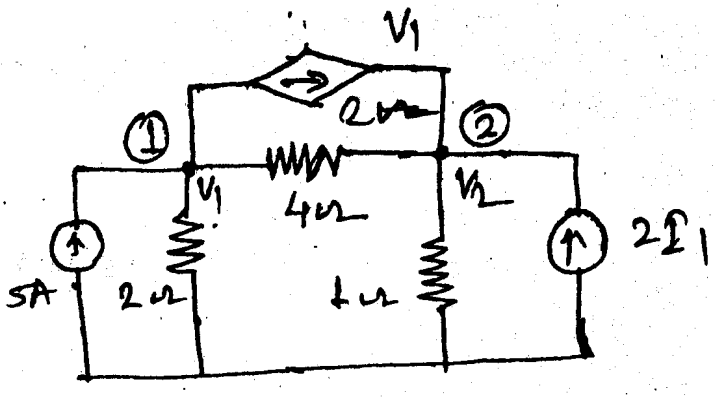
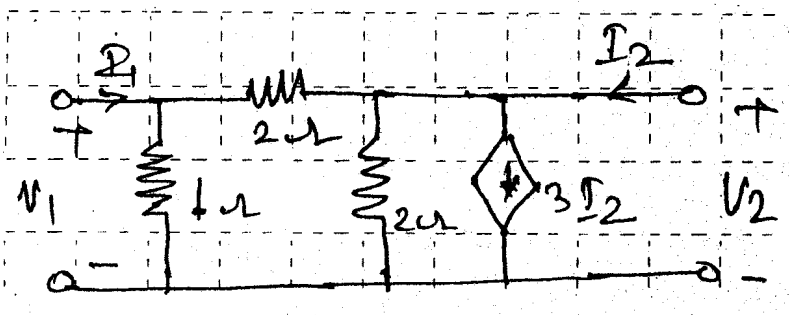
(b) Determine the node voltage at node (1) and (2) of network shown in **figure** below by using nodal analysis. 10



4. (a) Find Z and Y parameters. 10



(b) Realise the function in FI and FII forms. 10

$$Y(s) = \frac{s(s+2)(s+6)}{(s+1)(s+4)(s+8)}$$

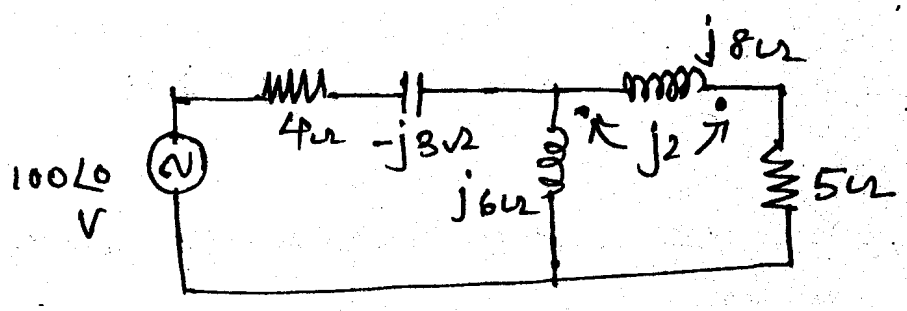
5. (a) Check the following polynomials for Hurwitz. 10

(i) $P(s) = s^4 + s^3 + 4s^2 + 2s + 3$

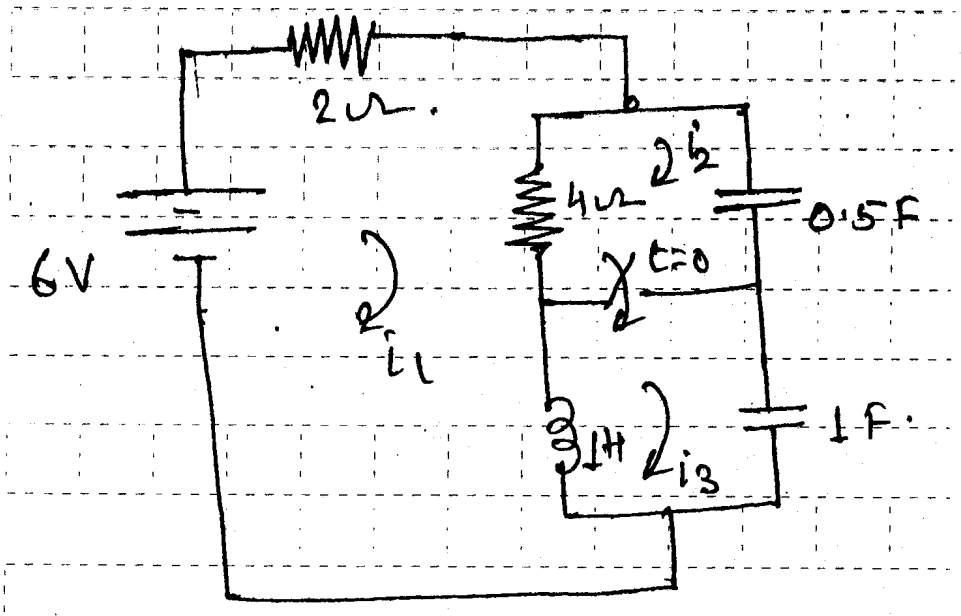
(ii) $P(s) = s^3 + 4s^2 + 5s + 20$.

use continued fraction Expansion.

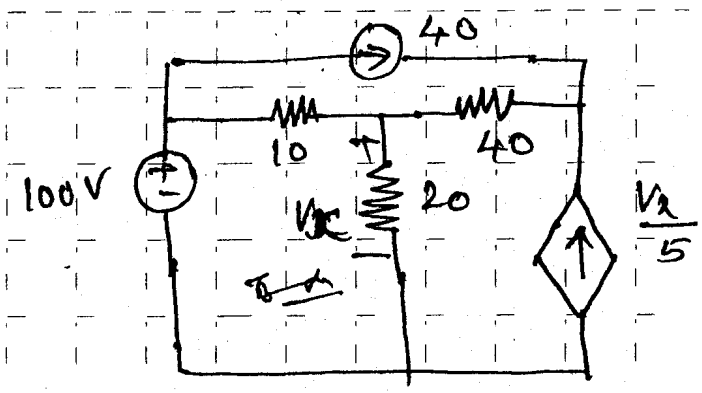
(b) Calculate the mesh currents for the circuit shown. 10



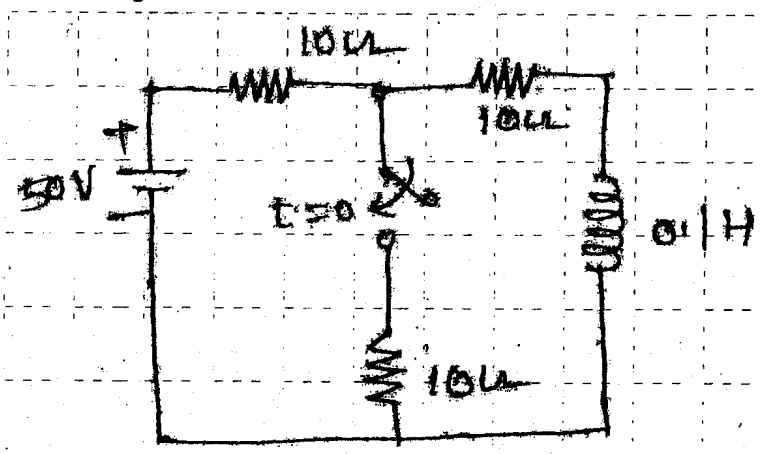
6. (a) Find three loop currents at $t = 0^+$. 10



(b) Find magnitude of VCCS by mesh analysis. 10



7. (a) Find i through circuit as shown in **figure** below if the switch is closed at t = 0. 10



(b) Test which of the following are positive functions. 10

(i) $\dfrac{s+2}{s^2+3s+2}$ (ii) $\dfrac{s^2+6s+2}{s^2+3s+5}$
