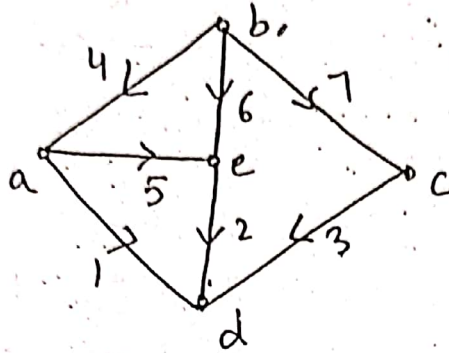


Circuit and Systems

Assignment No. 3

Que-1 → Obtain the f-loop (tieset) and f-cut set matrices for the graph shown in fig. for the tree of twigs (1, 2, 3, 4).



Que-2 → The fundamental cut-set matrix Q_f is given as-

Cut-sets	Twigs			Links			
	3	5	1	2	4	6	
1	1	0	0	1	0	1	
3	0	1	0	1	1	1	
5	0	0	1	0	1	1	

Draw the oriented graph of the network.

Que-3 → The reduced incidence matrix of a linear graph is given below-

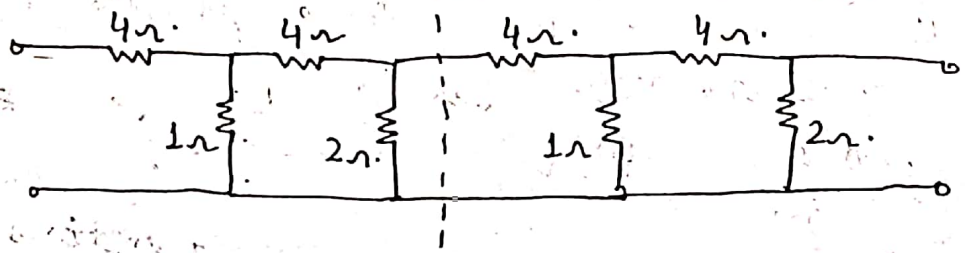
$$A = \begin{bmatrix} 0 & 0 & 1 & 1 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & -1 & 1 & 1 \\ -1 & 0 & -1 & 0 & 0 & -1 & 0 \end{bmatrix}$$

Assume branches 2, 3, 4 to constitute twigs of a tree, determine B_f and Q_f and verify the results by drawing the graph selecting branches 2, 3, 4 as twigs.

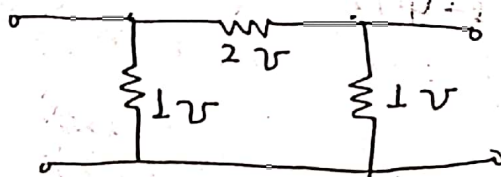
Que-4 → Derive the condition for reciprocity and symmetry for Z , Y and T parameters.

Que-5 → Obtain the T -parameters of the network in terms of all other parameters.

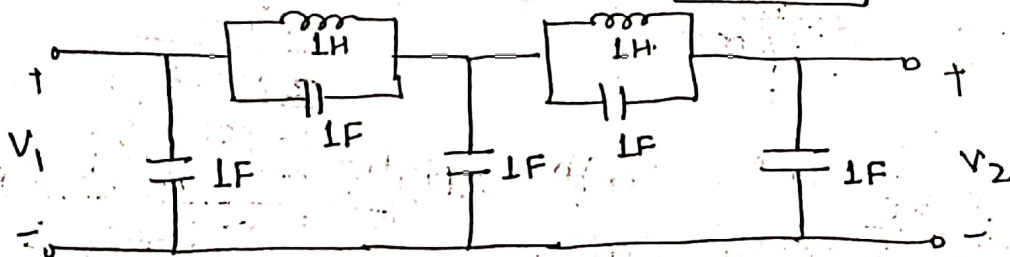
Que-6 → Determine the ABCD parameters of the two networks connected in cascade as shown in fig. below.



Que-7 → Two identical sections of the network shown in fig. below are connected in parallel. Find the Y-parameters of the resulting network. Also verify the result by direct calculation.



Que-8 → For the network shown in fig. below, calculate the voltage-ratio transfer function, $G_{21} = \frac{V_2}{V_1}$



Que-9 → Define Hurwitz polynomial and write its properties.

Que-10 → Check whether the given polynomials are Hurwitz or not.

(i) $P(s) = s^7 + 3s^5 + 2s^3 + s$

(ii) $P(s) = s^4 + 11s^3 + 39s^2 + 51s + 20$

(iii) $P(s) = s^5 + 12s^4 + 45s^3 + 44s^2 + 48$

(iv) $P(s) = s^6 + 2s^5 + 14s^4 + 26s^3 + 49s^2 + 72s + 26$

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