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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2044 Roll No. | | | | | | | | | | |

B.Tech.

THIRD SEMESTER EXAMINATION, 2006-07

NETWORK ANALYSIS AND SYNTHESIS

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt ALL questions.*

(ii) All questions carry equal marks.

(iii) In case of numerical problems assume data wherever not provided and state assumption made.

(iv) Be precise in your answer.

1. Attempt *any four* parts of the following : (5x4=20)

(a) Differentiate with suitable example :

(i) Cut-set and Tie-set.

(ii) Directed graph and connected graph.

(b) A reduced incidence matrix of a graph is given by

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

obtain the number of possible trees.

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(c) Draw a graph of resistive network shown in fig 1 (b). Select a suitable tree and obtain the tie-set matrix.

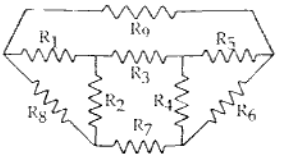

Fig.1(b)

(d) Derive relation between Branch voltage matrix, Twing Voltage matrix and Mode Voltage matrix of a network.

(e) Find Norton's current I_N for the network shown in fig. 1 (d) using graph theory.

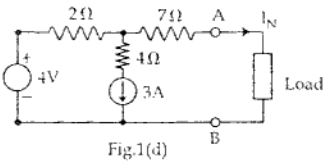

Fig.1(d)

(f) Develop the Tie-set matrix of the circuit given in fig. 1 (e).

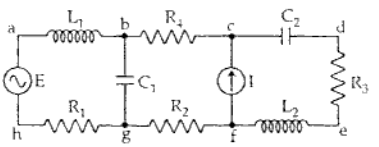

Fig.1(e)

2. Attempt *any two* parts of the following : (10x2=20)

(a) Define and explain Thevenin's theorem. In the network shown in fig. 2 (a), find Thevenin's equivalent network across A-B terminals.

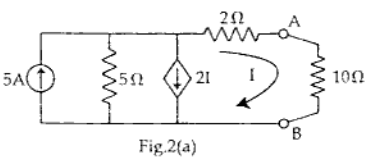

Fig.2(a)

(b) (i) Find Norton's equivalent circuit across 1-1' of ac network shown in fig 2 (b).

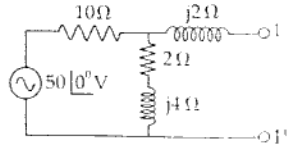

Fig.2(b)

(ii) Illustrate Tellegen's theorem for the network shown in fig 2 (c).

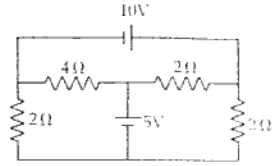

Fig.2(C)

(c) Find the current through the capacitor and voltage across 4 Ω resistance of the ac network shown in fig 2 (d) by using superposition theorem.

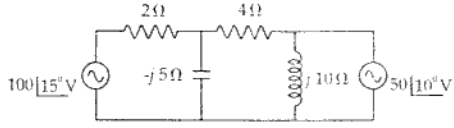

Fig.2(d)

3. Attempt ***any two*** parts of the following : **(10x2=20)**

(a) Enlist the necessary conditions for transfer function. Find the transfer function $\left(\frac{V_2}{V_1}\right)$ of the network given in fig. 3 (a). Also sketch pole - zero configuration.

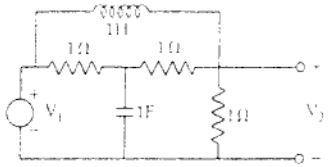

Fig 3(a)

(b) The transform current I (s) in a network is given by $I(s) = \frac{3S(S+2)}{(S+1)(S+4)}$

Plot the poles and zeros in the s-plane and hence obtain the time domain response.

(c) Discuss difference between driving point function and transfer function. Determine driving point impedance function of the network shown in figure 3 (b).

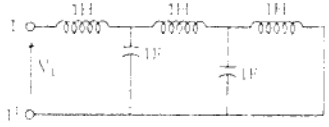

Fig 3(b)

4. Attempt *any two* parts of the following : (10x2=20)

(a) Determine the h parameters of the network given in fig. 4 (a).

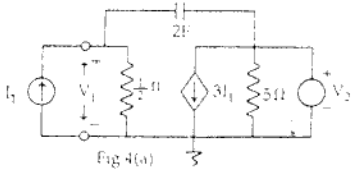

Fig 4(a)

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(b) For the T-network given in fig 4 (b) (i), obtain z-parameters and for π-network of fig. 4 (b) (ii). Obtain Y-parameters. If these networks have identical behaviour at the parts relate the elements of the two networks.

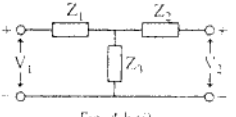

Fig. 4.b (i)

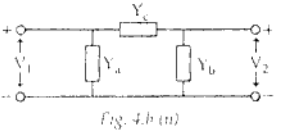

Fig. 4.b (ii)

(c) Determine transmission parameters of a network given in fig. 4 (c), considering sections as shown are connected in cascade manner.

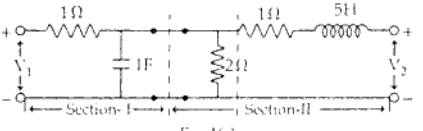

Fig.4(c)

5. Attempt *any two* parts of the following : **(10x2=20)**

(a) Diagnose whether the following impedance function represents a RL or RC network and find its first cauer form.

$$Z(S) = \frac{(S+4)(S+6)}{(S+3)(S+5)}$$

(b) Realise the function $Z(S) = \dfrac{S(S^2+4)}{2(S^2+1)(S^2+9)}$ in both foster forms of LC network.

(c) Design a T-section constant K - high pass filter having cutoff frequency of 10 KHz and design impedance of 600 Ω. Find its characteristic impedance and phase constant at 25 KHz.

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