

Roll No. to be filled in your Answer Book

Roll No.

--	--	--	--	--	--	--	--	--	--

B.Tech

SEMESTER-III, UTU EXAMINATION, 2013-14

NETWORK ANALYSIS AND SYNTHESIS

Time: 3 Hours]

[Total Marks: 100

Note:- Attempt All Questions. All Questions carry equal marks.

Q1. Attempt any four Questions of the following:- 4x5=20

(a) What do you understand by source transformation in reference to network analysis

$$F(s) = \frac{s^3 + 5s^2 - 9s + 3}{s^3 + 4s^2 - 7s + 9}$$

(b) Check the function $F(s)$ is positive real or not.

(c) Find the power delivered by the 5A current source (in Fig.1) using nodal analysis.

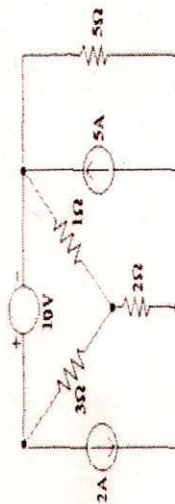


Figure 1

(d) Define cutset and tie set matrix

(e) The Z parameters of a circuit are given by $\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$ obtain transmission line parameters

- (f) Define the following terms related to a network graph
 a) Path b) Loop c) Tree d) Cotree e) Planar Graph

Q2. Attempt any four Questions of the following:- 4x5=20

- (a) Determine the condition of reciprocity and symmetry in h parameters.
 (b) Check when the function $Z(s) = \frac{2s^2+2s+1}{s^3+s^2+s+2}$ is a positive real function
 (c) Discuss the properties of RC Driving point impedance.
 (d) The fundamental cut-set matrix is given as:

Cut sets	Branches				Links		
	1	2	3	4	5	6	7
1	0	0	0	0	-1	0	0
0	1	0	0	0	1	0	1
0	0	0	1	0	0	1	1
0	0	0	0	1	0	1	0

Draw the oriented graph of the network.

- (e) Define the terms Gain Margin and Phase margin.
 (f) A network graph has three basic cut-sets and six basic loops.
 Draw -
 (i) The oriented network graph having all the nodes in one line, and
 (ii) All the six basic loops.

Q4. Attempt any two questions of the following 2x10=20

- (a) Obtain the Thevenin equivalent of the network shown in Fig.4. Then draw the Norton's equivalent network by source transformation.

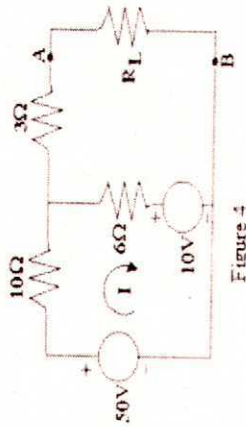


Figure 4

- (b) Determine the h-parameters of the network shown in

Fig.5.

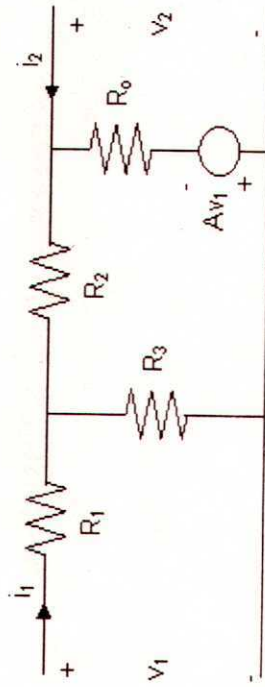


Figure 5

- (c) For the network function $Y(s) = \frac{2(s+1)(s+3)}{(s+2)(s+4)}$ synthesize in Foster form one and Cauer form one.

(4)

Q5. Attempt any two questions of the following

2x10=20

- (a) State Reciprocity Theorem for a linear, bilateral, passive network. Verify reciprocity for the network shown in Fig.6.

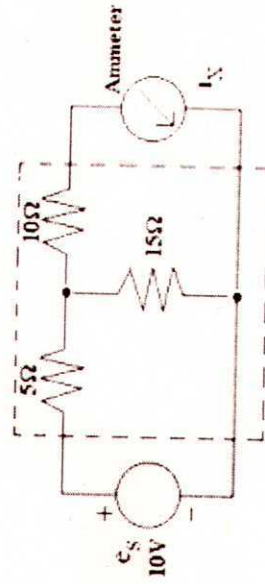


Figure 6

- (b) Consider the function $F(s) = \frac{s^2 + 1.03}{s^2 + 1.23}$ Plot its poles and zeroes. Sketch the amplitude and phase for $F(s)$ for $1 \leq \omega \leq 10$.

- (c) Determine the amplitude and phase for $F(s)$ from the pole zero plot in s-plane for the network

$$F(s) = \frac{s^2 + 4}{(s+2)(s^2 + 9)}$$

function

Q3. Attempt any two questions of the following 2x10=20

(a) For the symmetrical 2-port network shown in Fig.2, find the z-and ABCD-parameters.

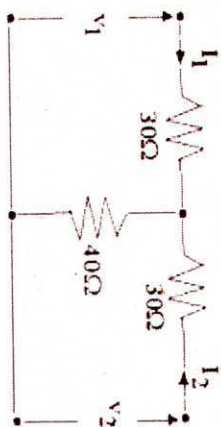


Figure 2

(b) Find the driving-point impedance $Z(s) = K \frac{N(s)}{D(s)}$, for the network shown in Fig.3. Verify that $Z(s)$ is positive real and that the polynomial $D(s) + K.N(s)$ is Hurwitz.

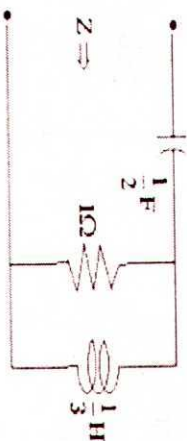


Figure 3

(c) Synthesise the network that has a transfer admittance

$$Y_{21}(s) = \frac{s^2}{s^3 + 3s^2 + 4s + 2} \text{ and a } 1\Omega \text{ termination at the output end.}$$

(3)