Printed Pages : 7 **TEE-303**

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

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

B. Tech.

(SEM. III) EXAMINATION, 2007-08

NETWORK ANALYSIS & SYNTHESIS

Time : 3 Hours] *[Total Marks : 100*

Note : *(1) Attempt **all** questions.*

*(2) All questions carry **equal** marks.*

(3) In case of numerical problems assume data wherever not provided.

1 Attempt any **four** parts of the following : 5×4=20

(a) Draw the oriented graph of a network with fundamental outset matrix as given below :

Twigs				*Links*		
1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

(b) A resistive network is given in **Fig. 1(b)**. Obtain the loop incidence matrix.

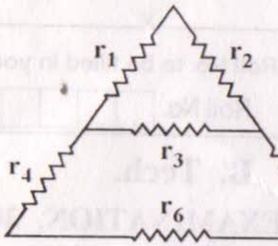

Fig. 1(b)

(c) Derive the generalised KCL equation in terms of fundamental cut set matrix.

(d) Differentiate between Twig matrix and Link matrix with suitable example.

(e) A network is given in **Fig. 1(e)**. Obtain the loop currents using branch impedance matrix and Tie-set matrix.

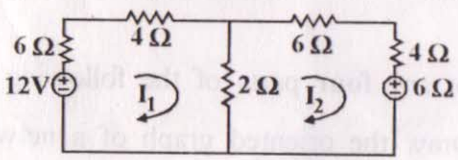

Fig. 1(e)

(f) Draw the dual networks of the circuits shown in **Fig. 1f(1)** and **(2)**

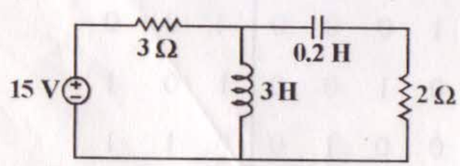

Fig. 1f(1)

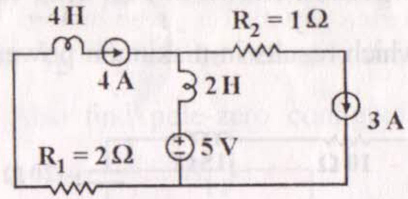

Fig. 1f (2)

2 Attempt any **three** parts of the following : $6\frac{2}{3} \times 3 = 20$

(a) Using superposition theorem, find the voltages across $(4 + j3)\Omega$ in the network shown in **Fig. 2(a)**.

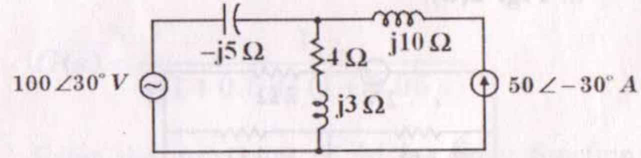

Fig. 2(a)

(b) Obtain Thevenin's equivalent of the network across terminals AB for the circuit shown in **Fig. 2(b)**.

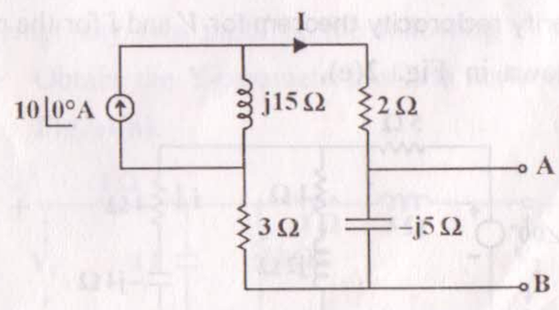

Fig. 2(b)

(c) In the network shown in **Fig. 2(c)**, find the value of R_L which results in maximum power transfer.

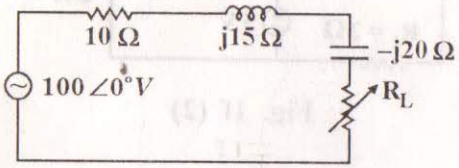

Fig. 2(c)

(d) Verify the Tellegen's theorem for the network shown in **Fig. 2(d)**.

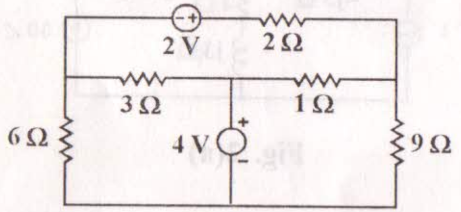

Fig. 2(d)

(e) Verify reciprocity theorem for V and i for the network shown in **Fig. 2(e)**.

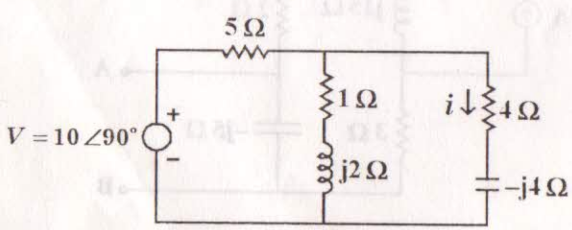

Fig. 2(e)

3 Attempt any **two** parts of the following : **10×2=20**

(a) Obtain V_2/V_1 of the network shown in **Fig. 3(a)**. Also find pole-zero configuration.

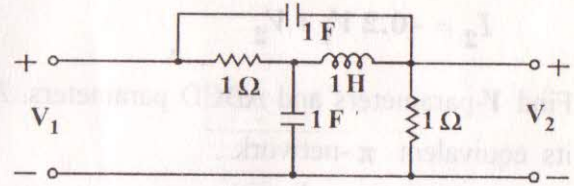

Fig. 3(a)

(b) Draw the Bode plot of the following transfer function

$$G(s) = \frac{1}{s(1+0.5s)(1+0.05s)}$$

(c) Enlist the properties of driving point function. Also check the stability criteria of the polynomial by applying Routh-Hurwitz criterion in

$$P(s) = s^6 + s^5 + 3s^4 + 3s^3 + 3s^2 + 2s + 1$$

4 Attempt any **two** parts of the following : **10×2=20**

(a) Obtain the Y-parameters of the network shown in **Fig. 4(a)**.

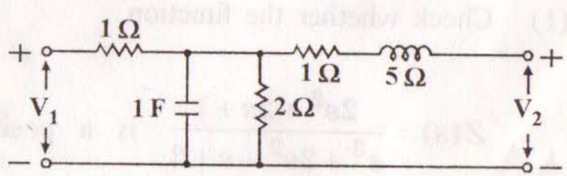

Fig. 4(a)

(b) For a network the equations are

$$I_1 = 0.5\,V_1 - 0.2\,V_2$$

$$I_2 = -0.2\,V_1 + V_2$$

Find Y-parameters and ABCD parameters. Also find its equivalent π-network.

(c) Determine input and output impedances of a generalised network in terms of hybrid parameters.

5 Attempt any **two** parts of the following : 10×2=20

(a) Design an m-derived high pass filter having a design impedance of 600 Ω, cut-off frequency of 5 kHz and m = 0.35. Also determine the frequency of infinite attenuation.

(b) Enlist the properties of RL driving point immittance function. Check whether

$$P(s) = 4s^6 + 2s^5 + 17s^4 + 8s^3 + 16s^2 + 6s + 3$$

is Hurwitz.

(c) (1) Check whether the function

$$Z(s) = \frac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$$ is a positive real function.

(2) The driving point impedance of an LC network is given by $Z(s) = \frac{10s^4 + 12s^2 + 1}{2s(s^2 + 1)}$.

Obtain the first form of Cauer LC network.