



Printed Pages : 7

TEE-303

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

PAPER ID : 2044

Roll No.

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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 : $5 \times 4 = 20$

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

<i>Twigs</i>				<i>Links</i>		
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.

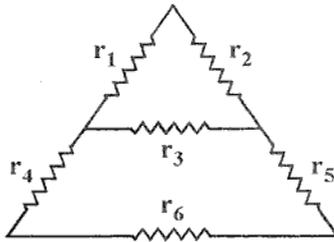


Fig. 1(b)

- (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.

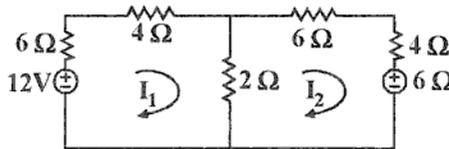


Fig. 1(e)

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

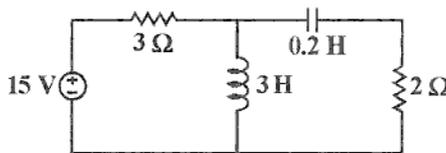


Fig. 1f(1)



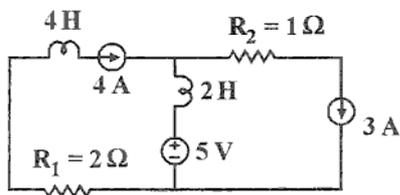


Fig. 1f (2)

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).

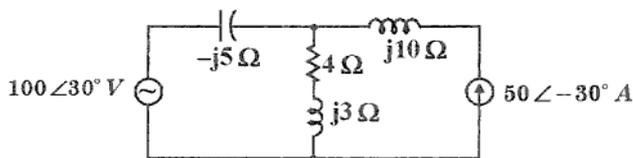


Fig. 2(a)

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

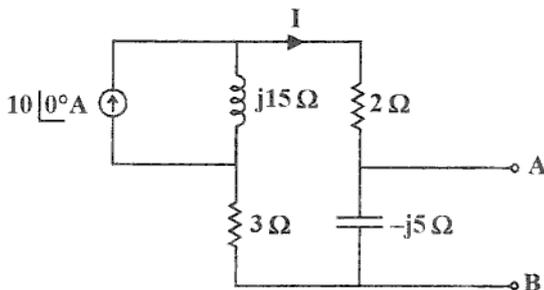


Fig. 2(b)



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

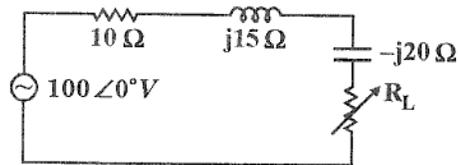


Fig. 2(c)

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

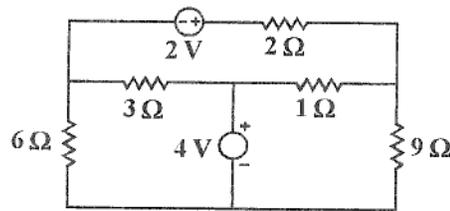


Fig. 2(d)

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

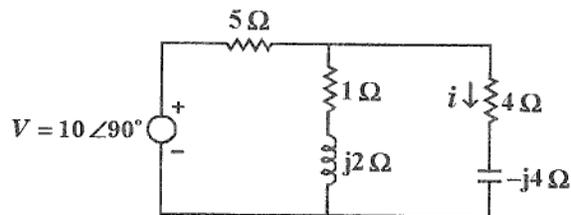


Fig. 2(e)

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.

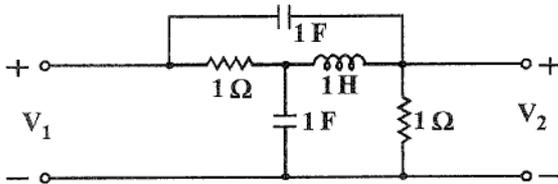


Fig. 3(a)

(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

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

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

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

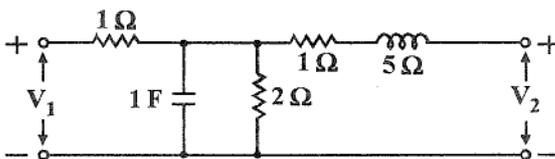


Fig. 4(a)

- (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 600Ω , 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

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

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.
