



Printed Pages : 7

TEE-402

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

**PAPER ID : 2052** Roll No. 

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**B. Tech.**

(SEM. IV) EXAMINATION, 2007-08

**NETWORK ANALYSIS & SYNTHESIS**

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

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

- (a) Define with suitable examples :
  - (i) Tree
  - (ii) Planar graph
  - (iii) Incidence matrix
  - (iv) Twigs
  - (v) Path
- (b) (i) For the network shown in **Fig. 1b(i)** the oriented graph and obtain the cut set matrix. Also find the number of twigs and links.

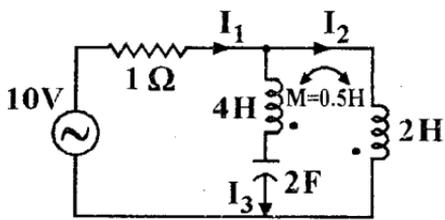


Fig. 1b(i)



- (ii) Obtain the dual network of the network shown in Fig. 1b(ii).

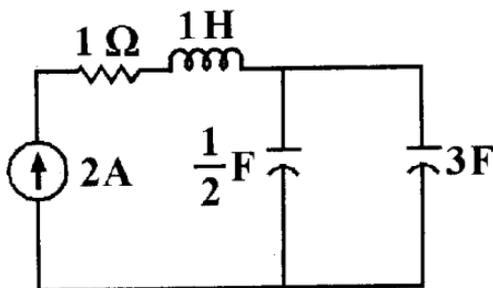


Fig. 1b(ii)

- (c) Consider the network as shown in Fig. 1(c).

Let  $c_1 = c_3 = \frac{1}{2}F$ ,  $R_2 = 1\Omega$ ,  $R_5 = 2\Omega$ ,

$L_4 = 1H$ ,  $L_6 = 2H$ ,  $V_{c_1}(0) = 1$  volt,

$V_{c_3}(0) = 0$ ,  $i_{L_4}(0) = 1A$  and  $i_{L_6}(0) = 0$

using graph theory find

$$i_b = [i_1 \ i_2 \ i_3 \ i_4 \ i_5 \ i_6]^T$$

$$V_b = [v_1 \ v_2 \ v_3 \ v_4 \ v_5 \ v_6]^T$$

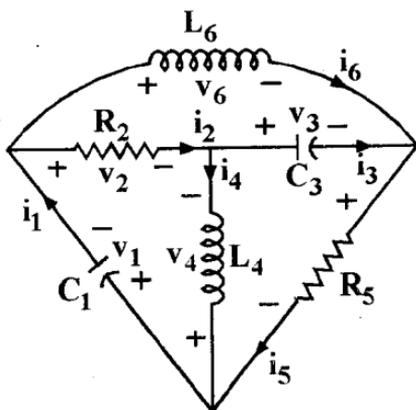


Fig. 1(c)



2 Attempt any **two** parts of the following :  $2 \times 10 = 20$

- (a) (i) State and prove Millman's theorem.
- (ii) Find the power loss in the  $10 \Omega$  of the circuit as shown in Fig. 2(a)(ii).

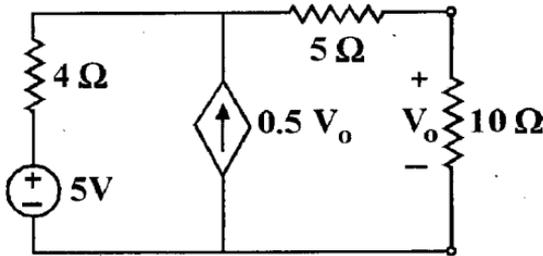


Fig. 2(a)(ii)

- (b) Fig. 2b represents a mixed circuit. Find the magnitude of  $V_0$  by superposition theorem and find the power produced by each of the sources.

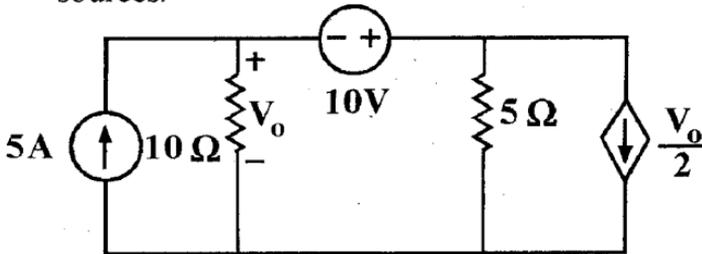


Fig. 2(b)

- (c) In the circuit of Fig. 2c, switch 'S' is in position 1 until steady states reached is switch 'S' is moved to position 2 at time  $t = 0$ . With switch in position '2', determine the Laplace transform of the current through the inductor making use of Thevenin's theorem.



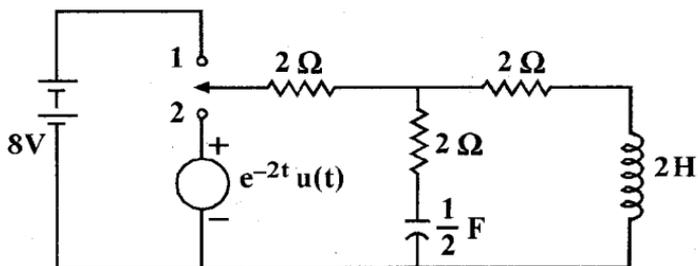


Fig. 2c

3 Answer any **four** of the following : 4×5=20

- (a) Enumerate the necessary condition for the transfer function.
- (b) Find the driving point admittance of the network as shown in Fig. 3b. Also plot the poles and zeros of  $Y(s)$  on the S-plane.

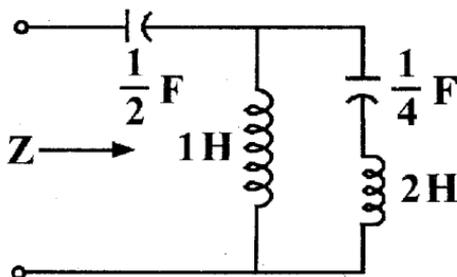


Fig. 3b

- (c) Check the stability of the following polynomial by applying Routh-Huswitz criterion. Also mention the number of roots lying on the  $j\omega$ -axis, right and left half of  $s$ -plane.

$$P(s) = s^6 + 5s^5 + 11s^4 + 25s^3 + 36s^2 + 30s + 36$$

- (d) In the network of Fig. 3d draw pole-zero plot.



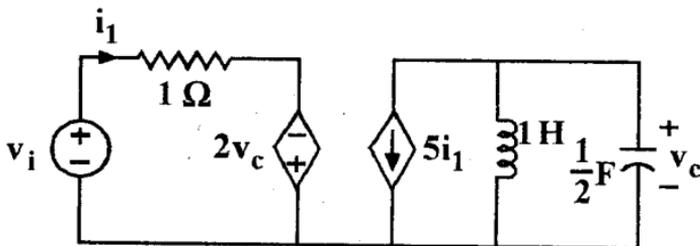


Fig. 3(d)

(e) Show that pole-zero plot of the given network

function  $V(s) = \frac{10s}{(s+3)(s+2)}$  and obtain

$v(t)$  with the help of pole-zero plot.

(f) Obtain the transfer impedance of the network as shown in Fig. 3f

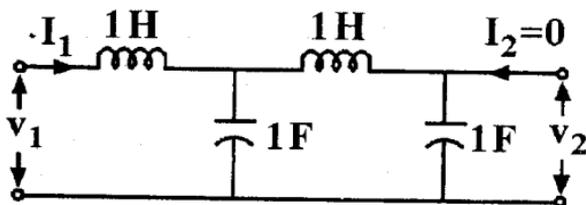


Fig. 3f

4 Answer any **four** of the following : 4×5=20

- (a) Obtain the conditions of symmetry and reciprocity in terms of T-parameters.
- (b) Prove that in series parallel interconnected two networks with h-parameter matrix  $[h_A]$  and  $[h_B]$  respectively, the overall h-parameter matrix is given as :

$$[W] = [h_A] + [h_B]$$



- (c) Obtain  $z$ -parameters of the network shown in Fig. 4(c)

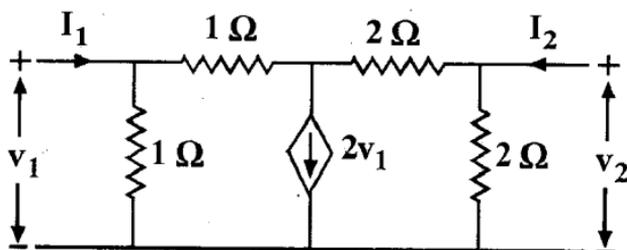


Fig. 4(c)

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

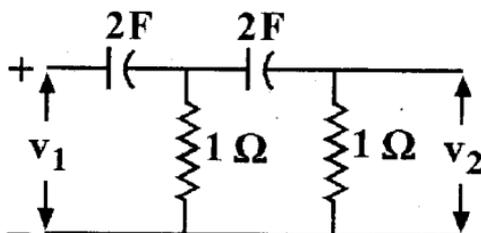


Fig. 4(d)

- (e) Determine the  $h$ -parameters of the network shown in Fig. 4(e)

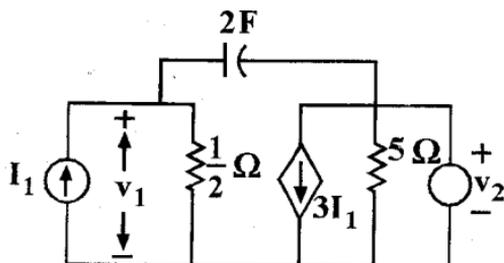


Fig. 4(e)

- (f) For a two port network,  $Y$ -parameters are  $Y_{11} = 0.1$  who,  $Y_{22} = 0.05$  who,  $Y_{12} = Y_{21} = -0.02$  who. Calculate the



Z-parameters for the network and write equilibrium equations for the network using these two types of parameters and also show the equivalent network for both type of parameters

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

- (a) Enlist the properties of LC immittance function. Check whether the function

$$Z(s) = \frac{s^3 + 5s^2 + 9s + 3}{s^4 + 4s^3 + 7s + 9} \text{ is a positive real}$$

function.

- (b) Find the first and second forms of caner network for the function

$$Z(s) = \frac{s^2 + 5s + 4}{s^2 + 2s}$$

- (c) Design a prototype band stop filter section having cut-off frequencies of 2000 Hz and 5000 Hz and design resistance of  $600\ \Omega$ .

