Printed Pages : 7 **TEE-402**

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

PAPER ID : 2052 Roll No. | | | | | | | | | | |

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.

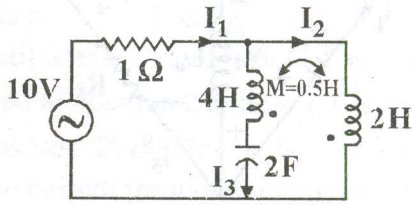

Fig. 1b(i)

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

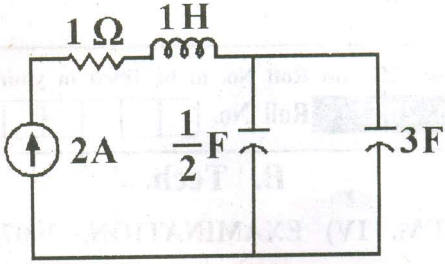

Fig. 1b(ii)

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

Let $c_1 = c_3 = \frac{1}{2}F$, $R_2 = 1\,\Omega$, $R_5 = 2\,\Omega$, $L_4 = 1\,H$, $L_6 = 2H$, $V_{c_1}(0) = 1$ volt, $V_{c_3}(0) = 0$, $i_{L_4}(0) = 1\,A$ and $i_{L_6}(0) = 0$ using graph theory find

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

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

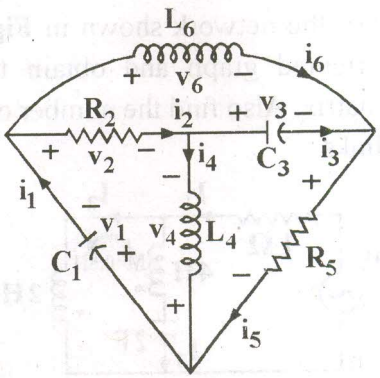

Fig. 1(c)

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

(a) (i) State and prove Millman's theorem.

(ii) Find the power loss in the **10 Ω** of the circuit as shown in **Fig. 2(a)(ii)**.

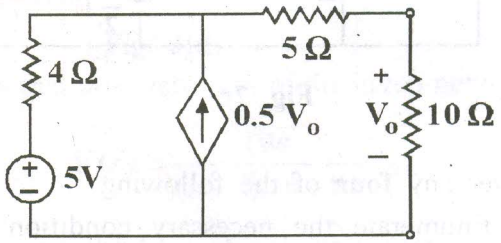

Fig. 2(a)(ii)

(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.

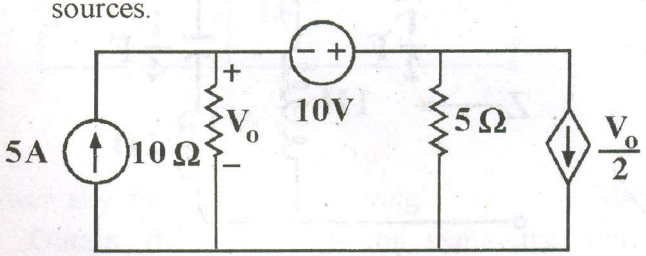

Fig. 2(b)

(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.

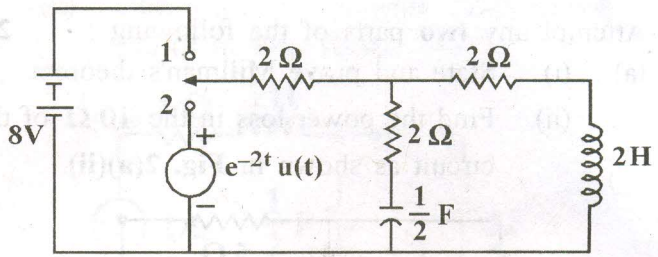

Fig. 2c

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.

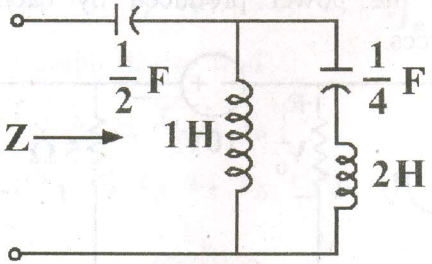

Fig. 3b

(c) Check the stability of the following polynomial by applying Routh-Huswitz criterion. Also mention the number of roots lying on the jw-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.

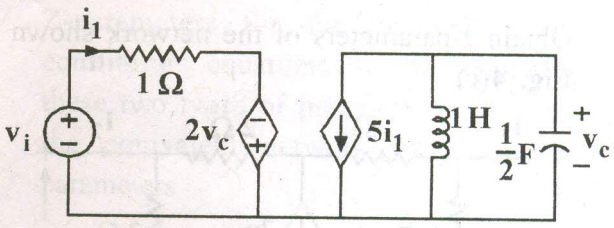

Fig. 3(d)

(e) Show that pole-zero plot of the given network function $V(s) = \dfrac{10s}{(s+3)(s+2)}$ and obtain $v(t)$ with the help of pole-zero plot.

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

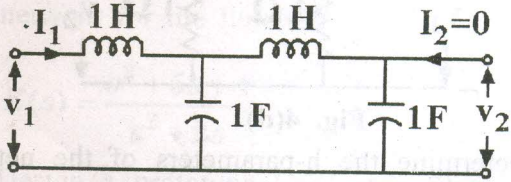

Fig. 3f

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)**

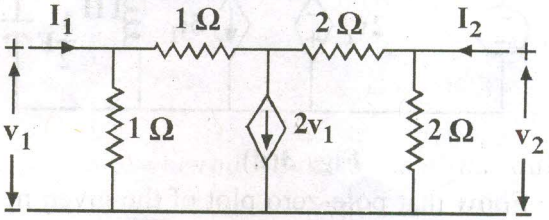

Fig. 4(c)

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

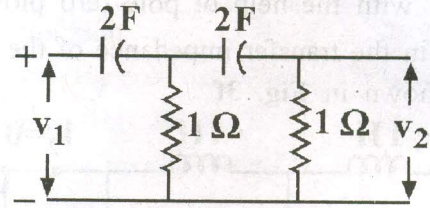

Fig. 4(d)

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

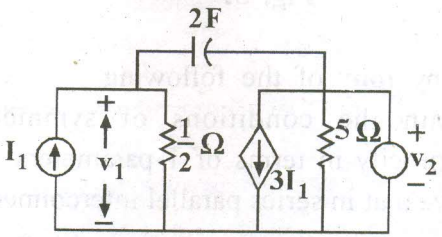

Fig. 4(e)

(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 equilibirum 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

$$Z(s) = \frac{s^3 + 5s^2 + 9s + 3}{s^4 + 4s^3 + 7s + 9}$$ 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 Ω.
