

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

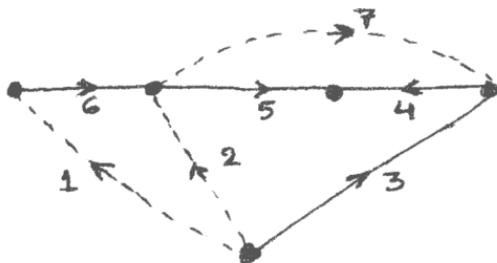
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B. Tech.**(SEM. III) EXAMINATION, 2007-08****NETWORKS AND SYSTEMS***Time : 3 Hours]**[Total Marks : 100*

- Note :** (1) Attempt all five questions.
 (2) Attempt all parts of a question together.

- 1** Answer any **four** of the following : **5×4**
- (a) Define the following terms related to network topology : **1×5**
- (1) Path
 - (2) Planar graph
 - (3) Tree
 - (4) Trial
 - (5) Fundamental circuit.
- (b) Develop a tie-set incidence matrix for the following graph shown in **Fig. 1**. **5**

**Fig. 1**

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[Contd...

- (c) Find the current through the 4 ohm resistance 5 in the following network using mesh current method, circuit shown in Fig. 2.

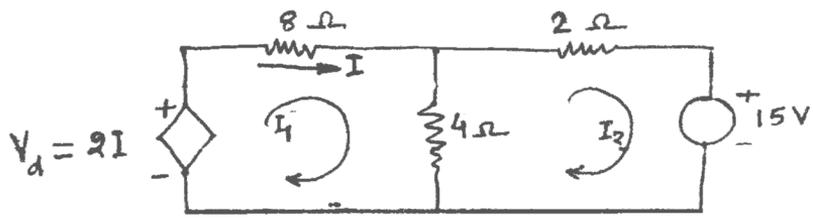


Fig. 2

- (d) Find the current when the voltage applied is 5 $v(t) = 2e^{-0.5t}u(t)$ and $i(0^-) = 0$ and $v_c(0^-) = 0$

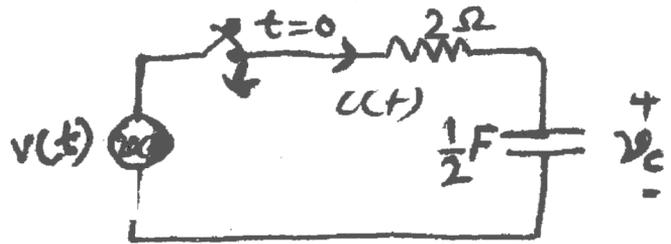


Fig. 3

- (e) What do you understand by Linear Time Invariant System ? Explain unit step, ramp and impulse functions. 5
- (f) Obtain tie set matrix for the following network 5 and get the values of loop currents, shown in Fig. 4.

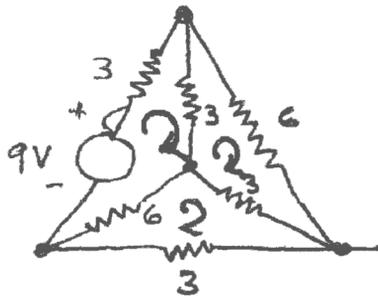


Fig. 4.

2 Answer any four questions : 5×4=20

- (a) Find the current through resistor R_2 in the following network shown in Fig. 5. Assume that the capacitor C_2 is initially uncharged and that the key 'k' is closed at time $t = 0$. 5

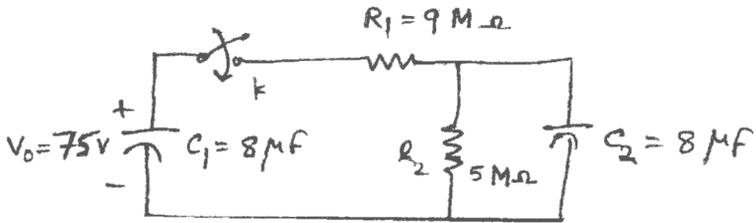


Fig. 5

- (b) Find the Thevenin's equivalent network of the following network at the load terminals A and B, shown in Fig. 6. 5

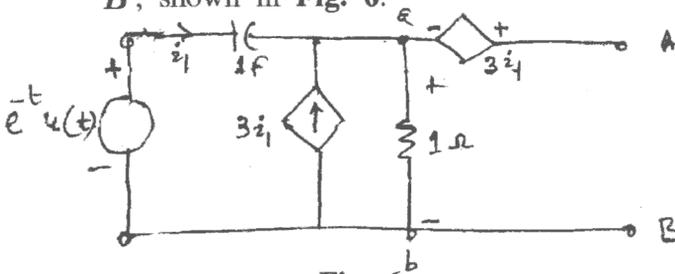


Fig. 6

- (c) In the network shown below in Fig. 7 determine the value of Z_L for maximum power transfer. Also calculate the maximum power.

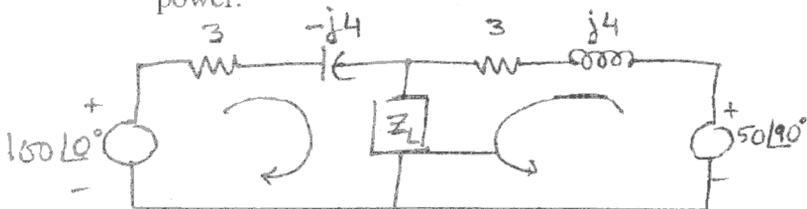


Fig. 7

- (d) State and explain superposition theorem. Determine the current through branch **AB** of the network shown below in Fig. 8 using super-position theorem.

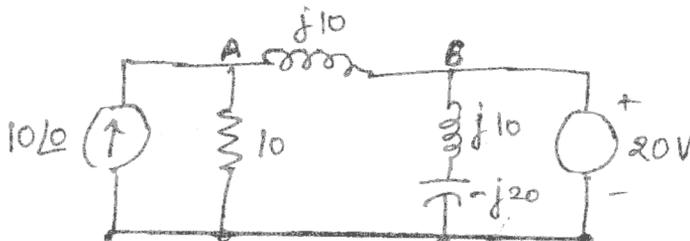


Fig. 8

- (e) The transfer function of a linear system is given by

$$H(s) = \frac{10(s+2)}{(s+1)(s^2+4)}$$

Determine the impulse response of this system.

- (f) State and explain :
 (1) Tellegen's Theorem
 (2) Millman Theorem.

Answer any **two** questions :

10x2=20

- (a) What do you understand by the terms 'Poles' and 'Zero's'. Explain the meaning of poles and zeros in terms of driving point immittances. **10**
- (b) (1) Explain the terms with their physical significance in Bode plot : Gain Margin, Phase-Margin. **5x2**
- (2) For a given denominator polynomial of a network function, verify the stability of the system by Routh criteria

$$Q(s) = S^4 + S^3 + 2S^2 + 2S + 12$$

- (c) For a given network function draw the pole-zero diagram and hence obtain the time domain response **10**

$$I(s) = \frac{5(s+5)}{(s+2)(s+7)}$$

4 Answer any **two** questions :

10x2

- (a) Show that evolution of standard ladder network into tandem network of π section and hence obtain the formula for its image impedance. **10**
- (b) Obtain the **Z** parameters of the following resistive network, shown in Fig. 9. **10**

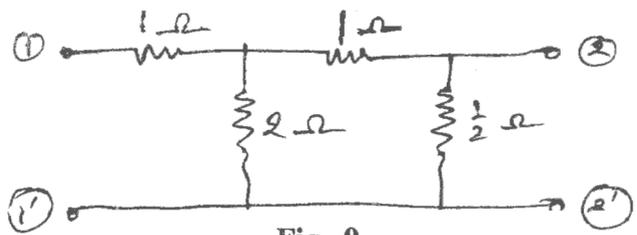
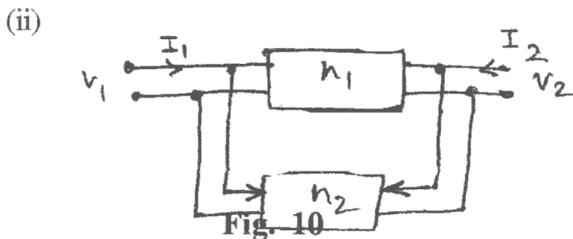
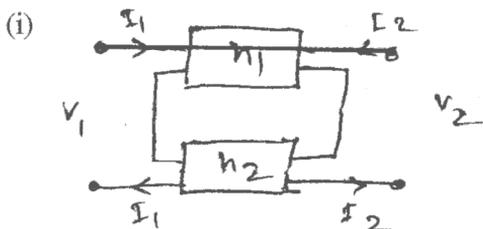


Fig. 9

- (c) Two individual networks have z parameters 10 as follows :

$$z_{n1} = \begin{bmatrix} 3 & 6 \\ 6 & 4 \end{bmatrix}, z_{n2} = \begin{bmatrix} 1 & 3 \\ 3 & 2 \end{bmatrix}$$

Find the overall z parameters if they are connected as (i) and (ii) below.



5 Answer any **two** questions : 10×2

- (a) Synthesise the R_L admittance using second 10 foster form

$$Y(s) = \frac{4(s+2)(s+6)}{5(s+4)}$$

- (b) Synthesise Caver-I form of R_C driving point 10 function

$$Z_{RC}(s) = \frac{2(s+3)(s+4)}{(s+1)(s+2)}$$

- (c) (1) Define Final Value theorem and verify 5×2 the same for function $5(1 - e^{-t})$.
- (2) Determine the Laplace transform of the function $y(t)$ represented by the following waveform, shown in **Fig. 11**.

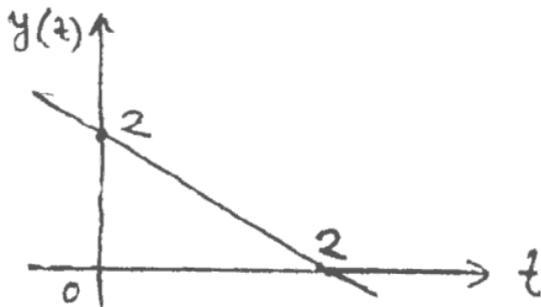


Fig. 11