

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

PAPER ID : 0208

Roll No.

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B.Tech.
(SEMESTER-IV) THEORY EXAMINATION, 2012-13
NETWORK ANALYSIS & SYNTHESIS

Time : 3 Hours]

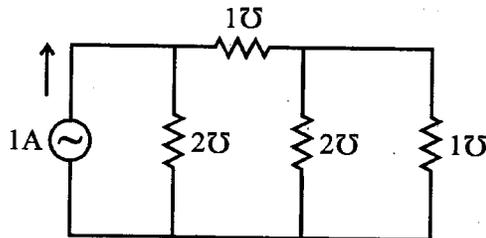
[Total Marks : 100

SECTION – A

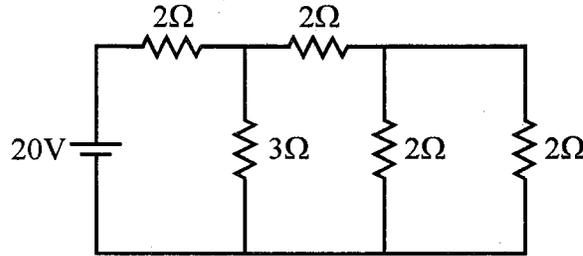
1. Attempt all question parts. 10 × 2 = 20
- (a) What are the advantages of the graph theoretic method of network analysis ?
 - (b) What is a fundamental cut-set matrix ?
 - (c) State and prove reciprocity theorem.
 - (d) Thevenin's theorem can be applied to calculate current in what type of load ?
 - (e) Mention the necessary and sufficient condition for the location of poles and zeros in driving point function.
 - (f) Define transfer impedance and admittance.
 - (g) For a two port network, y parameters are $y_{11} = 0.1 \Omega$, $y_{22} = 0.05 \Omega$, $y_{12} = y_{21} = -0.02 \Omega$. Calculate the z parameters of the network.
 - (h) A two port network is characterized by $V_1 = 10 I_1 + 5 I_2$ and $V_2 = 5 I_1 + 12 I_2$. Find the transmission parameters A and C.
 - (i) What do we mean by Network synthesis ? How is it different from network analysis ?
 - (j) Draw the ideal characteristics of low pass, high pass, band pass, band elimination filters.

SECTION – B

2. Attempt any three question parts : 3 × 10 = 30
- (a) For the network of figure shown below, find the fundamental cut set matrix and hence obtain the KCL equation.



- (b) Verify the reciprocity theorem for the network.



- (c) Draw the pole zero diagrams for the given network function and hence obtain $v(t)$. Verify the result analytically.

$$V(s) = \frac{20s}{(s + 2)(s + 5)}$$

- (d) The Z parameters of a two port network are $Z_{11} = 50\Omega$, $Z_{22} = 30\Omega$ and $Z_{12} = Z_{21} = 20\Omega$. Determine the Y parameter, ABCD parameters and the image parameters of the network.
- (e) Design a constant k – type band pass filter section to be terminated in 600 ohm resistance having cut off frequencies of 2 kHz and 5kHz.

SECTION – C

Attempt all questions :

5 × 10 = 50

3. Attempt any two parts :

2 × 5 = 10

- (a) For the resistive network shown in Fig. 1, draw a graph, select a tree and obtain tie-set matrix. Write down the KVL equations from the tie-set matrix.

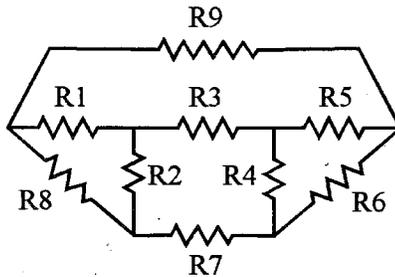
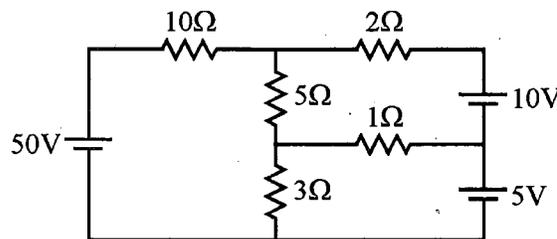


Fig. 1

- (b) State and prove Norton's theorem.
- (c) Determine the current flowing through 1Ω resistance using mesh analysis.



4. Attempt any **one** part :

1 × 10 = 10

- (a) Find the impedance matrix and mesh equations of the network shown in fig. 2 and obtain the current through 25 ohms resistance.

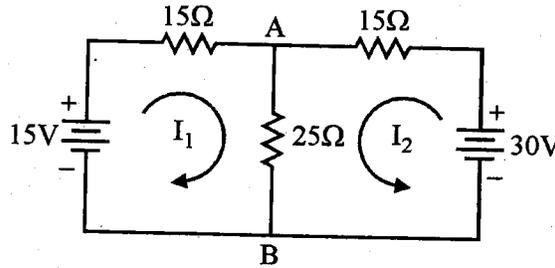


Fig. 2

- (b) Use pole zero diagram to find $i(t)$. Verify the result analytically.

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

5. Attempt any **one** part :

1 × 10 = 10

- (a) Find the open circuit parameter of the two port network shown in Fig. 3.

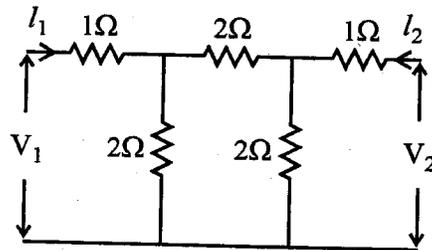


Fig. 3

- (b) Two identical sections, as shown in Fig. 4 are connected in parallel. Determine the Y parameters of the combination.

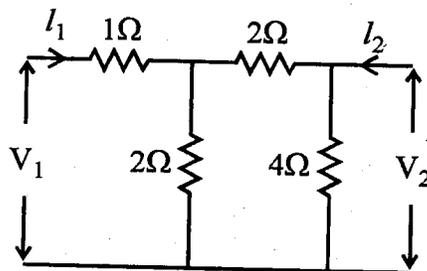


Fig. 4

6. Attempt any **one** part :

1 × 10 = 10

- (a) An impedance function at the input of a network is represented by

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

Express it in both the Foster forms.

- (b) Realise the following function in Cauer I and II forms of LC networks.

$$Z(s) = \frac{s(s^2 + 4)}{2(s^2 + 1)(s^2 + 9)}$$

7. Attempt any two parts :

2 × 5 = 10

- (a) Design a m-derived low pass filter having a cut-off frequency of 1 kHz, design impedance of 400 ohms, and resonant frequency 1100 Hz. Obtain T-section FILTERS.
- (b) Obtain a T and π section constant high pass filter having cut-off frequency of 2kHz and nominal impedance $R_o = 500$ ohms. Also find :
- (i) Its characteristics impedance and phase constant at 24 kHz and
- (ii) attenuation at 4kHz.
- (c) Check the positive realness for the given functions

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