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Total Pages : 4

8126

BT-3/D09

NETWORK ANALYSIS AND SYNTHESIS

Paper : EE-203(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt any *five* questions, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Establish a relationship between Fundamental circuit and Fundamental cutset matrix.

(b) Draw an oriented graph for the network of Fig. 1 and develope KVL and KCL equation in matrix form using fundamental circuit and cutset matrices.

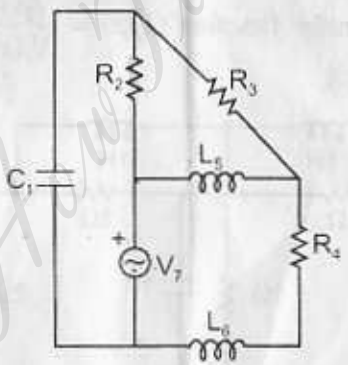

Fig. 1

Assume all element values to be unity with appropriate units. 8+12

2. (a) The switch is suddenly moved from contact 1 to 2 at an instant when the current in the network of Fig. 2 is 4A and the voltage across the capacitor is 9V. Draw the transformed circuit after the switching operation and hence or otherwise calculate the current $i(t)$ for $t > 0$.

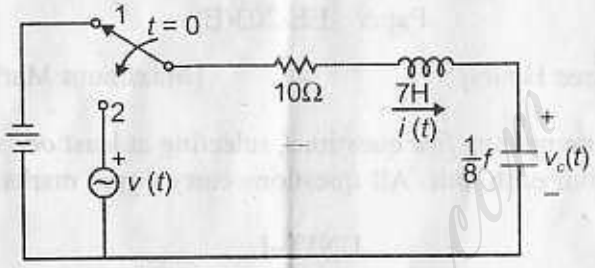

Fig. 2

(b) Unit impulse response of a circuit is e^{-t}. Determine the response of this circuit if input is $[u(t) + u(t-2)]$.

12+8

UNIT–II

3. Determine transfer function $G_v(s) = \dfrac{V_2(s)}{V_1(s)}$ for the network shown in Fig. 3.

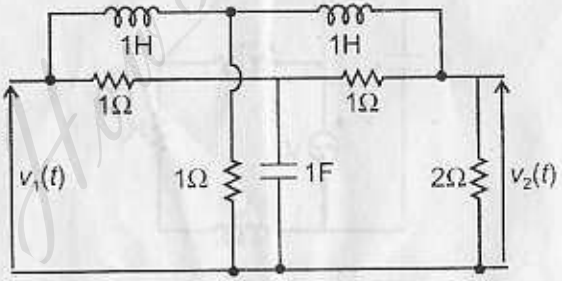

Fig. 3

20

4. (a) How frequency domain behaviour of a transfer function can be obtained from the location of its poles and zero's in the complex frequency plane?

(b) Plot pole-zero configuration for the following network function

$$G(s) = \frac{s+1}{s^2+3s+2}$$

If the network is excited by a source of value cost find the response of the network graphically? 8+12

UNIT–III

5. (a) Define and determine Z and Y parameters for the symmetrical T network shown in Fig. 4.

Fig. 4

(b) Determine Y-parameters for the network of Fig. 5 using the knowledge gained in part (a).

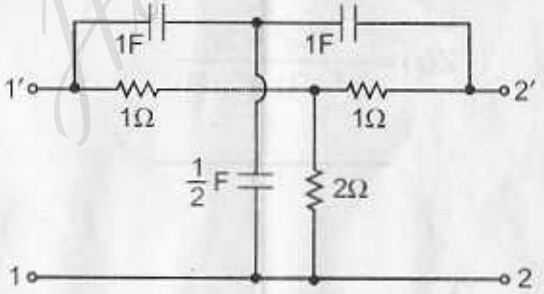

Fig. 5 12+8

6. (a) Derive relationship between Transmission and Open circuit parameters of a 2-port network. Prove that AD – BC = 1 for reciprocal passive networks.

(b) Find transmission parameters for network of Fig. 6.

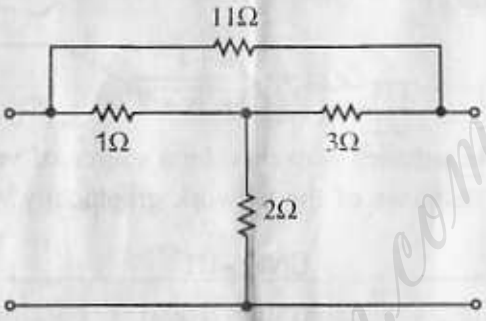

Fig. 6. 10+10

UNIT–VI

7. Design a constant-K high-pass filter section having f_c = 1 kHz and a load of 600 Ω. Calculate α and β of your filter at 0, 500, 1000, 1500 and 2000 Hz. Derive relations used. 20

8. State the properties of L-C driving point impedance function. Show that the following impedance satisfies all the properties stated and synthesize it in two faster forms:

$$Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}.$$ 20