Roll No. ..... Total Pages : 04

BT-3/D-23 43148

NETWORK THEORY

EC-213A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) For the tree shown in Fig.1, develop the fundamental cut-set matrix. **8**

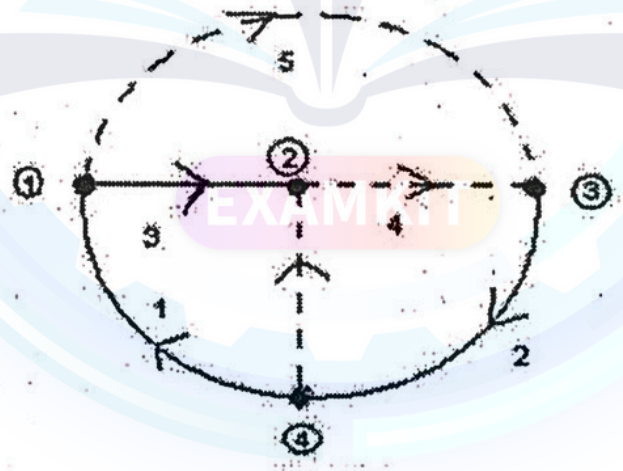


Fig.1

(b) Derive and explain the Impulse Response of series RLC circuit. **7**

2. (a) Calculate impulse response of the current $i(t)$. 8

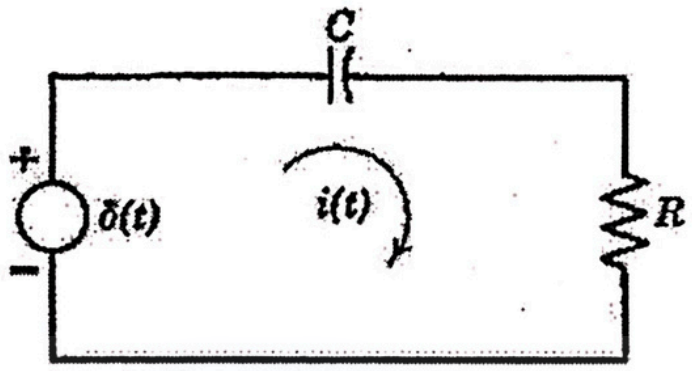


Fig.2

(b) Derive and explain the Step Response of series RLC circuit. 7

Unit II

3. (a) As shown in the following Fig. 3, the switch moves from position a to position b at $t = 0$. Find $i(t)$ for $t > 0$ using Laplace Transform. 8

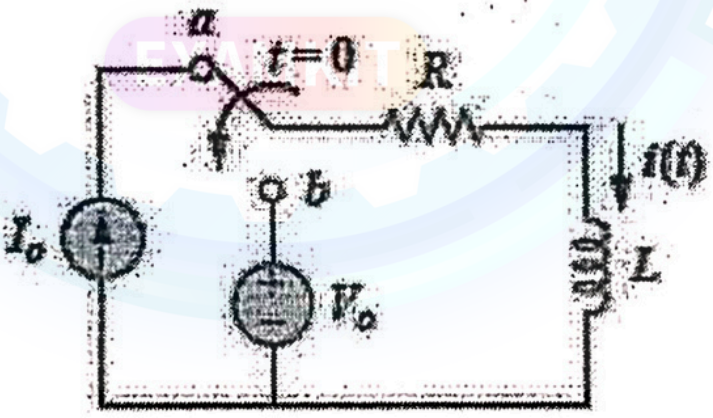


Fig.3

(b) List and explain various restrictions on pole and zero locations for driving-point functions. 7

4. (a) For the circuit shown in Fig. 4, the switch is thrown from position 1 to 2 at $t = 0$. Just before the switch is thrown, the initial conditions are $i_L(0\text{-}) = 2A$ and $v_C(0\text{-}) = 2V$. Find the current $i_1(t)$ after the switching action using Laplace-Transform. 8

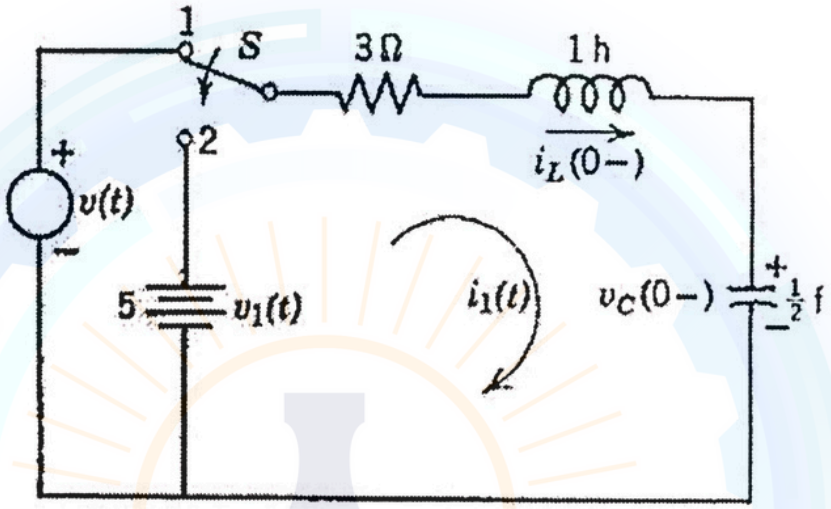


Fig.4

(b) List and explain various restrictions on pole and zero locations for transfer functions. 7

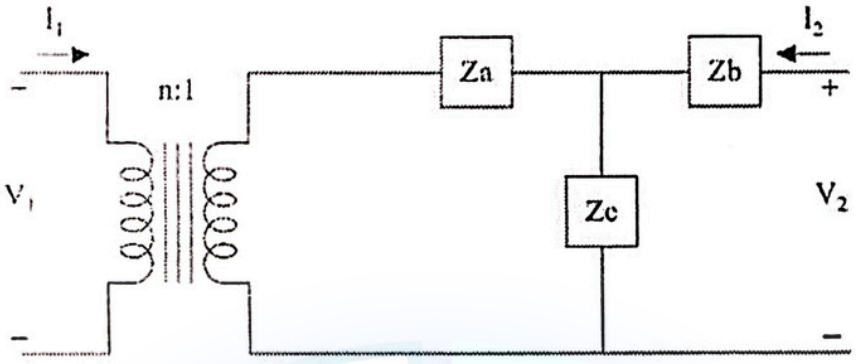
Unit III

5. (a) Determine the Y parameters of a two-port network whose Z parameters are : 8

$$[Z] = \begin{bmatrix} 6 & 4 \\ 4 & 6 \end{bmatrix} \Omega$$

(b) Express h-parameters in terms of Z-parameters. 7

6. Determine the ABCD parameters for the two-port shown in Fig. 5. **15**



Unit IV

7. (a) Design *m*-derived T-sections low-pass filters for R_0 = 600 ohms, f_c = 1800 Hz and f_∞ = 2000 Hz. **8**

   (b) Explain the concept of causality and stability in network synthesis. **7**

8. (a) Design *m*-derived π-section low-pass filters for R_0 = 500 ohms, f_c = 3600 Hz and f_∞ = 4000 Hz. **8**

   (b) Define and explain positive real functions with its various properties. **7**