Exam.Code:0927
Sub. Code: 6773

1079

B.E. (Electronics and Communication Engineering)
Third Semester
EC-318: Network Synthesis and Filters Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.

x-x-x

I. (a) State Kirchhoff's voltage law. (1)
(b) Define characteristic impedance a filter. (1)
(c) Define transfer function. (1)
(d) What is a passive network? (1)
(e) What are poles and zeros of a network function? What is their significance? (2)
(f) What is an ideal voltage source and ideal current source? (2)
(g) Describe the concept of complex frequency. (2)

Section A

II. (a) Define step signal and impulse signal. (3)
(b) State the necessary conditions for a network function to be driving point function for a one port passive network. (3)
(c) State and explain maximum power transfer theorem. (4)

III. (a) A network function is given by: (5)

$$Z(s) = \frac{5s}{(s+1)(s+2)}.$$

Draw the pole-zero plot and hence obtain the function in time domain. (5)

(b) For the circuit shown in Fig 1, draw the transform circuit and hence determine the current $i(t)$ for $t \geq 0$ if $V_C(0) = 4\ V$. (5)

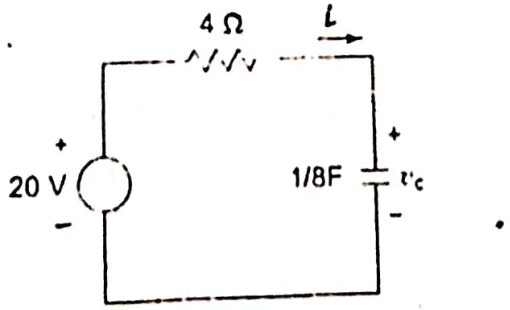

Fig. I

IV. (a) Define and explain dependent and independent energy sources. (5)

P.T.O.

(b) State Thevenin's theorem. Determine the Thevenin's equivalent circuit for the network shown in Fig 2. (5)

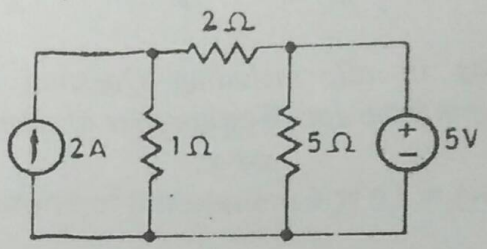

Figure 2

Section B

V (a) Explain the characteristics of an ideal filter. Give classification of filters. (5)
(b) Design T and π-sections of m-derived high pass filter having cut-off frequency of 2 kHz, infinite attenuation frequency of 1.8 kHz and design impedance of 900 Ω. (5)

VI (a) Realize the impedance function $Z(s)=\frac{(s+1)(s+4)}{s(s+2)(s+5)}$ in both forms of Foster networks. (5)

(b) For the network function $Z(s)=\frac{(s+1)(s+3)}{s(s+2)}$, determine the Cauer-I and Cauer-II forms. (5)

VII. (a) Explain the working of composite filter with the help of its block diagram. (5)
(b) Find the Z parameters for the network shown in figure 3. Also draw the equivalent circuit of the network in terms of these parameters. (5)

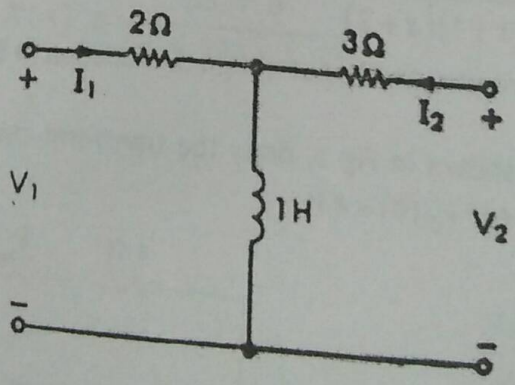

Figure 3

x-x-x