Exam.Code:0927
Sub. Code: 6381

1078

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

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

I. (a) Define poles and zeros of a network function. What is their significance? (2)
(b) List the properties of an ideal voltage source and ideal current source. (2)
(c) Differentiate clearly between network analysis and network synthesis. (1)
(d) What is a filter? (1)
(e) Describe the concept of complex frequency. (2)
(f) What is a symmetrical two port network? (1)
(g) What is the use of network theorems in network theory? (1)

Section A

II. (a) Define the elementary signals used in network analysis. (4)
(b) State the necessary conditions for a network function to be transfer function for a one port passive network. (3)
(c) State and explain Norton's theorem. (3)

III. (a) In the circuit shown in figure 1, switch K is opened at $t = 0$ steady state conditions having been established earlier to the switching operation. Draw the transform network showing all initial conditions and hence find the current through the circuit for $t > 0$. (5)

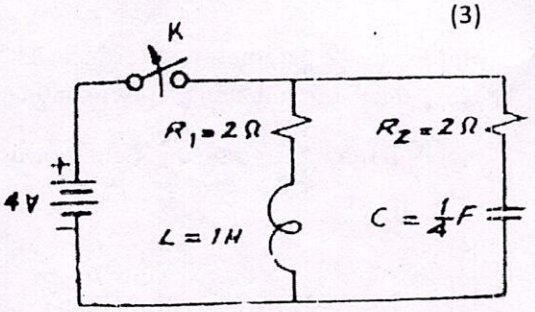

Figure 1

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

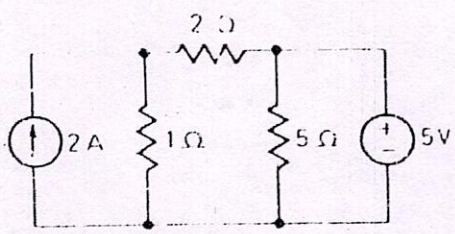

Figure 2

P.T.O.

IV. (a) A network function is given by: $Z(s) = \dfrac{5s}{(s+1)(s+2)}$. Draw the pole-zero plot and hence obtain the function in time domain. (5)

(b) Explain mesh analysis and node analysis with the help of example. (5)

Section B

V. (a) Explain the concept 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 and infinite attenuation frequency of 1.8 kHz and design impedance of 900 Ω. (5)

VI. (a) Synthesize the network function $Z(s) = \dfrac{s\left(s^2+10\right)}{\left(s^2+4\right)\left(s^2+16\right)}$ in both Foster forms. (5)

(b) Define network parameters of a two-port network. 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)

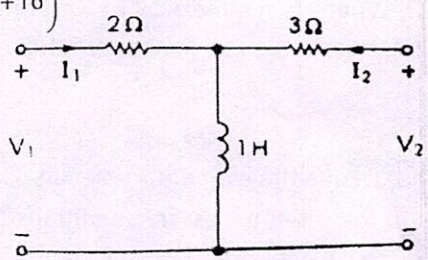

Figure 3

VII. (a) Express Z-parameters in terms of its hybrid parameters for a two-port network. (2)

(b) Explain the function of a terminating half section in a composite filter. (3)

(c) Find the first and second Cauer forms of the network function $Z(s) = \dfrac{(s+1)(s+3)}{s(s+2)}$. (5)

x-x-x