2016

ELECTRONICS

(Major)

Paper : 5.5

(Network Analysis)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Give objective-type answer to the following : 1×7=7

(a) How can we define a distributed element?

(b) What do you mean by a constant voltage source?

(c) Define graph of a network.

(d) Write an expression for power dissipated in an inductor.

(e) Give the expression for Laplace transform of $\sin at$.

(f) Write the expression for Fourier coefficient a_n.

(g) What is band elimination filter?

2. Give short answer to the following (any *four*) : 2×4=8

(a) Define node and mesh of a network.

(b) Define Laplace transform of a unit step function.

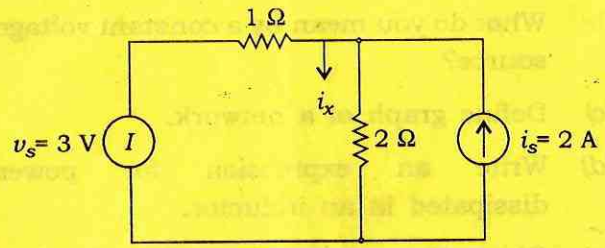
(c) How can we define the poles and zeros of a network function?

(d) What is the quality factor of an *R-L-C* network?

(e) What is passive filter?

3. Write short answer to any *three* of the following : 5×3=15

(a) For the circuit given below, calculate the branch current i_x :



(b) Evaluate the Laplace transform of the following :

(i) $\sin at$

(ii) $\int f(t)\,dt$

(c) State and prove the maximum power transfer theorem.

(d) Draw the circuit diagram of a first-order Butterworth filter and discuss briefly about the circuit.

(e) Discuss briefly about the significance of network functions.

4. Answer any *three* of the following : 10×3=30

(a) Derive the open circuit impedance parameter of a two-port network.

(b) Synthesize the one-port *L-C* network using Foster's second form of equivalent network and evaluate the elements of the network.

(c) For a π-section filter, show that the characteristics impedance is given by

$$Z_{0\pi} = \frac{Z_1 Z_2}{Z_{0T}}$$

where the symbols have their usual meanings.

(d) Write short notes on the following :

(i) *m*-derived filter

(ii) Routh-Hurwitz stability criteria

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