**2017**

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)* What do you understand by passive element of a network?

*(b)* What is the internal impedance of an ideal voltage source?

*(c)* Define the tree of a network.

*(d)* Write down the expression for energy consumed in a capacitor.

*(e)* What is the value of Laplace transform of $t^n$?

*(f)* What is decibel unit of measurement?

*(g)* Write down the expression for Fourier coefficient $b_n$.

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

*(a)* Derive an expression for resonance frequency of a series *R-L-C* network.

*(b)* Evaluate Laplace transform of an integral.

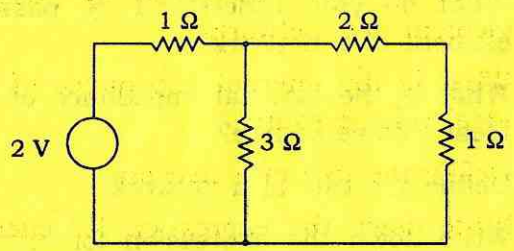
*(c)* Define poles and zeros of a network function.

*(d)* What is band elimination filter?

*(e)* What is network synthesis?

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

*(a)* For the network given below, find out Thevenin's equivalent network :




*(b)* Evaluate Laplace transform of the following :

*(i)* $\cosh at$

*(ii)* $\frac{d}{dt} f(t)$





*(c)* State and proof the maximum power transfer theorem.

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

*(e)* Discuss briefly about symmetrical and lattice networks with necessary diagram.

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

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

*(b)* For a band-pass filter, show that

$$f_0 = \sqrt{f_1 f_2}$$

where $f_0$ is cut off frequency and $f_1$ and $f_2$ are two bands of frequency of the filter.

*(c)* Derive the short circuit admittance parameter of a two-port network.

*(d)* Write short notes on the following :

*(i)* Passive π and T section filter

*(ii)* Fourier analysis of a periodic signal

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