

DT-28/4/16

Total Pages—4

(Set-R₁)

B.Tech - 6th
Signals and Systems - I

Full Marks : 70

Time : 3 hours

**Answer six questions including Q. No. 1
which is compulsory**

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10
- (a) Define periodic signal and nonperiodic signal.
 - (b) Define discrete time signals and classify them.
 - (c) Write down the trigonometric form of the fourier series representation of a periodic signal.
 - (d) Write short notes on dirichlets conditions for fourier series.

(Turn Over)

(2)

- (e) Define Bilateral and unilateral laplace transform.
 - (f) State the linearity property for laplace transform.
 - (g) State initial value theorem and final value theorem for laplace transform.
 - (h) Define Z transform.
 - (i) State multiplication property in relation to Z transform.
 - (j) State the significance of block diagram representation.
2. Distinguish between the following : $2\frac{1}{2} \times 4$
- (a) Continuous time signal and discrete time signal.
 - (b) Unit step and Unit Ramp functions.
 - (c) Periodic and Aperiodic Signals.
 - (d) Deterministic and Random Signals.

(3)

3. (a) Find whether the following signal

$$(t) = 2\cos(10t + 1) - \sin(4t - 1)$$

is periodic or not.

- (b) Find the summation.

- (c) Explain the properties of unit impulse function.

- (d) Find the fundamental period T of the continuous time signal.

$$(t) = 20 \cos (10\pi t + \pi/6) \quad 2\frac{1}{2} \times 4$$

4. (a) Determine the Fourier Transform for double exponential pulse whose function is given by $(t) = e - 2 |t|$. Also draw its magnitude and phase spectra.

5

- (b) Obtain inverse Laplace Transform of the function

$$X(s) = \frac{1}{s^2 + 3s + 2}, \quad \text{ROC} : -2 < \text{Re}\{s\} < -1 \quad 5$$

(4)

5. The LTI system is characterized by impulse response for given by

$$H(s) = \frac{1}{s+10} \text{Roc : } \text{Re} > -10.$$

Determine the output of a system when it is excited by the input $x(t) = -2u(-t) - 3u(t)$. 10

6. (a) State and prove the convolution Property of Z-Transform. 5

(b) Obtain the relationship between DTFT and Z-transform. 5

7. Determine the transfer function and impulse response for the causal LTI system described by the equation using Z transform

$$Y(n) - 1/4y(n-1) - 3/8y(n-2) = -x(n) + 2x(n-1) \quad 10$$

8. What is the overall impulse response $h(n)$ when two system with impulse response $h_1(n)$ and $h_2(n)$ are connected in parallel and in series ? 10