

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Electronics Engg.) (2012 Onwards)
B.Tech. (ECE/Electronics & Computer Engg./ETE) (2011 Onwards)
(Sem.-4)

SIGNAL AND SYSTEM

Subject Code : BTEC-402

Paper ID : [A1190]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Compare periodic and non-periodic signals.
- b) What is the significance of PSD?
- c) Write down the duality theorem of Fourier Transform.
- d) What is meant by DTFT pair?
- e) What conditions are required for a system to be linear?
- f) What do you mean by true averages?
- g) Discuss four properties of ROC.
- h) Comment on the periodicity of the following signal :

$$x(t) = \sin^2 t$$

- i) What are Dirichlet conditions?
- j) What is meant by Sinc function?

SECTION-B

2. Find the Fourier transform of :

$$x(t) = \begin{cases} 1-t^2, & 0 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

3. By using continuous-time convolution integral, find out the response of the system to unit-step input signal. Impulse response is given as :

$$h(t) = \frac{R}{L} e^{-tR/L} u(t)$$

4. Determine z -transform and ROC of :

$$x(n) = \left(\frac{1}{2}\right)^n u(-n)$$

5. The joint pdf of two random variables X and Y is given as

$$f_{xy}(x, y) = \begin{cases} C(2x + y) & \text{for } 0 \leq x \leq 2, 0 \leq y \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$

Find (a) C (b) $P(2 < x < 3)$

6. Discuss properties of DTFT.

SECTION-C

7. Give the steps involved in convolution and state the properties of convolution integral.

8. Find the magnitude and phase spectrum of the given signal

$$x(t) = \begin{cases} A, & \text{for } -T \leq t \leq 0 \\ -A, & \text{for } 0 \leq t \leq T \\ 0, & \text{otherwise} \end{cases}$$

9. Obtain the Fourier series representation for the following signal

$$x(t) = \begin{cases} 0, & \text{for } -T/2 < t < -T/4 \\ A, & \text{for } -T/4 < t < T/4 \\ 0, & \text{for } T/4 < t < T/2 \end{cases}$$