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 :

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

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

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

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

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

9. Obtain the Fourier series representation for the following signal

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