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BT-3/D-23 43147

SIGNALS AND SYSTEMS

EC-209A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What do you understand by a signal ? Describe various types of signals. Find out whether the following signals are periodic or not : **15**

$$x_1(t) = 2\sin \pi t + \cos 4\pi t$$

$$x_2(t) = \sin 5\pi t + 3\sin 13\pi t$$

2. What are LTI systems ? Discuss their properties. With the help of mathematical representation, neat and clean sketches, explain the concept of causal and non-causal systems. **15**

Unit II

3. Describe the terms pdf, cdf, moments, distributions and correlation functions in detail. **15**

4. Evaluate convolution between the following two signals : **15**

$$x(t) = e^{-t} \text{ and } h(t) = \sin(t)$$

Unit III

5. What do you mean by sampling ? With the help of suitable mathematical expressions, elaborate the concept of under and over-sampling. Highlight their disadvantages in reconstruction of the signal. **15**

6. (a) State the convergence conditions of Fourier series. **5**

   (b) Expand $\cos^2 x$ as a Fourier series in the interval $(-\pi, \pi)$. **10**

Unit IV

7. Find out Fourier transform of $e^{|-a|t}$. **15**

8. Explain the properties of Laplace transform in detail. **15**