Roll No. ..... Total Pages : 02

BT-3/D-22 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. (a) Explain power signals and derive its expression for discrete time signals. 7

   (b) If $x(t) = u(-3t + 2)$, determine $y(t) = x(t - 2) - x(t + 2)$. 8

2. Explain the linearity and stability property of a system. Also check the causality, time invariance, linearity and stability for the system with input $x[n]$ and output $y[n] = n^2 . x[n]$. 15

Unit II

3. Explain correlation functions. Also state and prove its properties. 15

4. Describe LTI systems and impulse response. Also state and prove the unit step response of LTI systems. 15

Unit III

5. (a) Explain the reconstruction process for sigma $x\ (t)$ and derive the expression for it. **10**

   (b) Determine nyquist rate and nyquist interval of $x\ (t) = \sin\ (100\pi t) + \cos\ (20\pi t)$. **5**

6. Explain and derive the expression for trigonometric and exponential fourier series coefficients. **15**

Unit IV

7. State and prove any *five* properties of DTFT. **3×5=15**

8. Explain the properties of ROC for Laplace transform. Find the Laplace transform for $x\ (t) = e^{-5t}\ u\ (t) - e^{-7t}\ u\ (t)$ and also determine its ROC. **15**