

5E5021	Roll No. _____	[Total No. of Pages : 2]
	5E5021	
	B.Tech. V Semester (Main&Back) Examination, Nov./Dec. - 2017	
	Electronic Instrumentation & Control Engg.	
	5EI1 A Signals & Systems	
	Common with EC	

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates :

*Attempt any **five** questions, selecting **one** question from **each** unit. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. Differentiate following: (4 × 4 = 16)
- a) Continuous-time and discrete-time signals.
 - b) Continuous-valued and discrete-valued signals.
 - c) Multichannel and Multidimensional Signals.
 - d) Deterministic and Random Signals.

OR

1. For the following input output relationships, determine whether the corresponding system is linear or not
- a) $y(t) = x^2(t)$ (8)
 - b) $y(n) = 2x(n) - 3$ (8)

Unit - II

2. Write and Explain all the properties of Continuous-Time Fourier series. (16)

OR

2. a) Given the Periodic waveform $x(t) = t^2, 0 < t < 1$ Determine the exponential Fourier series and plot the magnitude and phase spectra. (8)
- b) Find the time-domain signal corresponding to the Discrete Periodic waveform $X_k = \cos(k4\pi/11) + 2j\sin(k6\pi/11)$. (8)

Unit - III

3. Find the Fourier transform of the following :
- a) $x(t) = \cos(\omega_0 t)$ (5)
 - b) Unit step function $u(t)$ (5)
 - c) Continuous time signal $x(t) = e^{-at} u(t)$, $a > 0$ (6)

OR

3. Explain the following properties of Fourier transform along with proof
- a) Convolution property (5)
 - b) Modulation property (5)
 - c) Duality (6)

Unit - IV

4. Determine the Laplace transform of
- a) A unit Impulse function $x(t) = \delta(t)$ (5)
 - b) A unit step function $x(t) = u(t)$ (5)
 - c) A unit ramp function $x(t) = r(t)$ (6)

OR

4. a) Write and Explain the Initial value theorem and final value theorem with proof. (8)
- b) Determine the Z-Transform of the following:
- i) $x(n) = -u(-n-1)$ (4)
 - ii) $x(n) = u(-n)$ (4)

Unit - V

5. Specify the Nyquist rate and Nyquist interval for each of the following signals
- a) $x(t) = \text{sinc}(200t)$ (5)
 - b) $x(t) = \text{sinc}^2(200t)$ (5)
 - c) $x(t) = \text{sinc}(200t) + \text{sinc}^2(200t)$ (6)

OR

5. Explain following in detail.
- a) Sampling of sinusoidal signals. (8)
 - b) Sampling theorem for Low-pass signals. (8)

