

5E5021

Roll No. 15EEEC036

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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)
- Continuous-time and discrete-time signals.
  - Continuous-valued and discrete-valued signals.
  - Multichannel and Multidimensional Signals.
  - Deterministic and Random Signals.

**OR**

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

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