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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
 (AUTONOMOUS)

**B.Tech II Year I Semester Regular Examinations Nov/Dec 2019**  
**SIGNALS & SYSTEMS**  
**(Electronics & Communication Engineering)**

Time: 3 hours

Max. Marks: 60

**PART-A**(Answer all the Questions  $5 \times 2 = 10$  Marks)

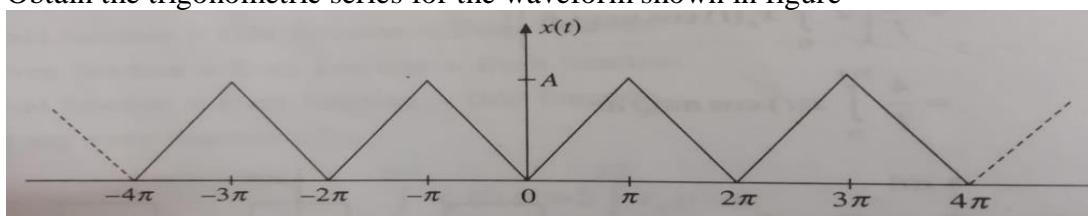
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|---|---|----|
| 1 | a Define causal and non-causal systems.   | 2M |
|   | b What are the Dirichlet's conditions? State them.                              | 2M |
|   | c Define sampling frequency and sampling period.                                | 2M |
|   | d What are the properties of auto correlation function?                         | 2M |
|   | e What is the relation between Discrete-time Fourier transform and Z-transform? | 2M |

**PART-B**(Answer all Five Units  $5 \times 10 = 50$  Marks)**UNIT-I**

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|---|---|----|
| 2 | a Define various elementary signals in discrete time and indicate them graphically.   | 5M |
|   | b Find whether the following signals are periodic or not? If periodic determine the fundamental Period.<br>(i) $3\sin 200\pi t + 4 \cos 100t$ (ii) $\sin 10\pi t + \cos 20\pi t$<br><b>OR</b> | 5M |
| 3 | a Define a system. How systems are classified? Define each one of them.   | 6M |
|   | b Check whether the following systems are causal or not?<br>(i) $y(t) = x^2(t) + x(t-4)$ (ii) $y(n) = x(2n)$  | 4M |

**UNIT-II**

- |   |   |    |
|---|---|----|
| 4 | a State and Prove any Three Properties of the Fourier Series.   | 6M |
|   | b Find the Fourier transform of the following signals<br>(i) $x(t) = e^{-3t} u(t)$ (ii) $x(t) = te^{-at} u(t)$<br><b>OR</b> | 4M |
| 5 | a Find the Fourier transform of the following<br>(i) $\text{sgn}(t)$ (ii) $\sin \omega_0 t$                                 | 4M |
|   | b Obtain the trigonometric series for the waveform shown in figure  |    |



6M

**UNIT-III**

- |   |  |    |
|---|--|----|
| 6 | a Derive the transfer function and impulse response of an LTI system.  | 4M |
|   | b Find the Nyquist rate and Nyquist interval for the following signals<br>(i) $x(t) = 1 + \cos 2000\pi t + \sin 4000\pi t$ (ii) $10 \sin 40\pi t \cos 300\pi t$<br><b>OR</b> | 6M |
| 7 | a Let the system function of an LTI system be $1/(j\omega + 2)$ . What is the output of the system for an input $(0.8)^t u(t)$ ?   | 6M |
|   | b Discuss about Aliasing effect in sampling.   | 4M |

## **UNIT-IV**



OR

- 9**    a Derive and Define the properties of Energy Spectral Density. **5M**  
          b Verify Parseval's theorem for the energy signal  $x(t)=e^{-4t} u(t)$ . **5M**

## **UNIT-V**

- 10**    **a** Find the Laplace transform and region for the following signals 6M  
 (i)  $x(t)=e^{-5t} u(t-1)$                       (ii)  $x(t)=t e^{-|t|}$   
**b** State and prove initial and final value theorems of Z-transform? 4M

OR



\*\*\*END\*\*\*