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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 x 2 = 10 Marks)

- 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 x 10 = 50 Marks)

UNIT-I

- 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. 5M

(i) $3\sin 200\pi t + 4 \cos 100t$ (ii) $\sin 10\pi t + \cos 20\pi t$

OR

- 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? 4M

(i) $y(t) = x^2(t) + x(t-4)$ (ii) $y(n) = x(2n)$

UNIT-II

- 4 a State and Prove any Three Properties of the Fourier Series. 6M
- b Find the Fourier transform of the following signals 4M

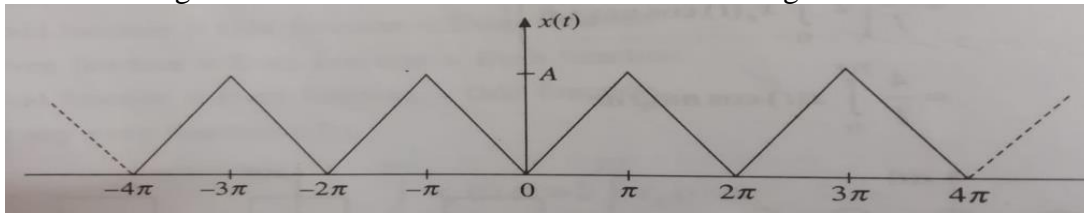
(i) $x(t) = e^{-3t}u(t)$ (ii) $x(t) = te^{-at}u(t)$

OR

- 5 a Find the Fourier transform of the following 4M

(i) $\text{sgn}(t)$ (ii) $\sin \omega_0 t$

- 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 6M

(i) $x(t) = 1 + \cos 2000 \pi t + \sin 4000 \pi t$ (ii) $10 \sin 40\pi t \cos 300\pi t$

OR

- 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

- 8 a Show that R(r) and ESD form Fourier transform pair. 4M
b Explain the detection of periodic signals in the presence of noise by auto correlation. 6M

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) $x(t)=t e^{-2|t|}$
b State and prove initial and final value theorems of Z-transform? 4M

OR

- 11 a Find the inverse Laplace transform of the following 6M
(i) $X(s) = 1/ s(s+1) (s+2) (s+3)$ (ii) $X(s)=s/(s+3)(s^2+4s+5)$
b Using the Properties of Z-transform. Find the Z-transform of following signals 4M
(i) $x(n)=u(-n)$ (ii) $x(n)=2^n u(n-2)$

END