

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

B.Tech II Year I Semester Supplementary Examinations June-2024
SIGNALS, SYSTEMS AND RANDOM PROCESSES

(Electronics & Communications Engineering)

Time: 3 Hours

Max. Marks: 60

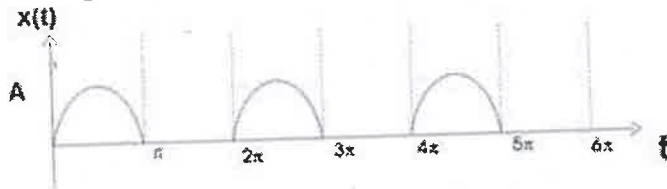
(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Find which of the signals are causal or non-causal. CO1 L3 6M
 (i) $x(t) = e^{2t} u(t-1)$ (ii) $x(n) = u(n+4) - u(n-2)$
 b Sketch the following signals. CO1 L3 6M
 (i) $x(t) = 2u(t+2) - 2u(t-3)$ (ii) $x(t) = r(t) - r(t-1) - r(t-3) + r(t-4)$
- OR
- 2 Interpret whether the following systems are Static or dynamic, Linear or Non-Linear and Time invariant or time variant. CO1 L2 12M
 (a) $y(n) = \log_{10} |x(n)|$ (b) $y(t) = at^2 x(t) + bt x(t-4)$

UNIT-II

- 3 Construct the Fourier series expansion of the Half wave rectified sine wave shown in figure. CO2 L6 12M



OR

- 4 a Demonstrate how Fourier Transform derived from Fourier Series. CO2 L3 6M
 b Find the Fourier transform of the following. CO2 L1 6M
 (i) $x(t) = \text{sgn}(t)$ (ii) $x(t) = u(t)$ (iii) $\cos \omega_0 t$

UNIT-III

- 5 a Explain the Filter characteristics of linear systems and explain with neat diagrams. CO3 L2 6M
 b Define the following. CO3 L1 6M
 (i) Impulse Response (ii) Step Response (iii) Response of the System
- OR
- 6 a The impulse response of a continuous-time system is expressed as $h(t) = e^{-2t} u(t)$. Find the Frequency response of the system. CO3 L3 6M
 b Define the Following Properties of LTI System. CO3 L1 6M
 (i) Distributive Property (ii) Associative Property

UNIT-IV

- 7 a Determine the Laplace transform of the signal $x(t) = e^{-at} u(t) - e^{-bt} u(-t)$ and also find its ROC. CO5 L5 6M
 b Find the Laplace transforms and region for the following signals. CO5 L1 6M
 (i) $x(t) = e^{-5t} u(t-1)$ (ii) $x(t) = e^{-a|t|}$

OR

- 8 Let X is a continuous random variable with density function. CO6 L3 12M
 $f_X(x) = \begin{cases} x/9+k & 0 < x < 6 \\ 0 & \text{Otherwise} \end{cases}$
i) Find 'k' ii) Find $p[2 < x < 5]$

UNIT-V

- 9 What is cross correlation function of a random process? State and explain any four properties of cross correlation function of a random process. CO6 L1 12M

OR

- 10 a Briefly explain the concept of Random process. CO6 L2 6M
b Prove that the PSD of the derivative $X(t)$ is equal to ω^2 times the PSD of $S_{xx}(\omega)$. CO6 L6 6M

*** END ***