SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B. Tech II Year I Semester Supplementary Examinations November-2022
SIGNALS, SYSTEMS AND RANDOM PROCESSES
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 60M

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

UNIT-I

1	Explain the classification of signals with respect to continuous time and discrete time with suitable examples.	L2 12M

OR

2 a Define the following Systems   L1   6M
       (i)   Linear and Non- Linear
       (ii)   Time invariant and time variant.
       (iii)   Static and dynamic
       (iv)   Causal and Non-causal

   b Find whether the following system is   L3   6M
       (i)   Linear or Non- Linear
       (ii)   Static and dynamic.

$$d^3y(t)/dt^3+2d^2y(t)/dt^2+4dy(t)/dt+3y^2(t)=x(t+1)$$

UNIT-II

3 Construct the Trigonometric Fourier series expansion of the half wave rectified sine wave shown in figure.   L3   12M
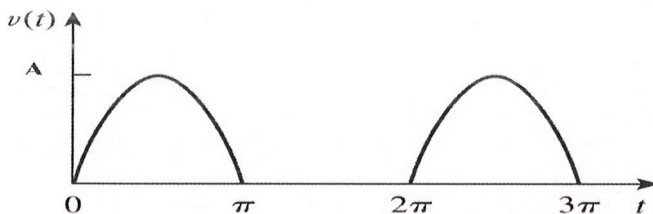
OR

4 a Explain about Fourier Transform of Periodic Signals.   L2   6M
   b Find the Fourier Transform of the following signals using Properties.   L3   6M
       (i) $e^{-at}u(t)$
       (ii) $\delta(t+2)+ \delta(t+1)+\delta(t-1+ \delta(t-2)$

UNIT-III

5 a Describe the following responses of Systems.   L2   6M
       (i)   Impulse Response.
       (ii)   Step Response.
       (iii)   Response of the System.

   b Define linear time variant and linear time-invariant system with necessary equations.   L1   6M

OR

6 a Demonstrate the Procedure to perform convolution graphically.   L2   6M
   b Examine the convolution of the following signals by graphical method.   L3   6M
       $x(t)=e^{-3t}u(t)$ and $h(t)=u(t+3)$

UNIT-IV

7 a Determine the Laplace transform of the following signals using properties   L3   6M
  (i) $x(t)=t\,e^{-t}\,u(t)$
  (ii) $x(t)=t\,e^{-2t}\,\sin 2t\,u(t)$

  b Derive the relation between Laplace Transform and Fourier Transform of a signal.   L3   6M

OR

8 a Define Random variable and explain briefly.   L2   6M

  b Define probability distribution and density functions. Explain any two properties for each one.   L2   6M

UNIT-V

9 a Describe the first order, second order, wide-sense and strict sense stationary process.   L2   6M

  b Illustrate about Time averages of Random process.   L3   6M

OR

10 a If the Power Spectral Density of x(t) is Sxx(ω) then find the Power Spectral Density of dx(t)/dt.   L3   6M

  b The power spectral density of a stationary random process is given by   L3   6M
  $$Sxx\,(\omega) = \quad A \quad ; -k < \omega < k$$
  $$\qquad\qquad\quad 0 \quad ; \text{otherwise Find the auto correlation function.}$$

*** END ***