Reg. No: ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations August-2021
RANDOM SIGNAL & STOCHASTIC PROCESSES
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 60

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

UNIT-I

1 a Define axioms of probability. Also define probability as a relative frequency. **6M**
   b When two dice are thrown, determine the probabilities from axiom3 for the following three **6M**
      events
      i) A= {sum=7} ii) B= { 8< sum<11} iii) C={10<sum}

OR

2 a Define a Random variable? Explain about probability distribution function with properties? **6M**
   b (b) let X be a continuous random variable with density function **6M**

$$f_X(x) = \begin{cases} \dfrac{x}{9} + k, & 0 < x < 6 \\ 0, & otherwise \end{cases}$$

   i) Find the value of 'k' ii) find $P(2<x<5)$

UNIT-II

3 a Explain about Joint distribution & density function? And discuss its properties? **8M**
   b If the joint Pdf of two dimensional random variable (x, y) is given by: **4M**
      $f_{X,Y}(x,y) = kxy$; $0<x<y<1$
      $= 0$; otherwise
      Find the 'k' value and marginal density function of X and Y.

OR

4 a Discuss about the Sum of Two Random Variables? **6M**
   b Statistically independent random variables X and Y have densities **6M**
      $f_X(x) = 5\mu(x)e^{-5x}, f_Y(y) = 2\mu(y)e^{-2y}$. Find the density of the sum W= X+Y

UNIT-III

5 a Explain about first order, second, wide-sense and strict sense stationary process. **12M**

OR

6 a Explain about mean-ergodic process. **6M**
   b If x (t) is a stationary random process having auto correlation function: **6M**
      $R_{XX}(\tau) = 9 + 2e^{-|\tau|}$. Find the mean and variance of the random variable.

UNIT-IV

7 State and prove Wiener –Khintchins relations **12M**

OR

8 a Discuss the properties of CPSD?. **6M**
   b The auto correlation of a WSS random process X(t) is given by $R_{XX}(\tau) = Acos(\omega_0\tau)$ **6M**
      where A and ω_0 are constants. Find PSD?.

UNIT-V

9 a Derive the relation between PSDs of input and output random process of an LTI system. **6M**
   b Discuss about cross correlation between the input X (t) and output Y (t). **6M**

OR

10 Write short notes on: **12M**
    (i) Band Pass random process. (ii) Band limited random process
    (iii) Narrow band random process.

*** END ***