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Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations June 2019
RANDOM SIGNAL AND STOCHASTIC PROCESS
(Electronics & Communication Engineering)

Time: 3 hours   Max. Marks: 60

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

UNIT-I

1   **a**   How the probability is the numerical measure of uncertainty?   5M

    b   Define independent events? If A & B are independent events then prove that A & $\bar{B}$, $\bar{A}$ & B and $\bar{A}$ & $\bar{B}$ are also independent events.   7M

OR

2   **a**   State all the properties of Cumulative Distribution Function (CDF).   4M

    b   Pair of dice tossed, random variable 'X' is defined to show difference face values turned up. Find and plot CDF of random variable 'X'.   8M

UNIT-II

3   **a**   The joint PDF between random variables X & Y is given by

$$f_{XY}(x,y) = \begin{cases} \frac{5}{16}x^2 y; \ 0 < y < x < 2 \\ 0 \ ; Else \ Where \end{cases}$$

       Find Marginal Density Function of random variable X and Y.   5M

    b   The joint CDF between random variables 'X' & 'Y' is given by

$$F_{XY}(x,y) = \begin{cases} \left(1 - e^{-x^2}\right)\left(1 - e^{-y^2}\right); x > 0 \ and \ y > 0 \\ 0 \qquad\qquad ; Else \ Where \end{cases}$$

       i)   Find joint PDF.
       ii)   Find P{1<X<2 and 1<Y<2}.   7M

OR

4   **a**   Write the expression and explain the importance of following statistical parameters.
       i) Mean value   ii) Co-Variance   iii) Correlation Coefficient   6M

    b   Two Gaussian random variables X_1 & X_2 have zero means, variance 4 & 1 respectively and covariance is 3 are transformed to new random variables Y_1 & Y_2 such that $Y_1 = X_1-X_2$ and $Y_2=3X_1+4X_2$. Find Co-variance between Y_1 & Y_2.   6M

UNIT-III

5   **a**   Discuss about following random process.
       i)   Stationary   ii) Deterministic   4M

    b   A random process X(t) = A Cos ($\omega_0 t+\varphi$), where 'φ' is random variable which is uniformly distributed between 0 to $\frac{\pi}{2}$. Find following statistical parameters of random process i) Mean value   ii) Mean square value   iii) Correlation and   iv) Is X(t) WSS random process.   8M

OR

6   **a**   State any 'THREE' properties of Cross Correlation Function (CCF).   6M

    b   ACF of random process X(t) is given by $R_{XX}(\tau) = (4\tau^2+100)/(\tau^2+4)$.
       Find i) Average value   ii) AC Power   iii) Total power of random process   6M

UNIT-IV

7 **a** Derive the expression for Average total Power P_{XX} of random process X(t). 6M

  b A random process X(t) = A Cos $(\omega_0 t + \varphi)$, where 'φ' is random variable which is Uniformly distributed between 0 to $\frac{\pi}{2}$. Find Average total Power P_{XX} of random process X(t)? 6M

OR

8 **a** State and prove any 'THREE' properties of PSD. 6M

  b Find Cross Correlation Function of random process X(t) whose Cross PSD is given

$$S_{XY}(\omega) = \begin{cases} a + j\dfrac{b\omega}{W_0} \;\; ; \;\; -W_0 < \omega < W_0 \\ \;\;\; 0 \;\;\;\; ; \; Else\ Where \end{cases}$$ 6M

UNIT-V

9 **a** Output of any LTI System is equal to linear convolution between input and impulse response of the system. Justify. 4M

  b Find mean square response and PSD response of LTI system. 8M

OR

10 **a** Explain about following random process.
     i) Band pass   ii) Band limited   iii) Narrow Band pass 9M

  b Find rms band width of random process whose PSD is given $S_{XX}(\omega) = \dfrac{2}{(1+\frac{\omega^2}{4})^2}$. 3M

*** END ***