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

**B.Tech II Year I Semester Supplementary Examinations November-2020**

**RANDOM SIGNAL & STOCHASTIC PROCESSES**

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

**UNIT-I**

- 1 a** Explain about Baye's theorem? **7M**  
**b** In a bolt factory, machines A, B, C manufacture 30%, 30%, 40% of the total output respectively. From their outputs 4, 5, 3 percents are defective bolt. A bolt is drawn at random and found to be defective. What are the probabilities that it was manufacturing by machines A, B and C? **5M**

**OR**

- 2 a** Explain about probability density function and State its properties? **6M**  
**b** The random variable X has the discrete variable in the set  $\{-1, -0.5, 0.7, 1.5, 3\}$ . The corresponding probabilities are assumed to be a  $\{0.1, 0.2, 0.1, 0.4, 0.2\}$ . Plot the distribution function? **6M**

**UNIT-II**

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

**OR**

- 4 a** Explain central limit theorem? **6M**  
**b** Find the distribution function  $F_X, Y(x,y)$  and the marginal distribution functions? **6M**

(X, Y)	(0, 0)	(1, 2)	(2, 3)	(3, 2)
P(X, Y)	0.2	0.3	0.4	0.1

**UNIT-III**

- 5 a** What is ACF? State and explain any four properties of ACF? **6M**  
**b** Explain about first order, second, wide-sense and strict sense stationary process. **6M**

**OR**

- 6 a** Show that the autocorrelation function of a stationary random process is an even function of  $\tau$ . **7M**  
**b** Give the classification of random processes. **5M**

**UNIT-IV**

- 7 a** Briefly explain the concept of cross power density spectrum. **6M**  
**b** Find the cross correlation functions of  $\sin \omega t$  and  $\cos \omega t$ . **6M**

**OR**

- 8 a** Discuss the properties of cross power density spectrum. **6M**  
**b** Discuss the relation between cross power spectrum and cross correlation function. **6M**

**UNIT-V**

- 9 a** Explain about LTI system. **6M**  
**b** Find the power density spectrum of response of a linear system. **6M**

**OR**

- 10 a** Derive the relation between PSD 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**

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