

13.06.24(FN)

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

**B.Tech II Year I Semester Supplementary Examinations June-2024**

**RANDOM SIGNAL AND STOCHASTIC PROCESS**

(Electronics and 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.   | CO1 | L1 | 6M |
|   | 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 bolts is drawn at random and found to be defective. What are the probabilities that it was manufacturing by machines A,B and C? | CO1 | L2 | 6M |

**OR**

- |   |  |  |     |    |     |
|---|--|--|-----|----|-----|
| 2 |  | Define Random variable. Explain about probability distribution function with properties. | CO1 | L3 | 12M |
|---|--|--|-----|----|-----|

**UNIT-II**

- |   |   |   |     |    |    |
|---|---|---|-----|----|----|
| 3 | a | Define statistical independence of random variables and explain about Point Conditioning in distribution and density functions. | CO2 | L3 | 6M |
|   | b | Discuss about the sum of two random variables.  | CO2 | L6 | 6M |

**OR**

- |   |   |   |     |    |    |
|---|---|---|-----|----|----|
| 4 | a | State and prove the properties of correlation function  | CO2 | L5 | 6M |
|   | b | Consider two random variables X and Y such that $Y = -4X + 20$ . The mean value and the variance of X are 4 and 2 respectively. Find the correlation. | CO2 | L4 | 6M |

**UNIT-III**

- |   |  |  |     |    |     |
|---|--|--|-----|----|-----|
| 5 |  | What is cross correlation function of a random process? state and explain any four properties of cross correlation function of a random process. | CO3 | L5 | 12M |
|---|--|--|-----|----|-----|

**OR**

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|---|--|---|-----|----|-----|
| 6 |  | Determine whether the random process $X(t) = A \cos(\omega t + \theta)$ is wide sense stationary or Not where A, $\omega$ are constants and $\theta$ is a uniformly distributed random variable on the Interval $(0, 2\pi)$ . | CO3 | L4 | 12M |
|---|--|---|-----|----|-----|

**UNIT-IV**

- |   |   |   |     |    |    |
|---|---|---|-----|----|----|
| 7 | a | Briefly explain the concept of cross power density spectrum.                  | CO4 | L2 | 6M |
|   | b | Find the cross correlation of functions $\sin \omega t$ and $\cos \omega t$ . | CO4 | L1 | 6M |

**OR**

- |   |  |                                    |     |    |     |
|---|--|------------------------------------|-----|----|-----|
| 8 |  | State and prove properties of PDS. | CO4 | L1 | 12M |
|---|--|------------------------------------|-----|----|-----|

**UNIT-V**

- |    |   |   |     |    |     |
|----|---|---|-----|----|-----|
| 9  | a | Derive the relation between PSD of input and output random process of an LTI system.  | CO5 | L3 | 6M  |
|    | b | Discuss about cross correlation between the input X (t) and output Y (t).   | CO5 | L6 | 6M  |
| 10 |   | X(t) is a stationary random process with zero mean and auto correlation $R_{XX}(t) = e^{-2 t }$ is applied to a system of function $H(\omega) = 1/j\omega + 2$ . Find mean and PSD of its output. | CO5 | L4 | 12M |

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