**EC 223 (R-20)**

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# II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

## Second Semester

## ELECTRONICS AND COMMUNICATIONS ENGINEERING

## PROBABILITY THEORY AND STOCHASTIC PROCESS

Time : **Three Hours** Maximum : **70** Marks

**Answer ONE question from each Unit. 5x14=70 M**

**All Questions carry equal marks.**

### UNIT - I

1. a) Two boxes are selected randomly. The first box contains 5 white balls and 3 black balls. The second box contains 5 white balls and 4 black balls. What is the probability of drawing a Black ball ?

   b) State and prove Total Probability Theorem ?

(OR)

2. a) A single card is drawn from a 52 card deck.

   (i) What is the Probability of the card red 7.

   (ii) What is the Probability of the card will be 8 or Smaller.

   b) Define

   (i) Probability.

   (ii) Discrete Sample Space.

### UNIT - II

3. a) Explain Binomial Probability Density Function with equations and diagram.

   b) Explain the properties of Density Function.

(OR)

4. a) Explain Uniform Probability Density Function with equations and Diagram.

   b) Explain the properties of Distribution Function.

### UNIT - III

5. a) Explain about properties of Variance.

   b) Explain Monotonic Transformations of Continuous Random Variable.

**P.T.O.**

(OR)

6. a) Explain Two properties of Characteristic Function.

   b) Explain Non-Monotonic Transformations of Continuous Random Variable.

## UNIT - IV

7. a) State and prove Central Limit Theorem.

   b) Find Constant b so that the function is a valid joint density function

$$f_{X,Y}(x,y) = b\,(x^2+4y^2) \quad 0 \leq x < 1 \text{ and } 0 \leq y \leq 2$$

(OR)

8. a) Explain about Interval Conditioning.

   b) Explain any two properties of Joint Density Function.

## UNIT - V

9. a) Explain about Cross Correlation Function and its properties.

   b) Explain Concept of Stationary and Statistical Independence.

(OR)

10. a) Explain Energy Spectrum Density.

    b) Consider a Random process X(t) = A cos wt, where w is a constant and A is a random variable uniformly distributed over (0, 1). Find Autocorrelation of X(t).