

**4E4131**

Roll No. \_\_\_\_\_

Total No of Pages: **3****4E4131****B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. – 2020****Electronics & Communication Engineering****4EC2A Random Variable & Stochastic Processes****Time: 2 Hours****Maximum Marks: 48**[ersahilkagyan.com](http://ersahilkagyan.com) **Min. Passing Marks: 16***Instructions to Candidates:*

*Attempt three questions, selecting one question each from any three unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly. Use of following supporting material is permitted during examination (Mentioned in form No.205)*

1. NIL2. NIL**UNIT-1**

- Q.1 (a) There are 5 green, 7 red balls. Two balls are selected one by one without replacement. Find the probability that first is green and second is red. [6]
- (b) Discuss conditional probability in detail. Give an example to explain it. [10]

**OR**

- Q.1 (a) How to determine the conditional probability from the given word problems. [6]
- (b) For three events A, B and C, we know that - [10]
- A & C are independent
  - B & C are independent
  - A & B are disjoint
  - $P(A \cup C) = 2/3$ ,  $P(B \cup C) = 3/4$ ,  $P(A \cup B \cup C) = 11/12$

Find  $P(A)$ ,  $P(B)$  and  $P(C)$ .

## UNIT- II

Q.2 (a) Write and explain distribution and density function. [8]

(b) Explain Bernoulli and Poisson distribution with examples. [8]

**OR**

Q.2 (a) Let  $X$  be a random variable with PDF given by  $f_X(x) = \begin{cases} Cx^2 & |x| \leq 1 \\ 0 & \text{otherwise} \end{cases}$  [10]

(i) Find the constant  $C$

(ii) Find  $E(X)$  and  $\text{Var}(X)$

(iii) Find  $P(X \geq 1/2)$

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(b) Discuss mean, variance and moments functions. [6]

## UNIT- III

Q.3 (a) Explain Gaussian random variables in detail. [8]

(b) State & elaborate central limit theorem. [8]

**OR**

Q.3 (a) Suppose that  $X$ ,  $Y$  and  $Z$  are three independent random variables. If  $X, Y \sim N(0,1)$  and  $Z \sim \text{exponential}(1)$ , find - [10]

(i)  $E\{XY|Z=1\}$

(ii)  $E\{X^2 Y^2 Z^2|Z=1\}$

(b) What do you mean by statistical independence? [6]

## UNIT-IV

Q.4 Discuss random process and linear systems. Explain random process concept. [16]

**OR**

Q.4 (a) Explain Statistics of Stochastic Processes. [8]

(b) Discuss following terms for a Stochastic Process. [8]

(i) Mean

(ii) Auto correlation

## UNIT- V

Q.5 What are Stochastic Processes in frequency domain? Explain with power spectrum. [16]

**OR**

Q.5 (a) List out properties of power spectral density. [8]

(b) Write short note on Gaussian and White processes. [8]