NOV-1000-2023

Rell No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Sc (Non Medical) (Sem.-5) THEORY OF PROBABILITY Subject Code: BSNM-505-18

M.Code: 78619

Date of Examination: 30-11-2023

Time: 3 Hrs.

Max. Marks: 50

# INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks
  each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

### SECTION-A

## I. Write briefly:

- a) Define mutually exclusive and exhaustive events.
- b) If a sample space  $S = A \cup B$ ,  $P(A) = \frac{1}{2}P(B) = \frac{3}{4}$  Find  $P(A \cap B)$ .
- c) Write ant two properties of Distribution function.
- d) A random variable X has the density function

$$F(X) = \frac{c}{x^2 + 1} \qquad -\infty < x < \infty. \text{ Find } c.$$

- e) Prove that Cov(X,Y) = E(XY) E(X)E(Y).
- f) Explain properties of Binomial distribution.
- g) If X is a normal variate with mean 30 & standard deviation 5. Find probability that  $26 \le x \le 40$ .
- h) Explain additive property of Gamma distribution.
- Prove that the probability of null set is Zero.
- j) Let X have the P.d.f.



$$F(x) = \begin{cases} \frac{x}{6} & x = 1, 2, 3 \\ 0 & elsewhere \end{cases}$$
 Find  $E(X^3)$ .

## SECTION-B

- A & B are two very weak students of statistics and their chances of solving a problem correctly are 1/8 and 1/12 respectively. If the probability of their making a common mistake is 1/1001 and they obtain the same manner. Find the chance that their answer is
- 3. Let X be a continuous random variable with probability density function given by :

$$F(x) = \begin{cases} kx & 0 \le x < 1 \\ k & 1 \le x < 2 \\ -kx + 3k & 2 \le x < 3 \end{cases}$$
 Find k. 0 elsewhere

- Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them.
- 5. The mean and variance of binomial distribution are 4 and 4/3 respectively. Find  $P(X \ge 1)$ .
- If X and Y are independent gamma variates. Find the distribution of X/(X+Y).

#### SECTION-C

- 7. The probability of getting no misprints in a page of book is 0.223. What is the probability that a page contains more than two misprints?
- 8. Fit a normal distribution to the Allowing data

Class:

15-20 20-25 25-30 30-35

Frequency

8

13 19 10

9. If A & B are two non-mutually exclusive events. If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{2}{5}$  and  $P(A \cup B) = \frac{1}{2}$ . Find the values of  $P(A \cap B)$ ,  $P(A \cap B^C)$  and  $P(A^C \cap B)$ .

NOTE: Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.