B. Sc. 1st Year, 1st Semester Examination, 2023

Statistics - I

Paper – GE-I

Time : Two hours Full Marks : 40

Use separate Answer script for each Part.

Part – I (Marks: 20)

The figures in the margin indicate full marks.

Answer Question No. **1** and ***any three*** from the rest.

2+6×3=20

1. Define mode of a frequency distribution with illustrative example. 2

2. Write down the formulas for the computation of median and mode for any frequency distribution. Derive the mentioned formulas. Also discuss their merits and demerits. 2+2+2

3. If for a random variable X, the absolute moment of order k exists for k = 1, 2, 3, ..., n, then prove that the following inequalities (i) $\beta_k^2 \le \beta_{k-1}\beta_{k+1}$, (ii) $\beta_k^{1/k} \le \beta_{k+1}$ hold for k = 1, 2, 3, ..., n–1, where β_k is the Kth absolute moment about the origin. 3+3

4. a) Find the mode of the Poisson distribution with parameter λ.

   b) Find the mean and central moments of arbitrary

[Turn over

order n for the normal distribution with parameters m and σ. 3+3

5. Calculate the correlation coefficient from the following table :

y \ x	0 – 10	10 – 20	20 – 30	30 – 40
0 – 5	1	3	2	0
5 – 10	7	10	8	1
10 – 15	10	13	10	8
15 – 20	5	8	10	7
20 – 25	0	1	5	4

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6. Find the mean, mode and median of the following distribution.

class limits	60 – 62	63 – 65	66 – 68	69 – 71	72 – 74
frequency	5	18	42	27	8

Part – II (Marks: 20)

Attemp ***any two*** questions. 2×10=20

Each question carries **ten** marks.

1. a) A fair coin is tossed repeatedly and independently until a HH (two consecutive heads) appears. Let X denotes the number of tosses needed to get the first HH. Find the probability mass function function of X and mean of X.

b) Do the same if the coin above is biased and Prob(H)=$\frac{1}{4}$.

2. Two points are chosen at random from the unit interval [0,1] independently. Let the interval [0,1] be divided by these two chosen points into lengths respectively of a, b and c units. Find the probability that a, b and c will form a triangle.

3. Calculate the characteristic function ϕ of a Binomial (n, p) random variable, $p \in (Q1)$, n a positive integer. Using φ, find the mean and variance of Bin(n, p) distribution.