B.Sc. Part–I Semester–I Examination
STATISTICS

Time : Three Hours] [Maximum Marks : 80

N.B.:—All questions are compulsory.

1. (A) Fill in the blanks :
   (i) Mean is the measure of _____.
   (ii) _____ is the simplest measure of dispersion.
   (iii) Probability of a sure event is always _____.
   (iv) Variance of a constant is _____. 2

   (B) Choose the correct alternatives (MCQ) :
   (i) Diagrammatic representation of data is done by :
   (a) Pictures (b) Charts
   (c) Diagrams (d) None of these
   (ii) The median of series 13, 14, 16, 18, 20, 22 is :
   (a) 17 (b) 18
   (c) 16 (d) 20
   (iii) The probability of getting three heads when three coins are tossed is :
   (a) $\frac{3}{8}$ (b) $\frac{2}{8}$
   (c) $\frac{1}{8}$ (d) 1
   (iv) If X is a r.v and c is constant then V(cX) is :
   (a) c.V(x) (b) zero
   (c) c^2.V(x) (d) none of these 2

   (C) Give answer in **one** sentence :
   (i) Define quartiles.
   (ii) State the range of [10-15]
   (iii) Who introduced 'Axiomatic Probability' ?
   (iv) Define cumulant generating function of a r.v. X. 4

2. (A) Describe scope of statistics of Industry. 4
   (B) State the functions of C.S.O. 4
   (C) Explain the terms - 'Nominal data' and 'Interval data'. 4

OR

3. (P) Discuss the functions of NSSO. 4
   (Q) Explain the term 'primary data' and give its various sources. 4
   (R) What do you mean by frequency and nonfrequency data ? 4

4. (A) Explain the term 'Central Tendency'. State its various measures. 4

(B) Discuss the term 'Classification'. What are the rules for classification ? 4

(C) What is meant by partition values ? Define percentiles. 4

OR

5. (P) Define :

(i) Harmonic Mean

(ii) Geometric Mean. 4

(Q) Explain ogives. Discuss its various types. 4

(R) Show that the sum of deviations of various values from their mean is zero. 4

6. (A) Define the term dispersion. Describe its various measures. 6

(B) Define variance of a frequency distribution. Show that variance is independent of change or origin but not of scale. 6

OR

7. (P) Explain various coefficients of dispersion based on range, quartile deviation, mean deviation and standard deviation. 6

(Q) Define :

(i) Raw moments

(ii) Central moments

Establish relation between raw moments and central moments. 6

8. (A) Define the terms :

(i) Random experiment

(ii) Equally likely events. 4

(B) Explain mathematical probability of an event. 4

(C) What is the chance that a leap year selected at random will consist of 53 Sundays ? 4

OR

9. (P) Define :

(i) Sample space

(ii) Trial and Event. 4

(Q) For any two events A and B, show that :

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 4

(R) If A and B are independent events then show that $\overline{A}$ and $\overline{B}$ are also independent events. 4

10. (A) Define :

(i) Probability mass function

(ii) Distribution function. 4

(B) For a random variable X, show that $E(aX + b) = aE(X) + b$ where a and b are constants. 4

(C) A r.v. X has the following p.d.f

$f(x) = k.x(3-x), \quad 0 < x < 3$

$= 0 \quad$ o.w.

where k is constant. Find the constant k. 4

OR

11. (P) Define with example :

(i) Dissertate random variable

(ii) Continuous random variable. 4

(Q) Let $Y = aX + b$ where a and b are constants, obtain V(Y). 4

(R) Define covariance. Show that $Cov(X+a, Y+b) = Cov(X,Y)$ where X and Y are random variables and a, b are constants. 4

12. (A) Explain :

(i) M.G.F.

(ii) P.G.F.

Establish relationship between m.g.f. and p.g.f. 6

(B) Define :

(i) Joint p.m.f.

(ii) Marginal p.m.f.

For the following joint probability distribution of X and Y, obtain marginal distribution of X.

X \ Y	1	2	3
1	5/27	4/27	2/27
2	1/27	3/27	3/27
3	3/27	4/27	2/27

6

OR

13. (P) Define two dimensional random variable. If X and Y are two dimensional random variables then prove that :

$E(X+Y) = E(X) + E(Y)$. 6

(Q) Define cumulant generating function. Prove that r^{th} cumulant of sum of n independent random variables is equal to the sum of r^{th} cumulant of each variables. 6