**AT – 278**

First Semester B. Sc. (Part - I) Examination

## STATISTICS – 1S

P. Pages : 7

Time : Three Hours ] [ Max. Marks : 80

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**Note :** All questions are compulsory.

1. (A) Fill in the blanks :—

(i) Three values which divide the series into four equal parts are known as———.

(ii) The probability of impossible event is——————.

(iii) The number of rooms in a college is ——————— random variable.

(iv) The mathematical expectation of product of ——————— random variables is the product of their expectations. 2

(B) Choose the correct alternative (MCQ) :—

(i) Headings of the column is———

(a) Caption (b) Stub

(c) Head note (d) Foot note

(ii) The highest level of scale of measurement is ————————

(a) Nominal scale (b) Interval scale

(c) Ratio scale (d) Ordinal scale

(iii) When a coin is tossed four times simultaneously the sample space contains:

(a) 8 points (b) 16 points

(c) 4 points (d) 32 points.

(iv) If x and y are two independent random variables then v(x+y) is

(a) v(x) + v(y).

(b) v(x) v(y).

(c) v(x) + v(y) + 2cov(x, y)

(d) v(x) +v(y) – 2cov(x, y) 2

(C) Answer in **One** sentence :—

(i) Define median.

(ii) What do you mean by skewness ?

(iii) Define random variable.

(iv) What is probability-generating function?

4

2. (A) Define primary data. Explain any one of the method of collecting primary data. 6

(B) Discuss the scope of statistics in detail. 6

**OR**

3. (P) State the names of various statistical organizations in India. Explain the working of NSSO. 6

(Q) Discuss various types of scales. 6

4. (A) What is tabulation of data ? State its advantages. 4

(B) Define median and state its merits. 4

(C) Prove that the algebraic sum of the deviations of the values taken about their mean is zero. 4

OR

5 (P) State the basic principles of good classification. 4

(Q) Define Harmonic mean and state its merits. 4

(R) Explain the terms :—

(i) Inclusive classes.

(ii) Exclusive type classes. 4

6. (A) What do you mean by dispersion ? State the various measures of dispersion. 4

(B) Explain the term Kurtosis. 4

(C) Define variance State its merits. 4

**OR**

7. (P) What do you mean by coefficient of dispersion ? Define co–efficient of dispersion based on Range. 4

(Q) Show that variance is independent of change of origin but not of scale. 4

(R) Define :—

(i) Coefficient of dispersion based on quartile deviation.

(ii) Coefficient of variation. 4

8. (A) Define mathematical probability. State its units. 4

(B) State and prove multiplication rule of probability. 4

(C) A card is drawn from a well shuffled pack of playing cards. What is the probability that it is either a spade or an ace ? 4

**OR**

9. (P) Define with the help of example :

(i) Mutually exclusive events.

(ii) Favourable events. 4

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

$P(A \cap \bar{B}) = P(A) - P(A \cap B)$. 4

(R) State Bayes theorem. 4

10. (A) Explain discrete and continuous random variables with the help of examples. Define probability mass function of random variable. 6

(B) A random variable x has p.df.

$f(x) = 2x^a \quad 0 \leq x \leq 1$

Find :

(i) The value of constant a

(ii) E(x) 6

OR

11. (P) Define variance of random variable in terms of mathematical expectations. Show that :

(i) $V(ax) = a^2v(x)$

(ii) $V(x+a) = v(x)$

Where a is constant. 6

(Q) A random variable x has the following probability function :—

| x | : | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| p(x) | : | 0.1 | k | 0.2 | 2k | 0.3 | k |

Find :—

(i) The value of constant k.

(ii) E(x).

(iii) Distribution function F(x). 6

12. (A) Define m.g.f. and p.g.f. 4

(B) State and prove multiplication theorem of mathematical expectation for two independent random variables X and Y. 4

(C) The joint p.m.f of x and y c's as follow :

| Y \ X | 1 | 2 | 3 |
|---|---|---|---|
| 1 | 1/15 | 2/15 | 1/15 |
| 2 | 3/15 | 2/15 | 1/15 |
| 3 | 2/15 | 1/15 | 2/15 |

Obtain :

(i) Marginal p.m.f of x.

(ii) Marginal p.m.f. of y. 4

**OR**

13. (P) Define cumulant generating function. Discuss the effect of change of origin and scale on cumulants. 4

(Q) Explain :

(i) Joint p.d.f.

(ii) Marginal p.d.f. 4

(R) The joint distribution of X and Y is given by:

$f(x, y) = 4xy\ e^{-(x^2+y^2)}$ ; $x \geq 0, y \geq 0$

Find :

(i) Marginal p.d.f. of x 4

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