2022
B.A./B.Sc.
First Semester
GENERIC ELECTIVE – 1
STATISTICS
Course Code: STG 1.11
(Statistical Methods)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Write the correct answers 1×2=2
   (i) Which of the following statement is true of ogives for a particular set of data?
   (A) Both 'more than' and 'less than' curves have the same slope.
   (B) 'More than' curves slope up and to the right.
   (C) 'Less than' curves slope down and to the right.
   (D) 'Less than' curves slope up and to the right.
   (ii) It is always possible to construct a frequency polygon from:
   (A) Bar diagram (B) Ogive
   (C) Histogram (D) Line diagram
   (b) What do you mean by term 'classification'? Discuss different types of classification. 2+4=6
   (c) What is mean by collection of data? Discuss various sources of collecting primary data. 2+4=6

2. (a) Write the correct answers: 1×2=2
   (i) The ogive of more than type and less than type distribution intersect at
   (A) mode (B) median
   (C) 3rd quartile (D) 2nddecile
   (ii) Pie-chart is always
   (A) in percentage (B) semi circular
   (C) circular (D) sub-divided form

(b) What do you mean by scale of measurement? Explain various types of scale of measurement. 2+4=6

(c) Explain briefly various types of diagrammatic representation. 6

UNIT–II

3. (a) Write the correct answers: 1×2=2

(i) Harmonic mean gives more weights to the

(A) bigger values (B) smaller values

(C) equal values (D) middle values

(ii) Which of the following deciles are less than the first quartiles?

(A) d_1 and d_2 (B) d_2 and d_3

(C) d_1, d_2 and d_3 (D) d_2, d_3 and d_4

(b) Write down the formulae of AM, GM, and HM for grouped data. Show that the AM is affected by change of origin and scale. 3+3=6

(c) Find the simple and weighted AM of first n natural numbers weight being the respective numbers. 6

4. (a) Write the correct answers: 1×2=2

(i) If the average of 1, 3, 5, x, 9, 11 is 6, then x is

(A) 8 (B) 7

(C) 6 (D) 10

(ii) Algebraic sum of deviations of 5 observations from their mean is

(A) 0 (B) minimum

(C) 1 (D) constant

(b) Write down the characteristics of a good measures of central tendency. Mention the merits and demerits of arithmetic mean. 3+3=6

(c) Write the definitions and formulae of quartiles, deciles, and percentiles with usual meanings of the symbols. 2+2+2=6

UNIT–III

5. (a) Write the correct answers: 1×2=6

(i) The relationship between MD and SD is

(A) 3MD = 2SD (B) 2MD = 3SD

(C) 5MD = 4SD (D) 4MD = 5SD

(ii) Which of the following is a unitless measures of dispersion?
(A) Co-efficient of variation (B) Mean deviation
(C) Quartile deviation (D) Standard deviation

(b) What is mean deviation? Show that the mean deviation is minimum when measured about the median. 2+4=6

(c) Define raw and central moments. Obtain the r^{th} order central moment in terms of raw moments and hence deduce down first four central moments in terms of raw moments. 2+4=6

6. (a) Write the correct answers: 1×2=2

(i) If the AM of a series is 8 and SD is 4, then the co-efficient of variation will be
(A) 32% (B) 50%
(C) 40% (D) 20%

(ii) The relationship between quartile deviation and standard deviation:
(A) 3QD = 4SD (B) 4QD = 3SD
(C) 2QD = 3SD (D) 3QD = 2SD

(b) Define standard deviation (SD). Show that the standard deviation is the root mean square deviation. 2+4=6

(c) What do you mean by skewness and kurtosis? Write down Karl Pearson's kurtosis and interpret it. 2+2+2=6

UNIT–IV

7. (a) Write the correct answers: 1×2=2

(i) If A and B are independent events, then
(A) $P(A/B) = P(A)$ (B) $P(A/B) = P(B)$
(C) $P(A/B) = P(A)P(B)$ (C) $P(A/B) = P(A \cap B)$

(ii) If two dice are thrown, then the probability of a sum of nine points obtained is
(A) 3/36 (B) 5/36
(C) 4/36 (D) 2/3

(b) State and prove theorem of compound probability. For any two events A and B, show that $P(A \cap B) \geq P(A) + P(B) - 1$ 4+2=6

(c) If A and B are any two events such that
$P(AB) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$ 6

8. (a) Write the correct answers: 1×2=2

(i) If A and B are mutually exclusive events, then

(A) $P(A \cap B) = 0$ (B) $P(A \cap B) = P(A)$

(C) $P(A \cap B) = P(B)$ (D) $P(A \cap B) = 1$

(ii) If A and B are any two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$, then $P(A \cup B)$ will be

(A) $\frac{3}{12}$ (B) $\frac{5}{12}$

(C) $\frac{7}{12}$ (D) $\frac{5}{6}$

(b) A card is drawn from a pack of 52 cards. What is the probability of getting either a spade or an ace? 6

(c) State and prove Baye's theorem probability. 6

UNIT–V

9. (a) Write the correct answers: 1×2=2

(i) According to proportion method of attributes A and B are said to be independent if:

(A) $\frac{(AB)}{A} = \frac{(\alpha\beta)}{\beta}$ (B) $\frac{(AB)}{A} = \frac{(\alpha\beta)}{\alpha}$

(C) $\frac{(AB)}{A} = \frac{(\alpha\beta)}{N}$ (D) $\frac{(AB)}{B} = \frac{(\alpha\beta)}{\alpha}$

(ii) According to Yule's Co-efficient of Association, $Q = 1$ implies:

(A) there is perfect correlation between A and B

(B) there is perfect relationship between A and B

(C) there is perfect positive association between A and B

(D) A and B are independent.

(b) Explain the term 'order of a class frequency' and 'ultimate class frequency'. What do you mean by attributes? Discuss any one method of measuring association between two attributes. 2+1+3=6

(c) From the following ultimate class frequencies, find the frequencies of the positive and negative classes and the total number of observations N.

$(AB) = 50,\ (A\beta) = 100,\ (\alpha B) = 60, (\alpha\beta) = 150$ 6

10. (a) Write the correct answers: 1×2=2

(i) Two attributes α and β will be called independent if:

(A) $(\alpha\beta) = (\alpha)(\beta)$ (B) $(\alpha\beta) = \frac{(\alpha)(\beta)}{N}$

(C) $(\alpha\beta) = \frac{(\alpha)}{N}\frac{(\beta)}{N}$ (D) $\frac{(\alpha\beta)}{N} = \frac{(AB)}{N}$

(ii) If there are n attributes, the total number of classes including N will be:

(A) n^3 (B) N^n (C) n^N (D) 3^n

(b) Give the concept of attribute. If there are two attributes A and B, write down all the possible classes of 'zero', 'first' and 'second order' and indicate the positive and negative classes. 2+4=6

(c) What is meant by consistency of data? From the following cases find out whether the data are consistent or not.

(A) = 100, (B) = 150, (AB) = 60 and N = 500 6