1 SEM TDC STS M 1 (N/O)

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(November)

STATISTICS

(Major)

Course : 101

(Descriptive Statistics)

(New and Old Course)

Full Marks : 80
Pass Marks : 24/32

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Choose the correct answer :   1×8=8

   (a) The clear definition of absolute zero
   point, representing the absence of the
   variable is represented only by

   (i) nominal scale

   (ii) ordinal scale

   (iii) interval scale

   (iv) ratio scale

(Turn Over)

(b) Data represented through a histogram can help in finding graphically the

   (i) mean

   (ii) mode

   (iii) median

   (iv) All of the above

(c) Which of the following is true for a symmetrical set of data?

   (i) Arithmetic mean $\leq$ Median $\leq$ Mode

   (ii) Arithmetic mean $\geq$ Median $\geq$ Mode

   (iii) Arithmetic mean = Median = Mode

   (iv) All of the above

(d) The sum of squares of deviation is least when measured from

   (i) median

   (ii) 0

   (iii) mean

   (iv) mode

(e) In a frequency curve of scores, the mode was found to be higher than the mean. This shows that the distribution is

   (i) symmetric

   (ii) negatively skewed

   (iii) positively skewed

   (iv) normal

(f) The regression coefficients are b_1 and b_2, then the correlation coefficient is

   (i) $\dfrac{b_1}{b_2}$

   (ii) $\dfrac{b_2}{b_1}$

   (iii) $b_1 b_2$

   (iv) $\pm\sqrt{b_1 . b_2}$

(g) Multiple correlation coefficient can never be

   (i) 0

   (ii) negative

   (iii) positive

   (iv) None of the above

(h) Two attributes A and B are said to be independent, if

(i) $(AB) = \dfrac{(A)\,(B)}{N}$

(ii) $(AB) < \dfrac{(A)\,(B)}{N}$

(iii) $(AB) > \dfrac{(A)\,(B)}{N}$

(iv) $(AB) = (A) + (B)$

2. (a) What are the scales used for measuring qualitative data? Illustrate with examples. 1+3=4

(b) Differentiate between the following : 2+2=4

(i) Time series data and Cross section data

(ii) Discrete data and Continuous data

3. (a) Distinguish between classification and tabulation of statistical data. What purposes do classification and tabulation serve? Mention the importance of classification. 2+2+2=6

Or

(b) What do you mean by cumulative frequency curve or ogive? What are the different types of ogives? Explain their uses. 2+2+2=6

4. Prove that for a frequency distribution

$$\sum_{i=1}^{n} f_i (x_i - A)^2$$

is minimum, when $A = \bar{x}$. 3

5. Answer any *three* of the following : 8×3=24

  (a) Define *(i)* arithmetic mean, *(ii)* geometric mean and *(iii)* harmonic mean of grouped and ungrouped data. Compare and contrast the merits and demerits of them. 6+2=8

  (b) Distinguish between relative and absolute measures of dispersion. Define skewness of a distribution and discuss its utility in statistics. 3+5=8

  (c) Explain the main difference between mean deviation and standard deviation. Show that standard deviation is independent of change of origin and scale. 3+5=8

  (d) Define the raw and central moments of a frequency distribution. Obtain the relation between the central moments of order r in terms of the raw moments. What is the effect of change of origin and scale of moments? 2+4+2=8

6. *(a)* Obtain the normal equations for fitting the curve, $y = ab^x$. 3

(b) Write down the formula for Spearman's rank correlation coefficient $\rho(X, Y)$ and mention two differences between $\rho(X, Y)$ and Karl Pearson's coefficient of correlation coefficient $r(X, Y)$. 3

7. Answer any *two* of the following : 8×2=16

(a) If r_{XY} is the Pearsonian correlation coefficient and b_{XY} and b_{YX} are regression coefficients, then prove that—

    (i) $-1 \le r_{XY} \le 1$;

    (ii) r_{XY} is the geometric mean of the two regression coefficients b_{XY} and b_{YX}. 5+3=8

(b) The equation of two regression lines obtained in an analysis are as follows :

$$3X + 12Y = 19$$
$$3Y + 9X = 46$$

Obtain—

    (i) the value of correlation coefficient;

    (ii) the mean value of X and Y. 4+4=8

(c) Explain the concept of multiple correlation. Illustrate with example. Also define coefficient of determination in 3-variable case. Prove that $R_{2.13} = 1$, when $R_{1.23} = 1$. 3+1+4=8

8. (a) What is meant by independence of attributes? When are two attributes said to be positively associated and negatively associated? Derive an expression for a measure of association between two attributes. Let A, B, C and a, b, c denote the presence and absence of the attributes respectively. Then write down all the positive class frequencies of order 2 and all the ultimate class frequencies.   2+2+3+2=9

Or

(b) Define Yule's coefficient of association and the coefficient of colligation. Establish that—

(i) $-1 \leq Q \leq 1$;

(ii) $Q = \dfrac{2Y}{1+Y^2}$

where Y is the coefficient of colligation.

3+6=9

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