Total No. of Questions : 5]

SEAT No. :

P308

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F.Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Descriptive Statistics

(Paper - I) (2008 Pattern) (42110)

Time :3 Hours] *[Max. Marks :80*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols have their usual meanings.***

Q1) a) Choose correct alternative for the following : **[4 × 1 = 4]**

i) The measurements on height and weight are made on

A) Nominal scale B) Orinal scale
C) Interval scale D) Ratio scale

ii) A variable taking values 1, 2, 3, ...,17 has median.

A) 9 B) 10
C) 8 D) 11

iii) If Corr $(x, y) = 0.8$, then Corr $(2x, -3y)$ is

A) 0.8 B) – 0.8
C) 0.4 D) – 0.6

iv) The following is not capable of further mathematical treatment.

A) Arithmetic mean B) Variance
C) Mode D) Geometric mean.

b) State whether the following statements are true or false: **[4 × 1 = 4]**

i) Standard deviation is dependent on change of origin and not scale.

ii) The following data are consistent :
N = 80, (A) = 60, (B) = 50 (AB) = 55

iii) Laspeyre's price index number uses base year quantity as weight.

iv) If correlation coefficient is negative, then the corresponding regression coefficients are also negative.

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c) Define Spearman's rank correlation coefficient and state its formula. **[2]**

d) State two merits of harmonic mean. **[2]**

e) The first 4 central moments of a frequency distribution are $\mu_1 = 0$, $\mu_2 = 16$, $\mu_3 = -64$, $\mu_4 = 312$. Compute coefficient of skewness. **[2]**

f) Define trimmed arithmetic mean. **[2]**

Q2) Attempt any four of the following : **[4 × 4 = 16]**

a) State characteristics of a good statistical average.

b) Draw Histogram for the following data and hence obtain its mode.

Marks	40-50	50-60	60-70	70-80	80-90
Frequency	8	12	18	7	5

c) Height in cms of 25 school children are given below, prepare stem and leaf chart.
95, 98, 102, 111, 99, 92, 84, 85, 92, 105, 108, 87, 86, 90, 88, 89, 91, 96, 113, 112, 109, 93, 100, 104, 101.

d) A sample of n observations on X and Y shows that the variables are uncorrelated and their variances are 4 and 9 respectively. Show that $U = 3X + 4Y$ and $V = 3X - Y$ are uncorrelated.

e) Describe the scope of statistics in,
i) Medical Sciences
ii) Management Sciences.

f) Test whether the attributes A and B are independent or not based on the following data :
$N = 100$, $(A) = 60$, $(B) = 50$, $(\alpha\beta) = 20$.

Q3) Attempt any four of the following : **[4 × 4 = 16]**

a) The mean monthly salary of all the employees in a firm is Rs. 3800. The mean salaries of male and female employees are Rs. 4,000 and Rs. 3500 respectively. Find the percentage of male employees in the firm.

b) Define Bowley's coefficient of skewness and prove that it lies between –1 and +1.

c) The arithmetic mean of weight of 98 students as calculated from a frequency distribution is 50 kg. It was later found that the frequency of the class (30-40) was wrongly taken as 8 instead of 10. Calculate the correct arithmetic mean.

d) The first 3 moments of a distribution about 2 are 1, 22 and 10 respectively. Find its standard deviation.

e) Derive the expression for the acute angle between the two regression lines.

f) Given that $(AB) = 13, (A\beta) = 20, (\alpha B) = 15, (\alpha\beta) = 25$. Find the remaining frequencies.

Q4) Attempt any two of the following : **[2 × 8 = 16]**

a) Given a sample of 'n' pairs of observations on the variables X and Y, using the method of least squares. Obtain the equation of line of regression of Y on X.

b) i) State two merits and two demerits of median.
ii) Represent the following data using box plot technique: 12, 13, 18, 21, 11, 14, 17, 15, 28, 16, 20, 19, 25, 30, 26.

c) i) Show that Fisher's index number lies between Laspeyre's and Paasche's index numbers.
ii) Define raw and central moments. Also write expressions for first 4 central moments in terms of raw moments.

d) Compute standard deviation of first 'n' natural numbers. Hence find the value of S.D. of 1, 2,.....16.

Q5) Attempt any two of the following : **[2 × 8 = 16]**

a) i) Explain stratified random sampling.
ii) The following data represent wheat yield for 20 plots:
11, 16, 15, 18, 21, 22, 23, 19, 20, 28, 32, 33, 38, 40, 41, 48, 10, 25, 24, 50. Obtain a systematic sample of size 5, starting with third observation. Also find arithmetic mean of the sample.

b) Derive the expression for mode of a frequency distribution with the help of Histogram.

c) State the expression for Yule's coefficient of association and mention its use. Also prove that it lies between –1 and +1.

d) i) Explain the procedure of fitting the curve $y = ab^x$.
ii) The regression equations are $3x - y - 5 = 0$ and $4x - 3y = 0$. Obtain the arithmetic means of X and Y. Also find the correlation coefficient between X and Y.

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