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F.Y.B.Sc.
STATISTICS /STATISTICAL TECHNIQUES
Descriptive Statistics
(Paper-I) (2008 Pattern)

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.*
5) *Graph papers will be supplied on request.*

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

   i)   Sampling is:

     a)   Not always useful.

     b)   Not always possible.

     c)   Has number of advantages over census.

     d)   The census.

   ii)   In order to construct a frequency polygon for equal class intervals along X axis and Y axis respectively.

     a)   Lower limits and less than cummulative frequency.

     b)   Upper limits and less than cummulative frequency.

     c)   Class intervals and frequency.

     d)   Mid points and frequency.

     are plotted.

   iii)   If $Q_1 + Q_3 = 2Q_2$ then distribution is

     a)   Positively skewed.

     b)   Negatively skewed.

     c)   Symmetric.

     d)   Moderately skewed.

P.T.O.

iv) If cov $(X, Y) = 2.5$ then cov $(-X, -Y)$ equal to

    a)   -2.5   b)   2.5

    c)   0   d)   5.0

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

    i)   Second order raw moment is always non negative.

    ii)   If correlation coefficient for certain bivariate data is zero then two regression lines are parallel.

    iii)   Median can be located using ogive curve.

    iv)   Coefficient of variation is relative measure of dispersion.

c) If arithmetic mean and geometric mean of two observations are 6.5 and 6 respectively, find harmonic mean.   **[2]**

d) If for two attributes A and B; N=200, (A)=40, (B)=50 and (AB)=10, comment on association between two attributes. Justify your answer. **[2]**

e) State any two requisites of a good measure of central tendency.   **[2]**

f) If $U = (X-a)/h$ then show that $\bar{U} = (\bar{X} - a)/h$.   **[2]**

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

a) For a bivariate data (X, Y); $\bar{X} = 2$, $\bar{Y} = 3$, $byx = 0.48$ & $bxy = 0.84$, find regression line of Y on X and coefficient of variation Y if $\sigma_x^2 = 5.6$.

b) Explain the following terms:

    i)   Population,   ii)   Sample,

    iii)   SRS,   iv)   Stratified sampling.

c) Prove that Bowley's coefficient of skewness always lies between -1 and +1.

d) Define "mode". State the formula of mode for continuous frequency distribution state any two demerits of mode.

e) Draw box-plot and hence comment for the following data; min=20, Q_1=40, Q_2=55, Q_3=90, Max=100.

f) Show that variance is invariant of change of origin.

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

a) Compute Fisher's price index number for the following data:

	Base year		Current year	
Commodity	Price	Quantity	Price	Quantity
A	25	5	30	6
B	60	2	100	3
C	100	1	120	2
D	30	4	40	5

b) The mean weight of 150 students is 60 kg. The mean weight of boys is 70 kg with standard deviation of 10 kg. For girls mean weight is 55 kg with standard deviation 15kg. Find combined standard deviation.

c) For the attributes A,B; show that $Q_{AB} = Q_{\alpha\beta}$.

d) Show that $cov(hX+a, \, kY+b)= hk \, cov(X,Y)$.

e) The mean and variance of a distribution are 30 and 64 respectively and its Pearson's coefficient of skewness is 0.25. Find mode and median.

f) Prove that $\mu_4 \geq \mu_2^2$.

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

a) For bivariate data(X,Y) show that $-1 \leq corr(X,Y) \leq 1$.

b) Define the following terms with an illustration.

   i) Attribute

   ii) Positive class

   iii) Positively associated attributes

   iv) Ultimate class.

c) Derive the formula for median for a continuous frequency distribution.

d) Define " index number". Explain any two types of index numbers also explain any two problems in construction of index numbers.

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

    i) In an examination 140 students passed which is 70% of total students appeared for the exam. 96 girls passed in examination which is 80% of total girls appeared for the exam.

       Comment on association between two attributes. [4]

    ii) If attributes A and B are independent then show that attributes A and B are also independent. [4]

  b) In case of no ties, with usual notation derive the formula of Spearman's rank correlation coefficient. [8]

  c) i) For symmetric distribution show that. $\mu_3' = (3\mu_2 + \mu_1'^2)\mu_1'$ [4]

    ii) Define "kurtosis". Explain any two types of kurtosis. [4]

  d) For a set of 10 pairs of (x_i, y_i); $\sum x_i = 522, \sum y_i = 1417,$

$$\sum x_i^2 = 28348, \quad \sum y_i^2 = 202493, \quad \sum x_i y_i = 75166$$

find two regression lines, estimate Y for X = 42 and comment on correlation between two variables. [8]

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