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SEAT No. :

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P510

[4917]-113

F. Y. B. Sc.

STATISTICS/STATISTICAL TECHNIQUES

Descriptive Statistics

(2013 Pattern) (Paper - I)

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 table and calculator is allowed.*
- 4) *Symbols have their usual meanings.*

Q1) Attempt each of the following:

A) a) Define “discrete variable” with one real life example. **[1]**

b) State any two requisites of good measure of dispersion **[1]**

c) Suggest an appropriate sampling method giving reason for the following situation. **[1]**

A sample of 1000 units is to be selected to find daily total requirement of electricity consumption out of 3000 houses, 500 offices and 600 shops.

d) Define “Positively correlated variables” with one illustration. **[1]**

B) Choose the correct alternative for the following: **[1 each]**

a) Mean deviation is minimum if the deviations are taken from:

i) Mean

ii) Median

iii) Mode

iv) The first quartile

b) If $\text{Var}(2X + 3) = 36$, then $\text{Var}(X)$ is equal to:

i) 36

ii) 18

iii) 33

iv) 9

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- c) If $N = 100$, $(A) = (B) = 20$, $(AB) = 5$, then attributes A and B are:
- Positively associated
 - Positively correlated
 - negatively associated
 - negatively correlated
- d) If regression coefficient Y on X is equal to 2, we can conclude that variables X and Y are
- perfectly positively correlated
 - perfectly negatively correlated
 - positively correlated
 - negatively correlated
- C) a) If $\text{Min} = 10$, $Q_1 = 25$, $Q_2 = 38$, $Q_3 = 60$, $\text{Max} = 90$, comment on skewness, give justification. [2]
- b) State Yule's coefficient of association, comment if its value is zero. [2]
- c) Find variance of data having the values $-4, -2, 0, 2, 4$. [2]
- d) Using the method of dot operator in case of three variables, express $(\alpha\beta C)$ in terms of positive class frequencies. [2]

Q2) Attempt any Four of the following:

[4 each]

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

Commodity	2011		2012	
	Price	Quantity	Price	Quantity
A	10	8	15	6
B	15	15	12	20
C	12	10	18	8

- b) Compute first four central moments if

$$\mu'_1 = 25, \mu'_2 = 725, \gamma_1 = 20, \gamma_2 = 500$$

- c) Find number of pairs (n) for the following data:

$$r = -0.7, \Sigma x_i = 20, \Sigma x_i^2 = 90, \Sigma y_i = 20, \Sigma y_i^2 = 90, \Sigma x_i y_i = 73.$$

- d) Average salary of an employee in certain company is Rs. 9,000/-. Find ratio of male and female employees, if their average salary is Rs. 12,000/- and Rs. 7,500/- respectively.
- e) What is correlation? Using scatter diagram explain various types of correlation.
- f) Define r^{th} order central moment. Express 4th order central moment in terms of raw moments.

Q3) Attempt any four of the following:

[4 each]

- a) With usual notation prove that

$$\mu'_3 = 3\mu'_2\mu'_1 - 2\mu_1'^3, \text{ for symmetric distribution.}$$

- b) Given the following information:

$$N = 100, (AB) = 25, (A\bar{B}) = 15, (\bar{A}B) = 25$$

Comment on the association between two attributes A and B.

- c) Size of two groups are in ratio 3:4, their means are 20 and 40 respectively whereas their variance are 10 and 5. Compute combined standard deviation.
- d) Define SRSWR and SRSWOR. Give one real life example of each.
- e) For two observations a and b , arithmetic mean and geometric mean are 6.5 and 6 respectively. Find a, b ; also find harmonic mean.
- f) Define dispersion. Explain relative measure of dispersion and state its utility.

Q4) Attempt any two of the following:

- a) i) Compute rank correlation coefficient for the following data: [6]

Marks by judge I	81	72	60	33	29	11	56	42
Marks by judge II	75	56	42	15	30	20	60	80

- ii) Define the following terms: [2]
- 1) Nominal scale.
 - 2) Population.
- b) Derive the formula for median using graphical method for a continuous frequency distribution. [8]
- c) i) Show that Yule's coefficient of association lies between -1 and $+1$. [4]
- ii) If $Q_{AB} = 0$, prove that $(AB)N = (A)(B)$. [4]
- d) Explain the procedure of fitting second degree curve $Y = a + bX + cX^2$ for bivariate data. [8]

Q5) Attempt any one of the following:

- a) i) Show that $\beta_2 \geq 1$. [4]
- ii) Define "Skewness". Explain the types of skewness using Box-plot. [4]
- iii) Show that $-1 \leq \rho(X, Y) \leq 1$ [8]
- b) i) Mean and variance for certain data of 100 observations are 10 and 45 respectively. At the time of rechecking it is found that observation 40 was misread as 14. Calculate correct arithmetic mean and variance. [6]
- ii) For a set of 100 observations [6]
- $$\sum x_i = 25, \sum y_i = 68, \sum x_i^2 = 167, \sum y_i^2 = 162, \sum x_i y_i = 130$$
- 1) Compute correlation coefficient.
 - 2) Find regression line of Y on X.
 - 3) Estimate Y for X = 0
- iii) Define "Kurtosis". Explain different types of Kurtosis. [4]

