MST–002

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Examination

December, 2023

MST-002 : DESCRIPTIVE STATISTICS

Time : 3 Hours   *Maximum Marks : 50*

Note : (i) *Question No. **1** is compulsory.*

(ii) *Attempt any **four** questions from the remaining Question Nos. **2** to **7**.*

(iii) *Use of scientific calculator (non-programmable) is allowed.*

(iv) *Use of Formulae and Statistical Tables Booklet for PGDAST programme is allowed.*

(v) *Symbols have their usual meanings.*

1. State whether the following statements are True *or* False. Give reasons in support of your answers :   5×2=10

    (a) If two variables are related in the form $Y = X^2$, then the variables are highly linearly related.

    (b) In regression analysis, the two regression coefficients are – 2 and – 2/3.

    (c) Sum of deviations of the observations from their mean is zero.

    (d) If the value of $\beta_2 < 3$, then the curve is said to be leptokurtic.

    (e) In a company of 1000 persons, 750 were male out of whom 530 were married. Among females, the number of married ones was 350, then the data is consistent.

2. (a) A candidate obtained the following percentage of marks in different courses of PGDAST programme :

    MST-001 – 46%
    MST-002 – 67%

MST-003 – 72%

MST-004 – 58%

MST-005 – 53%

It is agreed to give double weights to marks in MST-001 and MST-002 as compared to other courses. What is the simple mean and weighted mean ? 3

(b) For two Firms A and B, the following details are available :

	A	B
No. of employees	100	200
Average salary	16000	18000
SD of salary	16	18

Compute the following :

(i) Which Firm pays larger package of salary ?

(ii) Which Firm shows greater variability in the distribution of salary ?

(iii) Compute the combined average salary and combined variance of both firms.

7

3. (a) Define coefficient of determination and correlation ratio. 4

(b) Calculate the correlation coefficient from the following data :

X	Y
12	14
9	8
8	6
10	9
11	11
13	12
7	3

Let now each value of X be multiplied by 2 and then 6 be added to it.

Similarly, multiply each value of Y by 3 and subtract 2 from it. What will be the correlation coefficient between the new series of X and Y ? 6

4. (a) Differentiate between correlation and regression. 2

   (b) In order to find the correlation between two variables X and Y from 12 pairs of observations, the following calculations were obtained :

   $\Sigma X = 30, \quad \Sigma X^2 = 670, \quad \Sigma Y = 5, \quad \Sigma Y^2 = 285,$
   $\Sigma XY = 344$

   On subsequent verification, it was discovered that the pair (X = 11, Y = 4) was copied wrongly, the correct values being (X = 10, Y = 14). After making necessary correction, find : 8

   (i) regression coefficients,

   (ii) two regression equations, and

   (iii) correlation coefficient.

5. (a) In a musical contest, 168 contestants participated. The competition comprised three different stages. It was found that 57 contestants cleared first stage; 45 second stage and 72 third stage. The number of contestants who cleared all the stages, who did not clear any stage, who cleared only

first two stages and who cleared only third stage were 17, 29, 11 and 20, respectively. With the given information, find how many contestants cleared at least two stages.   6

(b) For a distribution, Bowley's coefficient of Skewness is – 0.56, Q_1 = 16.4 and median = 24.2. What is its coefficient of quartile deviation.   4

6. A researcher wants to study the association between temperament of husband and wife. She examined 5120 pairs and made the following contingency tables :

Temperament of Husband	Temperament of Wife		
	Quiet	Good Natured	Sullen
Quiet	850	571	580
Good Natured	618	593	455
Sullen	540	456	457

Determine and interpret the association between the temperament of husband and wife.   10

7. (a) Suppose a student of PGDAST calculated $r_{12} = 0.90$, $r_{13} = 0.30$ and $r_{23} = 0.70$ from a data set. Examine whether these computations are error free.   3

(b) (i) Explain the method of least squares.

(ii) Fit an equation of the form $y = ab^X$ on the following data using the method of least squares.   7

X	Y
2	144
3	172
4	207
5	248
6	298

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