

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Examination

December, 2019

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 questions No. 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. 5x2=10
- (a) Two distributions, with the same mean, standard deviation and coefficient of skewness, must have the same peakedness.
- (b) In simple regression analysis, the quantity that gives the amount by which Y (response variable) changes for a unit change in X (regressor variable) is called the Y intercept of the regression line.
- (c) The amount of variability in dependent variable that is explained by the independent variable is called correlation.
- (d) There can be two attributes A and B such that $(AB) > (A)$, where A and B have been observed from the same population.
- (e) We are given a regression equation between two variables. From this equation we can estimate whether the association is linear or non-linear.
2. Comment on the shape and peakedness of the data given below : 10
48, 55, 48, 66, 39, 50, 54, 49, 51, 39, 51, 67, 47, 35, 66
3. (a) By using the method of Least Squares, find estimated values of a and b, where X and Y have a relationship of the type $Y = ab^X$ from the following data : 8
- | | | | | | |
|---|---|---|---|----|----|
| X | 2 | 4 | 6 | 8 | 10 |
| Y | 1 | 3 | 6 | 12 | 24 |
- (b) Explain what information is obtained by correlation and regression analysis. 2

4. For the given data, find out : 10
- (a) Regression equation of x_1 on x_2 and x_3 .
- (b) Estimate the value of x_1 for $x_2=6$ and $x_3=8$.

| | | | | |
|-------|---|---|----|----|
| x_1 | 2 | 6 | 8 | 10 |
| x_2 | 4 | 5 | 9 | 12 |
| x_3 | 4 | 6 | 10 | 12 |

5. (a) In a Girl's High School, there were 200 students. Their results in the quarterly, half yearly and annual examinations were as follows : 5
- 85 passed the quarterly examination.
 80 passed the half yearly examination.
 94 passed the annual examination.
 28 passed all the three and 40 failed in all the three.
 25 passed the first two and failed in the annual examination.
 43 failed the first two but passed the annual examination.
- Find how many students passed atleast two examinations.

- (b) A company is interested in determining the strength of association between the communicating time of their employees and the level of stress-related problem observed on job. A study of 116 assembly line workers reveals the following information : 5

| Communicating time (in minutes) ↓ | Stress | | | |
|---|--------|----------|-----|-------|
| | High | Moderate | Low | Total |
| Under 20 | 9 | 5 | 18 | 32 |
| 20 - 50 | 17 | 8 | 28 | 53 |
| Over 50 | 18 | 6 | 7 | 31 |
| Total | 44 | 19 | 53 | 116 |

Find strength of association between above considered attributes.

6. (a) For the following data : 5
- 11, 9, 14, 10, 9, 14, 6, 13, 12, 6, 7, 13, 7, 17, 4, 10, 8, 10, 15, 12, 4
- Find A, B and C such that

(i) $\frac{1}{21} \sum_{i=1}^{21} (x_i - A) = 0$

(ii) $\frac{1}{21} \sum_{i=1}^{21} |x_i - B|$ is minimum

(iii) $\frac{1}{21} \sum_{i=1}^{21} (x_i - C)^2$ is least

- (b) In a competitive examination, 200 graduates appeared. Following facts were noted : 5

No. of boys = 139

No. of Science graduate girls who failed to qualify for interview = 25

No. of Arts graduate girls who qualified for interview = 30

No. of Arts graduate girls failed to qualify for interview = 18

Test the consistency of the data.

7. (a) Compute the correlation ratio for the following bivariate data : 5

| $x \backslash y$ | 5 | 10 | 15 | 20 | 25 |
|------------------|---|----|----|----|----|
| 5 | 8 | 8 | 4 | 0 | 0 |
| 10 | 7 | 15 | 15 | 1 | 0 |
| 20 | 0 | 6 | 1 | 15 | 11 |
| 25 | 0 | 0 | 5 | 10 | 8 |

- (b) From the following data, obtain the correlation coefficient between (i) x_1 and x_3 after removing linear effect of x_2 on them and (ii) x_1 and joint effect of x_2 and x_3 . 5
 $r_{12} = 0.30$, $r_{13} = -0.26$ and $r_{23} = -0.41$.