

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
First & Third Semester of BSc Physics Examination March 2018
(Elective Course)
PD107 Statistics-I

Date:31/03/2018,Saturday

Time:10:00 a.m. to 10:30 a.m.

Maximum Marks:20

MCQ

Important Instructions:

- Tick the correct answer/s and it should be written in question paper itself.
- Use of non-programmable calculator is allowed.

Q - I Choose the correct answer for the following questions.

1. A statistician records the ages of persons at death, constitute data of type
(i) continuous (ii) nominal
(iii) discrete (iv) ordinal
2. Which of the following relationship between class frequencies in study of attributes $A, \alpha, B, \text{ and } \beta$ is true?
(i) $f_A = f_{AB} + f_{A\beta}$ (ii) $f_\alpha = f_{\alpha B} + f_{\alpha\beta}$
(iii) $f_A = f_{AB} + f_{\alpha\beta}$ (iv) Both (i) and (iii)
3. The arithmetic mean of a series of variable X_1, X_2, X_3, X_4 is _____.
(i) $X_1 + X_2 + X_3 + X_4$ (ii) $(X_1 \times X_2 \times X_3 \times X_4)^{\frac{1}{4}}$
(iii) $\frac{X_1 + X_2 + X_3 + X_4}{4}$ (iv) $\frac{4}{\frac{1}{X_1} + \frac{1}{X_2} + \frac{1}{X_3} + \frac{1}{X_4}}$

4. If the Arithmetic mean of a set of two observations is 9 and its Geometric mean is 6. Then the Harmonic mean of the set of observations is_____.
- (i) 4 (iii) 3
(ii) $3\sqrt{6}$ (iv) 1.5
5. The average of five numbers is 40 and the average of another four numbers is 50. The average of all numbers taken together is_____.
- (i) 44.44 (iii) 45.55
(ii) 45.00 (iv) 90.00
6. The Arithmetic mean of seven observations is 8. A new observation 16 is added. The mean of eight observations is_____.
- (i) 12 (iii) 8
(ii) 9 (iv) 24
7. Which of the measure of central tendency is not affected by extreme values?
- (i) arithmetic mean (iii) harmonic mean
(ii) median (iv) geometric mean
8. The Median of the variate values 11,7,6,9,12,15,19 is_____.
- (i) 9 (iii) 15
(ii) 12 (iv) 11
9. If the sum of n observations is 630 and their Arithmetic mean is 42, then the value of n is _____.
- (i) 21 (iii) 15
(ii) 30 (iv) 20
10. A distribution of 6 scores has a median of 21.If the highest score increases 3 points, the median will become _____.
- (i) 21 (iii) 24
(ii) 21.5 (iv) can not be determined
11. Which of the following is not a measure of central tendency?_____.
- (i) Arithmetic Mean (iii) Mode
(ii) Median (iv) Standard deviation
12. The sample variance of the following sample of five numbers 3,3,3,3,3 is _____.
- (i) 0 (iii) 9
(ii) 3 (iv) 11.25
13. If the variance of a distribution is 9, the standard deviation is _____.
- (i) 3 (iii) 9
(ii) 6 (iv) 81

14. The standard deviation of a group of scores is 10. If 5 were subtracted from each score, the standard deviation of the new scores would be _____.
- (i) 2 (iii) 5
(ii) 10/25 (iv) 10
15. Consider a sample linear regression analysis between a dependent variable (Y) and an independent variable (X). A sample correlation coefficient of -1 (minus one) tells us that _____.
- (i) there is no relationship between Y and X in the sample (iii) there is no linear relationship between Y and X in the sample
(ii) there is a perfect negative relationship between Y and X in the sample. (iv) there is a perfect negative linear relationship between Y and X in the sample.
16. The simple correlation coefficient between variables X and Y is known to be zero. We then can conclude that:_____.
- (i) the variances of X and Y are equal (iii) there exists no linear relationship between X and Y
(ii) the covariance between X and Y is zero (iv) Both (ii) and (iii)
17. If the relationship between variables X and Y is $Y = AB^X$ then the relation between_____ is linear.
- (i) $\log Y$ and X (iii) $\log Y$ and $\log X$
(ii) Y and $\log X$ (iv) Y and X
18. If b_{yx} and b_{xy} respectively denote the linear regression coefficients of regression line Y on X and regression line X on Y , then the linear correlation coefficient $r_{xy} =$ _____.
- (i) $b_{yx} \times b_{xy}$ (iii) $b_{yx} + b_{xy}$
(ii) $\pm\sqrt{b_{yx} \times b_{xy}}$ (iv) $\pm\sqrt{b_{yx} + b_{xy}}$
19. Given $r_{12} = 0.6$, $r_{13} = 0.5$ and $r_{23} = 0.8$, the value of $r_{12.3} =$ _____
- (i) 0.40 (iii) 0.38
(ii) 0.72 (iv) 0.47
20. Given the two lines of regression as, $3X - 4Y + 8 = 0$ and $4X - 3Y = 1$, the arithmetic mean $\bar{X} =$ _____ and $\bar{Y} =$ _____.
- (i) 4,5 (iii) $\frac{4}{3}, \frac{5}{4}$
(ii) 3,4 (iv) $-4, -5$

End of MCQ

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Date: 31/03/2018, Saturday

Time: 10:30 a.m. to 01:00 p.m.

Maximum Marks: 50

Instructions:

- **Section I and II must be attempted in TWO ANSWER SHEET.**
- Make suitable assumptions and draw neat figures wherever required.
- Use of non-programmable calculator is allowed.
- Show necessary calculations.

SECTION I

Q - II Answer the following questions as directed. **[20]**

1. Define the following terms. **[08]**

(a) Arithmetic mean (b) Geometric mean (c) Harmonic mean (d) raw moment and central moment

2. Attempt any three questions. **[12]**

(i) The following data show the measurements of thermal conductivity (in Btu/hr-ft-°F) of Armco iron. Compute (a) Arithmetic mean (b) Variance and

Table 1: measurements of thermal conductivity (in Btu/hr-ft-°F)

41.60	41.48	42.34	41.95	41.86
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standard deviation

(ii) Consider the data shown in Table 1, (question **(i)**) again. Compute (a) Median

(b) Mean deviation about median

(iii) The raw moment of five measurements of thermal conductivity (in Btu/hr-ft-°F) are $m'_1 = 1.846, m'_2 = 3.498, m'_3 = 6.800, m'_4 = 13.552$ and $A = 40$. Compute

(i) All central moments m_2, m_3, m_4 (ii) Standard deviation (iii) Skewness

(iv) The following data show the scores of 10 students in Mathematics and Statistics Test. Assign the rank (smallest to largest) and compute Spearman rank correlation.

Table 2: Test Score

Mathematics	22	21	16	20	17	19	24	23	18	15
Statistics	14	17	16	12	19	18	11	20	15	13

SECTION II

Q - III Answer the following questions. [30]

1. Write brief note on following [12]

- (i) Scatter diagram and Simple correlation.
- (ii) Method of least squares.
- (iii) Class frequencies and their relationships in study of two attributes.

2. Attempt any three questions. [18]

- (i) The grades of a class of 9 students on a midterm report (x) and on the final examination (y) are as follows.

Table 3: Test grades

x	77	50	71	72	81	94	96	99	67
y	82	66	78	34	47	85	99	99	68

- (a) Estimate the linear regression line.
- (b) Estimate the final examination grade of a student who received a grade of 85 on the midterm report.
- (ii) Determine a and b so that $y = ae^{bx}$ fits the data (Table 4) by the method of least-squares.

Table 4: Data for curve fit

x	1.0	1.2	1.4	1.6
y	40.170	73.196	133.372	243.02

- (iii) The following are the numbers of boys observed with certain classes of defects amongst a number of school-children. A , denotes development defects ; B , nerve signs ; C , low nutrition. Find the frequencies of the positive class

$$\begin{array}{llll}
 f_{(ABC)} = 149 & f_{(\alpha BC)} = 204 & f_{(A\beta C)} = 225 & f_{(\alpha\beta C)} = 171 \\
 f_{(AB\gamma)} = 738 & f_{(\alpha B\gamma)} = 1762 & f_{(A\beta\gamma)} = 1196 & f_{(\alpha\beta\gamma)} = 21842
 \end{array}$$

- (iv) The total correlation between the variables x_1, x_2, x_3 and x_4 are given as

$$\begin{array}{ll}
 r_{12} = 0.410 & r_{23} = 0.287 \\
 r_{13} = 0.307 & r_{24} = -0.239 \\
 r_{14} = -0.619 & r_{34} = -0.517
 \end{array}$$

Determine the partial correlations

$$\begin{array}{lll}
 r_{12.4} & r_{13.4} & r_{23.4} \\
 r_{14.3} & r_{24.3} & r_{12.3}
 \end{array}$$