MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : BBAN-103

PUID : 01302 (To be mentioned in the main answer script)

FUNDAMENTALS OF STATISTICS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) The middle most value of a set of observations is

   a) median b) mode

   c) mean d) none of these.

   ii) Relation between mean, median & mode is

   a) mean – mode = 2 (mean – median)

   b) mean – median = 3 (mean – mode)

   c) mean – median = 2 (mean – mode)

   d) mean – mode = 3 (mean – median).

iii) The values which divide the total number of observations into 100 equal parts is

a) percentiles b) quartiles
c) deciles d) none of these.

iv) (3rd quartile – 1st quartile)/2 is

a) skewness b) median
c) quartile deviation d) none of these.

v) Coefficient of variation =

(Standard Deviation × 100)/Mean.

a) true b) false
c) both (a) and (b) d) none of these.

vi) If there are 3 observations 15, 20, 25 then the sum of deviation of the observations from their AM is

a) 0 b) 5
c) – 5 d) none of these.

vii) The quantity index number using Fisher's formula satisfies

a) Unit Test b) Factor Reversal Test
c) Circular Test d) Time Reversal Test.

viii) If $u = 2x + 5$ and $v = -3y - 6$ and regression coefficient of y on x is 2.4, what is the regression coefficient of v on u ?

a) 3.6 b) – 3.6
c) 2.4 d) – 2.4.

ix) The regression coefficient remains unchanged due to a

a) Shift of origin b) Shift of scale
c) Both (a) and (b) d) Either (a) or (b).

x) The two lines of regression become identical when

a) $r = 1$ b) $r = -1$
c) $r = 0$ d) (a) or (b).

xi) If the prices of all commodities in a place have decreased 35% over the base period prices, then the index number of prices of that place is now .

a) 35 b) 135

c) 65 d) none of these.

xii) Paasche index is based on

a) Base year quantities

b) Current year quantities

c) Average of current and base year

d) none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Given that the mean height of a group of students is 67.45 inches. Find the missing frequencies for the following incomplete distribution of height of 100 students :

Height in inches	60 – 62	63 – 65	66 – 68	69 – 71	72 – 74
No. of Students	5	18	–	–	8

3. Compute the correlation coefficient between x and y from the following data :

$n = 10, \sum xy = 220, \sum x^2 = 200, \sum y^2 = 262, \sum x = 40, \sum y = 50$

4. Below table depicts the data regarding the yield/acre of paddy in Karnataka over the 5 years. Represent the data in a Bar Diagram :

Year	2001	2002	2003	2004	2005
Yield	20	22	25	27	30

5. Find the mode for the following data :

Marks (CI)	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	Total
Students	3	16	26	31	16	8	N = 100

6. In a Country Music Band of 48 members, 22 play Guitar, 12 play Brass, 14 play Pianos. Create a tabular display of the Frequency and Relative Frequency Distribution for the type of instruments.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Compute the coefficient of mean deviation about median for the following distribution. 5

Weight in kgs	40 – 50	50 – 60	60 – 70	70 – 80
No. of persons	8	12	20	10

b) If x and y are related as $4x + 3y + 11 = 0$ and mean deviation of x is 5.40, what is the mean deviation of y ? 5

c) Find the missing frequency for the distribution in the below table. Given the mean value as 129 and $N = 80$. 5

Class Interval	80 – 100	100 – 120	120 – 140	140 – 160	160 – 180
Frequency	8	–	26	14	10

8. a) While calculating the correlation coefficient between two variables, x and y, the following results were obtained.

$n = 100, \sum xy = 404, \sum x^2 = 576, \sum y^2 = 452, \sum x = 148, \sum y = 104$

It was later discovered that the correlation (7, 5) and (2, 6) were wrongly recorded as (5, 7) and (2, 8) respectively. Find the correct correlation coefficient. 7

b) The following data relates to the production of iron and steel (in '000 tonnes) in 5 important steel plants (assuming that these are the only plants of our concern).

Plants	1997-1998	1998-1999
Bhilai	4223	4151
Durgapur	1365	1428
Rourkela	1176	1195
Bokaro	3534	3085
IISCO	298	303

Represent the contribution of different plants to the total production of iron and steel (from the given 5 plants) for the given year by divided bar diagrams. 8

9. a) Apply 3-year moving average to the following data on production of cements. Plot the data and the trend values on the same graph : 5

Year	Output (in '000 tons)
1992	1542
1993	1447
1994	1552
1995	2102
1996	2612
1997	3195
1998	3537
1999	3567

b) Heights (X in inches) and weights (Y in kg) of 5 persons are given below : 5

x	64	60	67	59	69
y	57	60	73	62	68

c) Determine the correlation coefficient between X and Y.

Suppose $5x + 12y = 85$ is the relation between two variables x and y, and y has S.D. 2. Find the S.D. of x. 5

10. a) Following are the salaries of 20 workers of a firm expressed in thousand rupees :
5, 17, 12, 23, 7, 15, 4, 18, 10, 6, 15, 9, 8, 13, 12, 2, 12, 3, 15, 14. The firm gave bonus amounting to Rs. 2,000, Rs. 3,000, Rs. 4,000, Rs. 5,000 and Rs. 6,000 to the workers belonging to the salary groups 1,000 – 5,000, 6,000 – 10,000 and so on and lastly 21,000 – 25,000. Find the average bonus paid per employees. 5

b) Show that for any two numbers a and b, standard deviation is given by $\frac{|a-b|}{2}$. 5

c) For a group of 60 boy students, the mean and SD of stats, marks are 45 and 2 respectively. The same figures for a group of 40 girl students are 55 and 3 respectively. What is the mean and SD of marks if the two groups are pooled together ? 5

11 a) A sample of 280 undergraduate students was asked to give their opinion regarding the India's change to play in World Cup Football. Each student was to respond either to 'very high' or 'very poor' or 'cannot comment' on the issue. The following data were obtained :

Responses	***No. of Students***
Very High	152
Very poor	51
Cannot comment	77

Draw a pie chart for the given data. 8

b) Here are the blood serum cholesterol levels(x) of 7 patients (in mg/dl) :

292, 265, 241, 283, 279, 252, 240

Obtain Standard Deviation for the above data.

Also Obtain Standard Deviation of –

(i) Y : 92, 65, 41, 83, 79, 52, 40

(ii) Z : 9.2, 6.5, 4.1, 8.3, 7.9, 5.2, 4.0. 3 + 2 + 2