MLIBISc 2nd Semester Examination, 2023

MLIBISC

(Quantitative Techniques in Research)

PAPER — MLI-208

Full Marks : 40

Time : 2 hours

The figures in the right hand margin indicate marks

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

GROUP – A

Answer any **two** questions : 10×2

1. Prove that $b_{yx} = r_{xy}^{*} (\sigma_y / \sigma_x)$, where σ_y and σ_x indicate standard deviations of x and y. Show that the Correlation Coefficient (r_{xy}) between

two discrete random variables 'x' and 'y' is equal to the geometric mean of b_{xy} and b_{yx} where b_{xy} = Regression Coefficient of x on y and b_{yx} = Regression Coefficient of y on x.　　7 + 3

2. Discuss Different types of data used in science and social science disciplines.　　5 + 5

3. Prove that the Correlation Coefficient between two discrete random variables 'x' and 'y' always lies between -1 and +1. Draw 'Scatter Diagram' to show different types and degrees of correlation.　　6 + 4

4. The data given below records the number of members present and the number of books issued in a library for twelve days :　　10

The Days	No. of members present (x)	No. of books issued (y)
Day 1	18	30
Day 2	20	26
Day 3	24	28

The Days	No. of members present (x)	No. of books issued (y)
Day 4	21	25
Day 5	27	33
Day 6	30	40
Day 7	26	37
Day 8	32	41
Day 9	35	42
Day 10	29	36
Day 11	37	43
Day 12	40	56

Find out the number of books issued in the library on a day, when 25 members were present.

GROUP — B

Answer any **four** questions : 5×4

5. Define Class Interval, Class Frequency, Class Limit and Class Boundary.   5

     (Turn Over)

6. For any two discrete random variables x_1 and x_2, show that AM ≥ GM ≥ HM. What is Frequency Density ?   4 + 1

7. Prove that the standard deviation is independent of any change of origin, but depends on the change of scale. What is an exponential function ? $3\frac{1}{2} + 1\frac{1}{2}$

8. Show that the variance of the discrete random variable 'x_i' is equal to the difference between the average of the squares and the square of the average of x_i, for $i = 1, 2, 3.... n$.   5

9. State different merits and demerits of Arithmetic Mean and Geometric Mean. $2\frac{1}{2} + 2\frac{1}{2}$

10. For a subject 'S' the ranking between ten journals according to Impact Factor and h Index is presented as follows :   5

S. No. of the Journals	Ranking according to Impact Factor (R_1)	Ranking according to h-Index (R_2)
J1	1	2
J2	2	1
J3	3	3
J4	4	4
J5	5	8
J6	6	10
J7	7	9
J8	8	7
J9	9	5
J10	10	6

Find out the Rank Correlation Coefficient between R_1 and R_2 and interpret the result.

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