8. *(a)* Define polynomial and exponential function.

(b) What is mean deviation? 3+2=5

9. *(a)* Distinguish between discrete variable and continuous variable.

(b) Explain how the concept of 'Bit' was developed from the definition of probability. 2+3=5

10. For a subject 'S', the ranking between eight authors according to 'Number of publications' and 'Number of citations received' is presented below :

Authors	*Ranking according to Number of publications* (R_1)	*Ranking according to Number of citations* (R_2)
Author-1	1	6
Author-2	2	2
Author-3	3	8
Author-4	4	7
Author-5	5	5
Author-6	6	1
Author-7	7	3
Author-8	8	4

Find out the rank correlation coefficient between R_1 and R_2 and interpret the result. 5

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PG/2nd Sem/MLI–208/24

2024

M.A. 2nd Semester Examination

Master of Library and Information Science

PAPER : MLI–208

(Quantitative Techniques in Research)

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

1. *(a)* Prove that $(r_{xy})^2 \quad b_{xy} \quad b_{yx}$, where r_{xy}—correlation coefficient between two random variables x and y; b_{xy}—regression coefficient of x on y and b_{yx}—regression coefficient of y on x.

(b) Enumerate the advantages of arithmetic mean. 8+2=10

2. *(a)* Define logistic function.

(b) Calculate the mean and standard deviation of first n natural numbers (integers).

(c) Define 'raw moment', 'central moment' and 'skewness'. 3+4+3=10

3. *(a)* Prove that the correlation coefficient between two random variables does not depend on origin and scale of the observations.

(b) Discuss different types of data used in social science discipline.

(c) Define harmonic mean. 4+4+2=10

4. The data given below records the Impact Factor and *h*-Index of twelve journals in a discipline :

Journals	*Impact Factor*	*h-Index*
Journal_1	1·56	11
Journal_2	1·91	12
Journal_3	2·78	14
Journal_4	2·39	14
Journal_5	3·56	16
Journal_6	3·73	17
Journal_7	3·88	18

Journals	*Impact Factor*	*h-Index*
Journal_8	4·69	20
Journal_9	5·12	21
Journal_10	5·77	22
Journal_11	5·98	22
Journal_12	6·67	24

Calculate the Impact Factor of a journal whose *h*-Index is 15. 10

GROUP—B

Answer *any* **four** questions

5. Prove that the value of correlation coefficient between any two random variables lies between –1 and +1. 5

6. *(a)* Prove that the value of variance of a random variable (x_i) is equal to the difference between the average of the squares and square of the average of x_i, for i 1, 2, 3, ⋯, n.

(b) Define 'frequency density' and 'class limit'. 3+2=5

7. *(a)* Draw scatter diagram to show strong positive correlation and zero correlation.

(b) Prove that AM GM HM for any two observations of the random variable (x), i.e., x_1 and x_2. 1+4=5