

Roll No. 23001326002

Duplicate Total Pages : 6

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December 2023

B.Sc. (H) Mathematics/B.Sc.

(Mathematics and Computing) - Ist SEMESTER

Probability and Statistics – I

(BMH23-104)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

PART-A

1. (a) Cards are dealt one by one from a well shuffled pack of cards until an ace appears. Find the probability that exactly 'n' cards are dealt before the ace appears. (1.5)
- (b) Two integers are selected at random from 1 to 11. If the sum is even, find the probability that both the numbered are odd. (1.5)

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- (c) Explain the following terms :
- (i) Classical Probability.
 - (ii) Empirical Probability.
 - (iii) Axiomatic Probability. (1.5)
- (d) Differentiate between Correlation and Regression Analysis. (1.5)
- (e) The coefficient of rank correlation between the debenture prices and share prices of a company was 0.8. If the sum of squares of the difference in ranks was 33, find the value of 'n'. (1.5)
- (f) The first four moments of a distribution about the value '4' of the variable are -1.5 , 17 , -30 and 108 . Discuss the kurtosis of the distribution. (1.5)
- (g) What do you understand by the term 'SKEWNESS'? Explain with the help of following terms :
- (i) Bowley's Method.
 - (ii) Method of Moments. (1.5)
- (h) Explain the following terms :
- (i) Non-linear Correlation.
 - (ii) Multiple Correlations.
 - (iii) Negative Correlation. (1.5)
- (i) Explain the applications of Statistics in Business and Economics. (1.5)

(j) Explain the merits and demerits of Median and Mode.

(1.5)

PART-B

2. (a) State and prove Baye's Theorem. (7)

(b) For any events A, B and C, show that
$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$
 (5)

(c) For any events A and B, show that
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
 (3)

3. (a) Calculate Mean, Median and Mode using following data:

(8)

Marks	Number of Students
Above 0	80
Above 10	77
Above 20	72
Above 30	65
Above 40	55
Above 50	43
Above 60	28
Above 70	16
Above 80	10
Above 90	8
Above 100	0

- (b) Explain the term 'STATISTICS' with the help of following:
- (i) Branches of Statistics.
 - (ii) Types of Data.
 - (iii) Representation of Data.
 - (iv) Applications. (7)

4. (a) Calculate the Karl Pearson's coefficient of Skewness from the data given below: (8)

Income (Rupees)	No. of Employees
400-500	8
500-600	16
600-700	20
700-800	17
800-900	3

- (b) Find out the Kurtosis of the data given below : (7)

Class Interval	Frequency
0-10	8
10-20	12
20-30	20
30-40	30
40-50	15
50-60	10
60-70	5

5. (a) Calculate Karl Pearson's coefficient of correlation between x and y for the following data : (8)

X 65 66 67 67 68 69 70 72

Y 67 68 65 68 72 72 69 71

- (b) From the following data obtain the two regression equations using the method of least squares. (7)

X 1 2 3 4 5 6 7 8

Y 3 7 10 12 14 17 20 24

6. (a) In the frequency of 100 families given below, the numbers of families corresponding to expenditure group 10-20 and 40-50 are missing from the table. However, the median is known to be 30. Find the missing frequencies. (6)

Expenditure	No. of Families
0-10	10
10-20	-
20-30	25
30-40	30
40-50	-
50-60	10

- (b) State and prove Multiplication Theorem of Probability for independent events. (6)
- (c) A cooperative bank has two branches employing 50 and 70 workers respectively. The average salaries paid by two respective branches are Rs. 360 and Rs. 390 per month. Calculate the mean of the salaries of all the employees. (3)

7. (a) From the following table, calculate the rank correlation coefficient. (5)

X	48	33	40	9	16	16	65	24	16	57
Y	13	13	24	6	15	4	20	9	6	19

- (b) Compute the standard deviation and variance from the following distribution of marks obtained by 90 students. (5)

Marks	No. of Students
20-29	5
30-39	12
40-49	15
50-59	20
60-69	18
70-79	10
80-89	6
90-99	4

- (c) Calculate linear regression coefficients from the following: (5)

X	1	2	3	4	5	6	7	8
Y	3	7	10	12	14	17	20	24