

Exam Code : D-22

Subject Code—11733

Dual Degree B.Sc. (Hons.)
(Mathematics) M.Sc. (Mathematics)

EXAMINATION

(Batch 2016 Onwards)

(Third Semester)

MATHEMATICAL STATISTICS

BML-305

Time : 3 Hours

Maximum Marks : 70

Note : Attempt *Five* questions in all, selecting *one* question each from Unit I to Unit IV.

Q. No. 1 is compulsory. All questions carry equal marks.

HISAR

(5-05-20-1222) J-11733

P.T.O.

(Compulsory Question)

1. (a) Calculate the harmonic mean of the following :

x	5	10	20	25
f	2	3	4	5

- (b) Define Range and quartile deviation.
- (c) What is effect of change of origin and scale on r th moment about mean ?
- (d) Define Kurtosis of a distribution.
- (e) Two-third of the students in a class are boys and the rest girls. It is know that the probability of a girl getting a first class is 0.25 and that of a boy getting a first class is 0.28. Find the probability that a student chosen at random will get first class marks in the subject.
- (f) Define a discrete and continuous random variable along with one example for each.

- (g) Prove that if one of the regression coefficient is greater than unity numerically, the other must be less than unity numerically.

Unit I

2. (a) Calculate Arithmetic mean and mode from the following data :

Marks	Frequency
0-5	3
5-10	10
10-15	22
15-20	14
20-25	4
25-30	2
30-35	1

- (b) Find the median and lower and upper quartiles for the following distribution :

Marks	Frequency
0-10	22
10-20	38

20–30	46
30–40	35
40–45	20

3. (a) Calculate the mean deviation from mean for the following data :

Income per week	No. of Families
20–30	120
30–40	200
40–50	150
50–60	75
60–70	25

- (b) Define standard deviation. Calculate mean and standard deviation for the following distribution. Also find coefficient of variation :

Marks	No. of Students
0–10	5
10–20	10
20–30	20
30–40	40

40-50	30
50-60	20
60-70	10
70-80	4

Unit II

4. (a) Calculate the first four moments about mean for the data :

Variate	Frequency
1	1
2	6
3	13
4	25
5	30
6	22
7	9
8	5
9	2

- (b) The first four moments of a distribution about $x = 4$ are 1, 4, 10, 45. Find mean, variance μ_3 , μ_4 , β_1 , β_2 .

5. Calculate coefficient of Skewness and Kurtosis for the following data :

Class-interval	Frequency
0–10	1
10–20	3
20–30	4
30–40	2

Unit III

6. (a) A and B throw alternately with a pair of ordinary dice. One who first throws a total of 9 wins. What are their respective chances of winning if A starts the game ?
- (b) There are two identical boxes containing respectively 4 white and 3 red balls; 3 white and 7 red balls. A box is chosen at random and a ball is drawn from it. Find the probability that the ball is white. If the ball is white, what is the probability that it is from first box ?

7. (a) A random variable X has the following probability distribution :

X	$P(X)$
1	K
2	$4K$
3	$9K$
4	$8K$
5	$10K$
6	$12K$

Find :

- (i) K
 - (ii) $P(X \geq 4), P(X \leq 5)$
 - (iii) Mean.
- (b) For the probability density function :

$$f(x) = K e^{-|x|}; -\infty < x < \infty,$$

show that $K = \frac{1}{2}$, $\mu_1^1 = 0$, $\sigma = \sqrt{2}$ and mean deviation about mean = 1.

P.T.O.

Unit IV

8. (a) Calculate Karl Pearson coefficient of correlation for the data :

X	Y
8	15
9	15
10	16
11	19
12	17
13	18
14	16
15	18
16	19

- (b) From the following data of the marks obtained by 8 students in the Physics and Mathematics papers, compute rank coefficient of correlation :

Marks in Physics	Marks in Mathematics
15	40
20	30

28	50
12	30
40	20
60	10
20	30
80	60

9. (a) Find the regression equations from the following data :

Age of Husband	Age of Wife
18	17
19	17
20	18
21	18
22	19
23	19
24	19
25	20
26	21
27	22

Also calculate the correlation coefficient between the ages of husbands and wives.

(b) Prove that following :

- (i) Correlation coefficient is the Geometric mean between two regression coefficients.
- (ii) Arithmetic mean of regression coefficients is greater than the coefficient of correlation.
- (iii) Regression coefficients are independent of the change of origin but not of change of scale.