

UG-479

BMS-22

**B.Sc. DEGREE EXAMINATION –
JANUARY 2009.**

Second Year

Mathematics

STATISTICS AND MECHANICS

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions from the following.

1. Calculate mean deviation from the median :

Class interval : 20-25 25-30 30-40 40-45 45-50

Frequency : 6 12 17 30 10

Class interval : 50-55 55-60 60-70 70-80

Frequency : 10 8 5 2

2. Fit a straight line trend by the method of least squares

Year 1996 1997 1998 1999 2000

Sales ('000) 4 6 7 8 10

3. The regression line of Y on X and X on Y are given by
 $Y = 11.64 - 0.5 X$ and $X = 19.13 - 0.87 Y$

Find mean of X and Y and r .

4. Find whether A and B are independent in the following case :

$$(AB) = 256, (\alpha B) = 768, (A\beta) = 48, (\alpha\beta) = 144 .$$

5. The following are the group index numbers and the group weights of an average working class family's budget. Construct the cost of living index number.

Group :	Food	Fuel	Clothing	Rent	Others
Index no.	352	220	230	160	190
Weight :	48	10	8	12	15

6. Suppose x is a random variable with probability mass function

$$P(x) = \frac{x^2 + 1}{148}, x = 0, 1, 2, \dots, 7$$
$$= 0 \quad \text{for } x > 7.$$

Compute $E(2x^2 + 3x)$.

7. A random sample of 600 bulbs was drawn from a large consignment and 74 was found to be defective. Find the limits of percentage of defective bulbs in the consignment.

8. Find the angle of projection when the range on a horizontal plane is $4\sqrt{3}$ times the greatest height attained.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions from the following.

9. Calculate Karl Pearson's coefficient of skewness for the following data :

Years :	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency :	449	705	507	281	109	53	11

10. Find the Karl Pearson's coefficient of correlation between the variables X and Y.

X:	71	68	66	67	70	71	70	73	72	65	66
Y:	69	64	65	63	65	62	65	64	66	59	62

11. Find the function U_x from the data below and hence estimate the value for $x = 2$.

x :	0	1	4	5
U_x :	8	11	78	123

12. Compute (a) Laspeyre's (b) Paasche's and (c) Fisher's index numbers

Item	Price		Quantity	
	Base	Current	Base	Current
A	6	10	50	50
B	2	2	100	120
C	4	6	60	60
D	10	12	30	25

13. Fit a Poisson distribution to the following data :

x :	0	1	2	3	4	5
f :	142	156	69	27	5	1

14. The following data related to Production in kg of three varieties A , B and C of paddy sown in 12 plots.

A 14 16 18 - -

B 14 13 15 22 -

C 18 16 19 19 20

Is there any significance in the production of the three varieties?

15. Two smooth spheres of masses m_1 and m_2 and coefficient of restitution e , collide obliquely with velocities u_1, u_2 whose directions are inclined to the common normal at angles α_1, α_2 . Find the velocities of the spheres after impact. Also find the impulse of the blow on the sphere of mass m_1 .

16. Obtain the differential equation of a central orbit in $p - r$ coordinates.
