UG–479 **BMS–22**

B.Sc. DEGREE EXAMINATION – JANUARY 2009.

Second Year

Mathematics

STATISTICS AND MECHANICS

Time : 3 hours Maximum marks : 75

PART A — ($5 \times 5 = 25$ 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

$$P(x) = \frac{x^2 + 1}{148}, x = 0, 12, \cdots, 7$$
$$= 0 \qquad for\ x > 7.$$

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 — ($5 \times 10 = 50$ 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.

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