**UG–652** **BMS–22**

# B.Sc. DEGREE EXAMINATION — JUNE 2018.

Second Year

Mathematics

STATISTICS AND MECHANICS

Time : 3 hours Maximum marks : 75

SECTION A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

1. Find the arithmetic mean of the following frequency distribution :

| $x$ : | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| $f$ : | 5 | 9 | 12 | 17 | 14 | 10 | 6 |

2. Explain curve fitting and principle of least squares.

3. The first four central moments of distribution are 0, 2.5, 0.7 and 18.75. Test the skewness.

4. Write the methods of interpolation.

5. From the following data construct an index for 1999 taking 1998 as base by average method calculate arithmetic mean.

| Commodities | $P_0$ Price index 1998 | $P_1$ Price index 1999 |
|---|---|---|
| A | 50 | 70 |
| B | 40 | 60 |
| C | 80 | 90 |
| D | 100 | 120 |
| E | 20 | 20 |

6. Given that the means of $X$ and $Y$ are 65 and 67, their standard deviation are 2.5 and 3.5 and the coefficient of correlation them is 0.8 write down the two regression lines.

7. A particle moves in a straight line. If $V$ be its velocity when at a distance $x$ from a fixed point in the line and $v^2 = \alpha - \beta x^2$ where $\alpha$ and $\beta$ are constants. Show that the motion is simple harmonic and determine its period and amplitude.

8. A ball A impriges directly on an exactly equal and similar ball B lying on a smooth horizontal plane. If 'C' be the coefficient the restitution. Prove after impact the velocity of B will be that of A as $1+e:1-e$.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Calculate standard deviation from the data given below :

| C.I. | 0-10 | 10-20 | 20-30 | 30-40 |
|---|---|---|---|---|
| f | 5 | 8 | 7 | 12 |
| C.I. | 40-50 | 50-60 | 60-70 | 70-80 |
| f | 28 | 20 | 10 | 10 |

10. Find rank correlation for the following data :

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $x$ : | 84 | 56 | 89 | 58 | 59 | 67 | 74 | 78 |
| $y$ : | 38 | 69 | 56 | 58 | 63 | 78 | 87 | 77 |

11. Calculate Karl Pearson's coefficient of correlation for the following data :

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $x$ : | 28 | 32 | 38 | 42 | 46 | 52 | 54 | 57 | 58 | 63 |
| $y$ : | 0 | 1 | 3 | 4 | 2 | 5 | 4 | 6 | 7 | 8 |

12. Explain "Time series" and its utilities.

13. What is a contingency table? Describe how $\chi^2$ distribution may be used to test whether the two criteria of classification of $m \times n$ contingency table are independent.

14. Show that the resultant motion of two SHM of same period along the perpendicular lines is alling on ellipse.

15. Find the range on an inclined plane.

16. Derive the pedal equation $(p - r)$ of central orbits.

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