

(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2024 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY-2025

M.COM. & M.Sc., PHYSICS

MAXIMUM MARKS: 100

SEMESTER: II

TIME : 3 HOURS

PART - IV

24PMS2N1 – NME-MATHEMATICAL STATISTICS AND TECHNIQUES

SECTION – A (5 X 5 = 25 MARKS)

ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS. (K1 & K2)

1. The following data gives the monthly income of 10 employees in an office, calculate the arithmetic mean:

Income (Rs): 14,780 15,760 26,690 27,750 24,840 24,920 16,100 17,810
27,050 26,950.

2. From the following data, find the median:

| | | | | | | |
|----------------|--------|--------|--------|--------|--------|--------|
| Income (Rs.) | 15,000 | 15,500 | 16,800 | 18,000 | 18,500 | 17,800 |
| No. of persons | 24 | 26 | 16 | 20 | 6 | 30 |

3. Calculate Karl Pearson's coefficient of correlation from the following data:

| | | | | | | | | |
|----------------|----|---|---|----|----|----|----|---|
| Case | A | B | C | D | E | F | G | H |
| X ₁ | 10 | 6 | 9 | 10 | 12 | 13 | 11 | 9 |
| X ₂ | 9 | 4 | 6 | 9 | 11 | 13 | 8 | 4 |

4. The ranking of 10 students in two subjects A and B are as follows:

| | | | | | | | | | | |
|---|---|---|---|----|---|---|----|---|---|---|
| A | 6 | 5 | 3 | 10 | 2 | 4 | 9 | 7 | 8 | 1 |
| B | 3 | 8 | 4 | 9 | 1 | 6 | 10 | 7 | 5 | 2 |

Find the rank correlation coefficient.

5. The following table shows the ages (X) and blood pressure (Y) of 8 persons:

| | | | | | | | | |
|---|----|----|----|----|----|----|----|----|
| X | 52 | 63 | 45 | 36 | 72 | 65 | 47 | 25 |
| Y | 62 | 53 | 51 | 25 | 79 | 43 | 60 | 33 |

Obtain the regression equation of Y on X and find the expected blood pressure of a person who is 49 years old.

6. In a sample of 500 people from a village in Rajasthan, 280 are found to be rice eaters and the rest wheat eaters. Can we assume that both the food are equally popular? S. E. (1% level) is 2.58.
7. In a hospital, 480 female and 520 male babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal number? 1.96 S.E. at 5% level is given.
8. In a sample of 8 observations, the sum of squared deviations of items from the mean was 84.4. In another sample of 10 observations, the value was found to be 102.6. Test whether the difference is significant at 5% level. Given that at 5% level, table value of F for $v_1=7$ and $v_2=9$ degrees of freedom is 3.29 and for $v_1=8$ and $v_2=10$ degrees of freedom is 3.07.

SECTION – B**(5 X 15 = 75 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K3), (K4 (Or) K5)**

9. a) Calculate mean, median and standard deviation from the following data:

| | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|
| Wages (Rs. '000) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
| No. of workers | 12 | 17 | 23 | 39 | 16 | 03 |

(OR)

b) Two brands of tyres are tested with the following results:

| | | | | | |
|---------|-------|-------|-------|-------|-------|
| Life | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 |
| Brand A | 1 | 22 | 64 | 10 | 3 |
| Brand B | 0 | 24 | 76 | 0 | 0 |

(i) Which brand of tyres have greater average life? (ii) Compare the variability and state which brand of tyres would you use on your fleet of trucks?

10. a) Calculate Karl Pearson's coefficient of correlation from the following data:

| | | | | | |
|----------------------|----|----|----|----|----|
| Roll No. of Students | 1 | 2 | 3 | 4 | 5 |
| Marks in Accountancy | 48 | 35 | 17 | 23 | 47 |
| Marks in Statistics | 45 | 20 | 40 | 25 | 45 |

(OR)

b) Ten competitors in a beauty contest are ranked by three judges in the following order:

| | | | | | | | | | | |
|-----------------------|---|---|---|----|---|----|---|----|---|---|
| 1 st judge | 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 |
| 2 nd judge | 3 | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 |
| 3 rd judge | 6 | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7 |

Use the rank correlation coefficient to determine which pair of judges has the nearest approach to common tastes in beauty.

11. a) In a correlation study the following values are obtained :

| | | |
|------|-----|-----|
| | X | Y |
| Mean | 65 | 67 |
| S.D. | 2.5 | 3.5 |
| C.V. | | 0.8 |

Find the two regression equations.

(OR)b) In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: Variance of $X = 9$, Regression equations are $8X - 10Y + 66 = 0$, $40X - 18Y - 214 = 0$. Find (i) The mean values of X and Y (ii) Coefficient of correlation between X and Y (iii) Standard deviation of Y .12. a) A random sample of size 16 has 53 as mean. The sum of the squares of the deviations taken from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% and 99% confidence limits of the mean of the population. (for $v=15$, $t_{0.05}=2.13$ for $v=15$, $t_{0.01}=2.95$)

(OR)

b) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data:

| | | | | | | | | | | |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Life in '000 hrs | 4.2 | 4.6 | 3.9 | 4.1 | 5.2 | 3.8 | 3.9 | 4.3 | 4.4 | 5.6 |

Can we accept the hypothesis that the average life time of bulbs is 4000 hrs. For $v=9$, $t_{0.05}=2.262$.

13. a) From the following data, would you conclude that owner cultivators are more inclined towards the use of fertilizers at 5% level? Carry out Chi-square test as per testing procedure.

| | Owned | Rented | Total |
|-----------------------|-------|--------|-------|
| Using fertilizers | 416 | 184 | 600 |
| Not using fertilizers | 64 | 336 | 400 |
| Total | 480 | 520 | 1000 |

(Given for degree of freedom = 1, chi-square 5% = 3.84).

(OR)

b) The following data present the yields in quintals of common ten subdivisions of equal area of two agricultural plots:

| | | | | | | | | | | |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Plot 1 | 6.2 | 5.7 | 6.5 | 6.0 | 6.3 | 5.8 | 5.7 | 6.0 | 6.0 | 5.8 |
| Plot 2 | 5.6 | 5.9 | 5.6 | 5.7 | 5.8 | 5.7 | 6.0 | 5.5 | 5.7 | 5.5 |

Test whether two samples taken from two random populations have the same variance. (5% point of F for $v_1=9$ and $v_2=9$ degrees of freedom is 3.18).
