

Indian Statistical Institute
Documentation Research and Training Centre

M.S. in Library and Information Science
Semester II, Mid-Term Exam (AY 2024-25)
Paper – 09: Elements of Mathematics and Statistics

Date: 19.02.2025

Max. Marks: 40

Time: 1 hr 30 minutes

INSTRUCTION: Read the question before you attempt.

Section A

Answer any **five** from the following questions

[1x5 = 5]

1. The set $A = \{x, x \in \mathbf{N}, \text{ and } x^2 - 3x + 2 = 0\}$ is
 - a. Null set.
 - b. Finite set.
 - c. Infinite set.
 - d. None of these.
2. If $A = \emptyset$ then total number of elements in $P(A)$ are
 - a. Zero.
 - b. Two.
 - c. One.
 - d. None of the above.

$nP(A)$
3. For a frequency distribution, the class interval is
 - a. the class frequencies divided by two.
 - b. the class frequency divided by the number of observations.
 - c. the number of observations in the class.
 - d. the difference between consecutive lower class limits.
4. Arithmetic Mean = 26.8, Median = 27.9. What is the value of Mode?
 - a. 30.2
 - b. 29.2
 - c. 30.1
 - d. 29.1
5. The sum of deviations from the _____ is always zero.
 - a. Mean.
 - b. Median.
 - c. Mode.
 - d. None of the above.
6. Which of the following diagrams is used to find the value of mode graphically?
 - a. Pie chart.
 - b. Bar graph.

- c. Histogram.
d. None of the above.

Section B

Answer any five of the following questions

[5 * 5 = 25]

1. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports?

2. Decide, among the following sets, which sets are subsets of one and another:
 $A = \{x: x \in \mathbb{R} \text{ and } x \text{ satisfy } x^2 - 8x + 12 = 0\}$, $B = \{2, 4, 6\}$, $C = \{2, 4, 6, 8, \dots\}$, $D = \{6\}$.

3. Find the median and the median class of the data given below:

Class Boundaries	15-25	25-35	35-45	45-55	55-65	65-75
Frequency	4	11	19	14	0	2

4. Find sets A, B and C such that $A \cap B$, $B \cap C$ and $A \cap C$ are non-empty sets and $A \cap B \cap C = \emptyset$.

5. In the following data two class frequencies are missing :

C.I.	100-110	110-120	120-130	130-140	140-150	150-160
Frequency	4	7	15	?	40	?
	160-170	170-180	180-190	190-200		
	16	10	6	3		

However it was possible to ascertain that the total number of frequencies was 150 and that the median has been correctly found out as 146.25. Find the two missing frequencies.

6. The mean income per month of a friendly society of 25 members is Rs 350 and the standard deviation is Rs 50. Five more members are admitted to the society and their incomes in Rs per month are 260, 300, 320, 490 and 590. Find the mean and standard deviation of income for the new group of 30 members.

7. Calculate the standard deviation for the following frequency distribution.

Values	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	2	5	7	13	21	16	8	3

Section C

[1 * 10 = 10]

Answer any **one** of the following questions (8. OR 9.)

8.

- a) The standard deviation calculated from a set of 32 observations is 5. If the sum of the observations is 80, what is the sum of the squares of these observations? [5]
- b) In a group of 300 individuals with an allergy, 180 had been exposed to Substance S1, 70 to Substance S2, and 40 to both Substances S1 and S2. Find the number of individuals exposed to:
- Substance S1 but not Substance S2.
 - Substance S2 but not Substance S1.
 - Neither Substance S1 nor Substance S2.
 - What percentage of individuals were exposed to both Substances S1 and S2?
- [5]

9.

- a) Draw one of the ogives for the following data and find the median wage: [5]

Weekly Wages in Rs	0-20	20-40	40-60	60-80	80-100
Number of Workers	40	51	64	38	7

- b) In an industrial establishment, the coefficient of variation of wages of male and female workers were 55% and 70% respectively. The standard deviations were Rs 22.00 and Rs 15.40 respectively. Calculate the combined average wages for all the workers, if 80% of the workers were males. [5]

