2024

STATISTICS — MDC

Paper : CC-1

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question nos.*** **1** & **2** and ***any three*** questions from the rest.

1. Answer ***any five*** questions : 2×5

(a) The arithmetic mean of a variable x is 100. Find the mean of the variable $5x - 10$.

(b) A train ran at x km. per hour from A to B and returned from B to A at y km. per hour. Find the average speed of the train.

(c) Give an example where mode is used as a measure of central tendency.

(d) What is discrete variable? Give an example.

(e) Two variables X and Y are given by $Y = 11 - 5X$. If the standard deviation of X is 4 find the standard deviation of Y.

(f) Examine the following statements and write with reason whether it is ***True*** or ***False*** :

(i) Events "The person is a businessman" and "He is a politician" are mutually exclusive.

(ii) $P(A)$ defined from classical definition of probability, is any real number lying between 0 and 1.

(g) Given that $P(A) = 3/8$, $P(B) = 5/8$ and $P(A \cup B) = 3/4$, find $P(A \mid B)$ and $P(B \mid A)$.

(h) Mention a measure of skewness when the frequency distribution has open end classes.

2. Answer ***any four*** questions : 5×4

(a) Discuss nominal and ordinal scales of measurement with examples.

(b) What is data? Discuss qualitative and quantitative data with examples.

(c) What do you mean by dispersion of a frequency distribution? Discuss the absolute measures of it.

(d) Define equally likely, mutually exclusive and exhaustive events. Describe the sample space when one coin is tossed repeatedly till head comes.

(e) The probabilities of solving a problem by three students A, B, C are 3/7, 3/8 and 1/3 respectively. If all of them try independently find the probability that the problem is not solved. Also find the probability that the problem could be solved by one person only.

(f) What do you mean by kurtosis of a frequency distribution? Discuss a measure of it.

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3. (a) Discuss different types of diagrams used to explain qualitative data.

(b) What is variable? Mention its different types with example.

(c) What is frequency distribution? Discuss cumulative frequencies of two types and mention the diagrams used to represent these. 5+4+6

4. (a) What do you mean by central tendency of a frequency distribution?

(b) Find the arithmetic mean and variance of first n natural numbers.

(c) Show that AM $\geq$ GM $\geq$ HM for $n(>2)$ positive observations. 3+5+7

5. (a) For 10 values of x, it is given that $\sum u = 4$ and $\sum u^2 = 144$, where $u = (x - 10)/5$. Find $\sum x^2$.

(b) If the sum of nine numbers is -6, then "their sum of squares is at least 36" — Prove or disprove the statement.

(c) What is coefficient of variation? If the arithmetic mean and coefficient of variation of x are 10 and 50% respectively, find out Var $(5 - 2x)$. 4+3+(4+4)

6. (a) What is conditional probability? When do we call two events to be independent?

(b) What are the limitations of classical definition of probability?

(c) Show that $P(A \cup B) \leq P(A) + P(B)$.

(d) If the letters of the word RAMESH be arranged at random, what is the probability that there are exactly three letters between A and E? 5+3+3+4

7. (a) State and prove Bayes' theorem.

(b) A box contains 5 red balls and 10 white balls. Two balls are drawn at random without replacement from the box. What is the probability that

(i) the second ball is white?

(ii) the second ball is white, given the first ball is red?

(iii) the first ball drawn is red, given the second ball drawn is white? 6+(3+3+3)
