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(October)

STATISTICS

(Elective/Honours)

(Descriptive Statistics, Numerical Analysis and Probability)

[STEH–1 (TH)]

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Distinguish between classification and tabulation. Explain the purpose and methods of classification of data giving suitable examples.   2+3=5

(Turn Over)

(2)

(b) Distinguish between primary and secondary data and discuss the various methods of collecting the primary data. Indicate the situations in which each of these methods should be used.   3+2=5

(c) Write a short note on frequency distribution.   2

2. (a) Define the terms 'arithmetic mean', 'median' and 'mode' for continuous or grouped frequency distribution. Write their merits and demerits. Also write the properties of arithmetic mean.   3+3+1=7

(b) Show that AM > GM > HM.   3

(c) What is the relation between mean, median and mode for moderately asymmetrical distribution.   2

UNIT—II

3. (a) What do you mean by correlation? Define Karl Pearson's coefficient of correlation and write its properties.   1+1+2=4

(b) Show that the correlation coefficient lies between −1 and +1.   4

(3)

(c) Prove that the two independent variables are uncorrelated and also show that the converse of this theorem may not be true.   3

4. (a) Write a note on the principle of least squares.   3

(b) Obtain the regression equation of Y on X by the method of least squares.   5

(c) What is regression coefficient? Write the properties of regression coefficients.   3

Or

Write notes on the following :   5½+5½=11

(a) Multiple correlation coefficient

(b) Partial correlation coefficient

UNIT—III

5. (a) What is finite difference? Define the operators Δ and E. Write their properties.   1+2+2=5

(b) State and prove Newton's forward interpolation formula.   1+5=6

6. Obtain the general quadrature formula and hence obtain (a) trapezoidal rule of numerical integration and (b) Simpson's 3/8th rule of numerical integration.   5½+5½=11

UNIT—IV

7. (a) Define the terms 'random experiment', 'trial and events', 'independent events'. What do you mean by discrete sample space? Write its properties.   2+1+2=5

(b) Give the classical and axiomatic definitions of probability.   1+1=2

(c) If A_1 and A_2 are any two events, then show that

$$P(A_1 \cup A_2) = P(A_1) + P(A_2) - P(A_1 A_2)$$ 4

8. (a) Define conditional probability. State and prove Bayes' theorem.   1+5=6

(b) The chances that doctor A will diagnose a disease X correctly is 60%. The chances that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease X, died. What is the chance that his disease was diagnosed correctly?   5

UNIT—V

9. (a) Define random variable. State mathematical expectation of a random variable and its properties.   1+1+2=4

(b) If X and Y are two independent random variables, then show that

$$E(XY) = E(X)E(Y)$$ 4

(c) Let X be a random variable with p.d.f.

$$f(x) = C(1-x); \quad 0 < x < 1$$

Find (i) C, (ii) E(X) and (iii) V(X).   3

10. Define the following :

(a) Moment generating function, cumulant generating function and probability generating function   2+2+2=6

(b) Conditional expectation and conditional variance for discrete and continuous cases   2+3=5

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