Total number of printed pages–4

1 (Sem–2) STA

2024

STATISTICS

Paper : STA0200104

(Correlation & Regression, Probability Distributions, Statistical Inference–I and Finite Difference)

Full Marks : 45

Time : Two hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×5=5

(a) Karl Pearson's correlation coefficient lies between _____ and _____.
(Fill in the blanks)

(b) For binomial distribution, mean > variance. *(true **or** false)*

(c) Define level of significance.

(d) What is categorical data ?

(e) What is the relation between Δ and E ?

Contd.

2. Answer ***any five*** from the following questions : 2×5=10

(a) Write *two* properties of Karl Pearson's correlation coefficient.

(b) Write Simpson's $\frac{1}{3}$rd rule of numerical integration.

(c) Find the mean of binomial distribution.

(d) Define type I and type II errors.

(e) Why there are *two* regression lines ?

(f) Prove that $(1+\Delta)(1- \quad)=1$

(g) Write *two* properties of Δ and E.

(h) Write *two* instances where Poisson distribution may be employed.

(i) For a binomial distribution $n=10$ $p=\frac{1}{2}$. Find $p(x=2)$.

(j) If X follows Poisson distribution with $E(X^2)=6$, find $E(X)$.

3. Answer ***any four*** questions : 5×4=20

(a) Write a short note on principle of least square.

(b) Describe the properties of normal distribution.

(c) Describe the test of goodness of fit using chi-square test.

(d) Derive Newton's forward interpolation formula.

(e) Define divided differences. Prove that the third, divided differences with the arguments a, b, c and d of the function $\frac{1}{x^2}$ is equal to

$$\frac{abc + bcd + dca + abd}{a^2b^2c^2d^2}$$

(f) Write a short note on 'general quadrature formula' in the case of numerical integration.

(g) Describe t-test for testing single mean.

(h) Prove that correlation co-efficient is independent of change of origin and scale.

4. Answer ***any one*** question from the following : 10

(a) Write a note on scatter diagram. Describe how we can study the correlation between two variables with the help of scatter diagram.

(b) Define Poisson distribution. Derive the distribution as a limiting case of binomial distribution.

(c) Describe the properties of divided differences and prove *any one* of them.

(d) Explain the test of significance for an observed proportion in case of large sample. A coin was tossed 100 times and 75 heads were observed. Test whether the coin is unbiased.
