UNIVERSITY OF NORTH BENGAL

B.Sc. Programme 4th Semester Examination, 2021

DSC4-STATISTICS

METHODS OF STATISTICAL INFERENCE

Full Marks: 40

ASSIGNMENT

The figures in the margin indicate full marks.
All symbols are of usual significance.

GROUP-A

Answer any *four* questions from the following 2×4 = 8

1. What do you mean by a consistent estimator?

2. What is interval estimation?

3. Differentiate between Type-I error and Type-II error.

4. Define BLUE (Best Linear Unbiased Estimator).

5. Differentiate between null and alternative hypothesis.

6. Define sufficient estimator.

GROUP-B

Answer any *four* questions from the following 8×4 = 32

7. What is goodness of fit? A dice was thrown 60 times with the following results: 2+6

Face	1	2	3	4	5	6	Total
Frequency	6	10	8	13	11	12	60

8. What do you mean by Maximum Likelihood Estimator? Write the properties of MLE. On the basis of a random sample find the maximum likelihood estimator of the parameter of a Poisson distribution. 1+2+5

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9. What do you mean by unbiasedness? If T is an unbiased estimator of θ, show that T^2 is a biased estimator for θ. X_1, X_2 and X_3 is a random sample of size 3 from a population with mean μ and variance σ^2. T_1, T_2, T_3 are the estimators used to estimate mean value μ, where $T_1 = X_1 + X_2 - X_3$, $T_2 = 2X_1 + 3X_2 - 4X_3$ and $T_3 = \frac{1}{3}(\alpha X_1 + X_2 + X_3)$.   1+3+4

   (i) Are T_1 and T_2 unbiased estimators?

   (ii) Find the value of α such that T_3 is unbiased estimator for μ.

   (iii) Which is the best estimator?

10. Obtain $100(1 - \alpha)\%$ confidence intervals for the parameters μ and σ^2 of the normal distribution.   4+4

11. What is critical region? What do you mean by power of the test? Let p be the probability that a coin will fall head in a single toss in order to test $H_0 = p = \frac{1}{2}$ against $H_1 : p = \frac{3}{4}$. The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Find the probability of Type-I error, Type-II error and power of the test.   1+1+6

12. What is the difference between 'variability within classes' and 'variability between classes'? Describe the fixed effect mathematical model for ANOVA testing in one way classification.   3+5

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