

May 2004

Bachelor of Computer Application (BCA) Examination

II Semester

Statistical Methods

Time 3 Hours]

[Max. Marks 40

Note : Attempt all five questions. Each question carries equal marks.

1. Explain the principle of maximum likelihood estimator.

Set X_1, X_2, \dots, X_n be a random sample from normal population with mean θ and variance σ^2 . Obtain the maximum likelihood estimators of θ and σ^2 .

OR

State and prove Cramer-Rao inequality stating regularity conditions clearly.

2. explain : (a) Simple and Composite Hypothesis (b) Types of Errors. Given the probability density function :

$$f(x, \theta) = \begin{cases} \frac{1}{\theta}, & 0 < x < \theta \\ 0, & \text{other wise} \end{cases}$$

And that you are testing the null hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 2$ by means of a single observed value of x . What would be the sizes of the type I and type II errors, if you, choose the interval $0.5 \leq x$ as the critical region?

OR

State Neyman-Pearson fundamental lemma. Using it obtain the best critical region for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 > \theta_0$ in case of a normal population for (θ, σ^2) , where σ^2 is known. Hence find the power of the test.

3. Define chi-square variate and write its probability density function. Show that the sum of independent chi-square varieties is also a chi-square variate.

OR

Define t-statistic. Explain the procedure for testing a single mean stating assumptions clearly.

A random sample of 10 boys had the following :

I. Q. S.: 7, 12, 11, 10, 8, 9, 9, 10, 8

Do these data support the assumption of a population mean I. Q. of 10? Given that for 9 degrees of freedom $P(|t| > 2.262) = 0.05$.

4. What do you mean by non-parametric inference? Describe sign test for one sample problem stating assumptions clearly.

OR

Describe Wilcoxon signed rank test stating assumptions clearly.

5. Describe one-way analysis of variance with one observation per cell.

OR

What is meant by a randomised block design? Give the analysis of variance for the design.

* * *