July 2009

Bachelor of Computer Application (BCA) Examination

II Semester

Statistical Methods

Time : 3 Hours] [Max. Marks : 40

Note- *Attempt all five question Each question carries equal marks.*

Section A

1. Define sufficiency of and estimator.

Show one example of sufficient estimator.

Show also that if maximum likelihood estimator exists then it is a function of sufficient estimator.

OR

For Poisson population, estimate the parameter λ using maximum likelihood method of estimation and show that this estimator possess the minimum variance given by Cramer-Rao Inequality.

2. Define type I, type II errors and power of the test.

Let p be the probability that a coin will fall head in a single toss in order to test $H_0 : p = 1/2$ against $H_1 : p = 3/4$. The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Find the probability of type I and type II errors and power of test.

OR

Discuss the major steps in solving testing of hypothesis problem.

Given the frequency function-

$$f(x, \theta) = \frac{1}{\theta} \quad 0 \leq x \leq \theta$$

$$= 0, \text{ elsewhere}$$

and that we are testing the null hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 2$ by means of a single observed value of X. Find the size of type I, type II errors and power of the test if we choose the critical region $1 \leq x \leq 1.5$

3. Write a note on gamma distribution.

Determine its moment generating function and hence determine its mean, variance and skewness.

OR

Define goodness of fit test.

A survey of 320 families with 5 children each revealed the following distribution-

No. of boys	:	5	4	3	2	1	0
No. of girls	:	0	1	2	3	4	5
No. of families	:	14	56	110	88	40	12

Is this result consistent with the hypothesis that the male and female births are equally probable at 5% level of significance?

given $t_{10,0.05} = 2.23$, $\chi^2, 0.05 = 11.07$ and $Pr [Z > 1.645] = 0.05$

4. Write note on Contingency table and Sign test.

OR

The life in ('000) kilometers of samples of two brands of tyres were found as follows-

Brand A : 8.1, 7.6, 9.2, 6.8, 7.5, 8.1, 7.9, 6.8, 7.2

Brand B : 8.9, 8.2, 7.8, 6.5, 7.9, 7.1, 6.9, 8.8, 7.8, 8.1, 7.9

Apply (i) Median test (ii) Run test to test the null hypothesis that the samples have come from the same population.

5. Define Analysis of Variance.

For one way classified data, discuss analysis of variance and show the analysis of variance table.

OR

Discuss the basic principles of experimental design.

How these principles are used to obtain randomised block design?

Show the analysis of variance table to anylyse the data.

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