MARCH 2008

[KS 252] **Sub. Code : 2852**

M.Sc. (Biostatistics) DEGREE EXAMINATION.

First Year

Paper II — RESEARCH DESIGNS AND BIOSTATISTICAL INFERENCE – I

Q.P. Code : 282852

Time : Three hours Maximum : 100 marks

Answer ALL questions.

I. Essay : (2 × 20 = 40)

1. (a) Explain the role of controls in experiments and the different types of controls.

(b) Explain the method of determination of sample size in clinical trials by giving examples.

2. (a) State and establish Neymann – Pearson lemma.

(b) Derive the UMP test for $H_0 : \theta = \theta_0$ against $H_1 : \theta > \theta_0$ based on a random sample of size n from a distribution with the density function.

$f(x ; \theta) = \theta l^{-\theta x} ; \theta > 0, x > 0$ Also obtain an expression for the power function.

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II. Write Short notes on : (10 × 6 = 60)

(1) Distinguish between CRD and RBD. Under what conditions is a CRD used? Explain the underlying model and draw its ANOVA table.

(2) What is a latin square design? Give an example of a 4 × 4 LSD. What are the advantages of LSD over CRD and RBD?

(3) Explain the advantages of sampling over complete census method.

(4) Define a Sufficient Statistic. Show that if $X_1, X_2, \ldots . X_n$ is a random sample from a $N(\mu, \sigma^2)$ population, then $\overline{X}$ is sufficient for μ if σ^2 is known.

(5) Explain the likelihood ratio test. What are its properties?

(6) Construct a confidence Interval for the difference of proportions in populations, stating the assumptions you make.

(7) Obtain an estimate of a missing observation in a latin square experiment.

(8) Give an account of source of errors in sample surveys and the methods of controlling the same.

(9) Explain the Chi square test for testing the goodness of fit.

(10) Show that the variance of an unbiased estimator tending to zero, is sufficient for the estimator to be sufficient. Give an example of an estimator which is not consistent.
