M 15936

Reg. No. : .....

Name : .....

II Semester M.Sc. Degree Examination, May 2009

STATISTICS

Paper – 2.3 : Design and Analysis of Experiments

Time: 3 Hours

Max. Marks: 70

*Instructions : Answer **any** 5 questions, without omitting **any** Unit.*
*All questions carry **equal** marks.*

UNIT – I

I. a) Define a Gauss-Markoff setup. State and prove the necessary and sufficient conditions for the estimability of a given parametric function $b'\theta$.

b) Derive the conditions under which every linear parametric function is estimable.

II. a) Explain :

i) Estimation space

ii) Error space

iii) BLUE.

b) If Y_1, Y_2, Y_3 are independent normal variates with common known variance σ^2 such that $E(Y_1) = \theta_1 + \theta_2$, $E(Y_2) = \theta_1 + \theta_3$ and $E(Y_3) = 2\theta_1 + \theta_3$, show that any linear parametric function of θ_1, θ_2 and θ_3 is estimable.

UNIT – II

III. a) Explain :

i) Randomization

ii) Replication and

iii) Local control bringing out their importance in designing experiments.

P.T.O.

b) Describe a two-way classification model with multiple but equal number of observations per cell and carry out the analysis of variance, stating all assumptions.

IV. a) Suppose that one observation in an RBD experiment is missing. Obtain its estimate and discuss on the analysis of variance and modifications to be made.

b) Derive the efficiency of the RBD over CRD. Also describe some practical situations that warrants the use of RBD than CRD.

UNIT – III

V. a) In the context of factorial experiments explain :

i) Main effect

ii) Interaction effect. Describe how they are estimated in the case of a 2^3 experiment.

b) Explain the need for confounding. Write down the plan for a confounded 2^4 experiment in blocks of size 2^2.

VI. a) Distinguish between

i) Total and partial confounding

ii) Symmetrical and asymmetrical factorial experiments giving illustrative examples.

b) Describe the concept of fractional replication in factorial experiments.

UNIT – IV

VII. a) Describe a split plot design using an example. Show that a split design can be viewed as a factorial experiment with main effects confounded.

b) When will you adopt a balanced incomplete block design. Derive Fisher's inequality relating the parameters of a BIBD.

VIII. a) Distinguish between a BIBD and a PBIBD. What is a resolvable BIBD.

b) Carry out the intra block analysis of a BIBD, stating all assumptions clearly.

UNIT – V

IX. a) Explain connectedness and orthogonality designs giving examples.

b) Describe the analysis of covariance in a RBD layout, describing the model and assumptions clearly.

X. a) Explain mixed plot analysis. How will you estimate two observations which got mixed up in a LSD.

b) Describe any two optimality criteria for experimental designs, bringing out their importance.