



M 17524

Reg. No. : ..... A9P55T1008

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**Second Semester M.Sc. Degree Examination, March 2010**  
**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) Explain the following :

i) Gauss-Markoff set up

ii) Estimable parametric function

iii) Estimation space

iv) Error space.

b) Derive a necessary and sufficient condition for estimability of a parametric function.

II. a) With respect to the standard Gauss-Markoff set up, obtain the least square estimator of  $\theta$ . Also show that the BLUE of  $b'\theta$  is unique.

b) Describe how you will test the linear hypothesis  $H_0 : b'\theta = \xi$ , stating all assumptions clearly.

**UNIT – II**

III. a) Describe the basic principles of experimentation. Explain how they are adopted in an LSD.

b) Carry out the analysis of variance of a two way classification model with multiple observations per cell.

IV. a) Compare the efficiencies of a LSD with respect to (i) CRD (ii) RBD.

b) Explain how you will estimate the missing observations in a RBD when two observations are missing.

P.T.O.



## UNIT – III

- V. a) Explain a  $2^3$  experiment with an illustrative example. What are its advantages over standard designs ?
- b) Illustrate how the main effects and interaction effects are computed.
- VI. a) Explain confounding in factorial experiments. Distinguish between total and partial confoundings using an example.
- b) Give the confounded arrangement of a  $2^5$  experiment in blocks of size  $2^3$  by confounding two interaction effects. Describe the analysis of such an experiment if there are 5 such replicates.

## UNIT – IV

- VII. a) Distinguish between split plot and strip plot designs giving real life examples. Write down the models and the assumptions made. ✓
- b) Define a BIBD. Derive the Fisher's inequality.
- VIII. a) Distinguish between a BIBD and a PBIBD. What is a resolvable BIBD ? When are they used ?
- b) Carry out the inter block analysis of a BIBD and prepare the ANOVA table.

## UNIT – V

- IX. a) Explain the need for analysis of covariance. Carry out the analysis of covariance in an RBD model with one covariance variable.
- b) Describe :
- Orthogonality of designs.
  - Connectedness of designs.
- X. a) If two observations got mixed up in a RBD, and the observations correspond to the same block, obtain their estimates.
- b) Discuss on any two optimality criteria for experimental designs. Examine whether a BIBD satisfies these criteria.
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