M 11988

Reg. No. : .....

Name : .....

Second Semester M.Sc. Degree Examination, May 2006

STATISTICS

Paper 2.3: Design and Analysis of Experiments

Time: 3 Hours

Max. Marks: 70

Instruction: *Answer* ***any five*** *questions selecting only* ***one*** *from* ***each Unit.***

UNIT – I

1. a) Show that under standard Gauss-Markov set up with full rank, the least square estimator of β, the vector of parameters, is the BLUE. (7+7)

b) Let y_1, y_2, y_3 be independent random observations with $E(y_1) = \theta_1 + \theta_2$, $E(y_2) = \theta_2 + \theta_3$ and $E(y_3) = \theta_3 - \theta_1$; $V(y_1) = V(y_2) = V(y_3) = \sigma^2$.

i) Show that $\theta_1 + 3\theta_2 + 2\theta_3$ is estimable.

ii) Obtain the best estimator of $\theta_1 + 3\theta_2 + 2\theta_3$.

2. In the general linear model $y = x\beta + e$ explain how the equality of β's are tested ? Discuss the case when the hypothesis is rejected. Discuss how will you test a sub hypothesis based on a sub vector of β. 14

UNIT – II

3. a) Explain the principle of randomization. How is it carried out in a latin square ? What is its advantage ? (7+7)

b) Discuss the analysis in two-way classification when there are multiple but equal number of observations in each cell.

4. a) Explain the layout and analysis of a CRD. How would you analyze a CRD if n observations each to different treatments are found missing. (10+4)

b) Discuss the efficiency of a RBD over a CRD.

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UNIT – III

5. a) Distinguish between factorial and non factorial experiments. Describe the analysis of 2^n factorial experiment with r replications illustrate for n = 3. (7+

   b) Explain the principle of confounding in factorial experiments. Distinguish between total confounding and partial confounding. Explain the concept of generalized interactions.

6. a) Construct a 2^6 factorial experiment with blocks of size 16 replicated twice, partially confounding only 4 factor interactions. (7+

   b) Describe a 3^2 factorial experiment. Explain the analysis of such an experiment.

UNIT – IV

7. a) Define:

   i) BIBD and

   ii) Symmetrical BIBD (7+

   For a symmetrical BIBD show that $\gamma - \lambda$ is a perfect square, under usual notations.

   b) Describe the intra block analysis of a BIBD.

8. a) Explain split plot and strip-plot designs establishing their relative advantages. (7+7

   b) If whole plots are in RBD explain split-plot technique on them mentioning relative merits of the two arrangements, one as randomized block and another with split plot for the same.

UNIT – V

9. a) Explain the advantages of analysis of Covariance. Explain the analysis of covariance of a latin square design. (10+4

   b) What do you mean by orthogonal latin squares ? Give an example.

10. Derive the analysis of RBD data with single con comitant variable. Hence obtain the estimate of one missing observation in RBD and set up the ANOVA table.