Reg. No. : ....

Name : ....

II Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.) Examination, March 2014
STATISTICS
Paper – 2.3 : Design and Analysis of Experiments

Time : 3 Hours   Max. Marks : 70

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

UNIT – I

1. a) State and prove Gauss-Markoff theorem.

   b) Obtain the least square estimate of the vector of parameters in the linear model,

   $Y = X\beta + \varepsilon$ (in the usual notation)   **(10+4)**

2. a) Define estimability of a linear parametric function.

   b) Given four uncorrelated random variables y_1, y_2, y_3, y_4 with common variance σ^2 and means

   $E(y_1)\ \beta_1 + \beta_2 + \beta_3$, $E(y_2) = \beta_1 - 2\beta_3$,

   $E(y_3) = \beta_1 - \beta_2 + \beta_3$, $E(y_4) = -2\beta_1 + \beta_2 + \beta_3$,

   Examine whether $(2\beta_1 - \beta_2 - \beta_3)$ and $(5\beta_1 - \beta_2 - \beta_3)$ are estimable parametric functions. If estimable, obtain BLUE for any one of them.   **(4+10)**

UNIT – II

3. a) Develop the ANOVA for one-way classified data with unequal number of observations per treatment, stating the necessary assumptions.

   b) Explain the need for uniformity of trials in field experiments.   **(8+6)**

4. a) Define an orthogonal Latin square and give an example. What are its uses ?

b) What is missing plot technique ? Suppose that in a RBD one observation is missing, how do you estimate it ? What are the modifications to be made in the ANOVA ? **(6+8)**

UNIT – III

5. a) How are factorial experiments different from varietal trials ?

b) Explain the Yates procedure for obtaining various effect totals in a 2^3 factorial experiment.

c) Distinguish between symmetrical and asymmetrical factorial experiments. **(3+7+4)**

6. a) Explain the analysis of 3^2 factorial experiment with 'r' replications.

b) Construct a $(\frac{1}{4})$ replicate of a 2^6– factorial design. Give the aliases of main effects and two factor interaction. **(7+7)**

UNIT – IV

7. a) Define a BIBD and suggest a method for its construction.

b) Discuss the analysis of a BIBD with recovery of inter-block information. **(6+8)**

8. a) Explain a PBIBD with 2 – associate classes. In the usual notation, show that $n_1 \lambda_1 + n_2 \lambda_2 = r (k - 1)$.

b) Discuss the missing plot analysis in BIBD. **(6+8)**

UNIT – V

9. a) What is a connected design ? Verify whether BIBD is a connected design.

b) Carryout the analysis of covariance, stating the model, with reference to a LSD for testing equality of treatment effect. **(6+8)**

10. a) Explain mixed plot analysis. How do you analyse the data based on a RBD, when two mixed up plots involved belong to the same block.

b) Discuss the estimation of residual effects. **(7+7)**