LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

FOURTH SEMESTER – **APRIL 2016**

ST 4813 / ST 4805 - APPLIED EXPERIMENTAL DESIGN

Date: 15-04-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

SECTION - A

Answer ALL questions. Each carries TWO marks.   **(10 x 2 = 20 marks)**

1. State the assumptions made for the validity of F-test in ANOVA.

2. Explain 'critical difference' with an example.

3. What is meant by experimental error? State the reasons for its occurrence.

4. Mention the advantages and disadvantages of CRD.

5. Obtain the efficiency of LSD relative to RBD and find which design is more efficient.

6. Give an illustration for the use of ANOCOVA by identifying the response variable 'y' and the concomitant variable 'x'.

7. Mention the different methods for the analysis of the designs with the missing plots.

8. Discuss about confounding the highest order interaction in 2^3 factorial experiment.

9. Describe the layout of Split Plot Design. What is another name for this design in industry?

10. Define Affine Resolvable BIBD and give an example for it.

SECTION – B

Answer any FIVE questions. Each carries EIGHT marks.   **(5 x 8 = 40 marks)**

11. Give the fixed effect model for the one-way classified data. State the assumptions, formulate the hypotheses and obtain the least square estimates of the parameters.

12. Write the procedure for estimating two missing observations in RBD.

13. Describe Yates' method of computing factorial effect totals.

14. In 2^3 factorial experiment, prove that the first order interactions AB, AC and BC and second order interaction ABC are mutually orthogonal contrasts of the treatment means. Also prove that AB = BA, ABC = BCA.

15. Prove that the parameters of a BIBD satisfy the relations (i) b ≥ v and (ii) r ≥ k.

16. For a resolvable BIBD, prove that b ≥ v + r – 1.

17. Discus in detail about Varietal Trials.

18. For what purpose Yates evolved Lattice designs? Explain the method of obtaining an m-ple square lattice design. What is the difference between a simple lattice and a triple lattice?

SECTION – C

Answer any TWO questions. Each carries TWENTY marks.   **(2 x 20 = 40 marks)**

19.   Describe the 'analysis of covariance' for one-way classification with a single concomitant

variable in CRD layout. Give the fixed effect statistical model, null hypothesis, estimation

of parameters, ANOCOVA table and conclusion.

20(a) Develop the intra block analysis of BIBD.   (10)

   (b) Describe the 2 x 3 asymmetrical factorial design. Give the partitioning of the total d.f.,

table of treatment totals and the formula for sum of square due to A,B and AB.   (10)

21.   Explain about confounding in more than two blocks. Illustrate confounding 2^5 factorial

in blocks of size 2^3 using the solutions of linear equations.

22.   Explain fractional factorials. Give the salient features of designs for fractionally replicated

experiments. Illustrate the procedure of blocking and partitioning of d.f. for $\frac{1}{2}(2^7)$

factorial.

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