

NKT/KS/17/5217

Bachelor of Science (B.Sc.) Semester—VI (C.B.S.) Examination

EXPERIMENTAL DESIGNS

(Statistics)

Paper—2

Time : Three Hours]

[Maximum Marks : 50

N.B. :— All questions are compulsory and carry equal marks.

1. (A) Give complete statistical analysis of variance of two way classified data with one observation per cell. 10

OR

- (E) Explain the linear model in analysis of variance of one way classified data with unequal number of entries in classes. Obtain the break up of total sum of squares. Also obtain expected values of various mean sum of squares. Write its ANOVA table. Explain how various hypotheses can be tested. 10

2. (A) Which basic principles of design of experiments are used in C.R.D. ? Carry out complete statistical analysis of C.R.D. 10

OR

- (E) What is meant by 'Design of an experiment' ? Describe in brief the three principles of designs of experiment. How are these principles used in C.R.D., R.B.D. and L.S.D. ? 10

3. (A) Give a layout of randomized block design with 3 blocks and 4 treatments. State the mathematical model of R.B.D. and describe various terms involved in it. Give the complete analysis of an R.B.D. assuming the expected values of various sum of squares. 10

OR

- (E) Explain the procedure of testing the significance of the difference between two treatment means in R.B.D.

(F) Derive an expression for relative efficiency of R.B.D. with respect to C.R.D.

(G) Obtain the expected value of mean sum of squares due to treatment in L.S.D.

(H) What are the advantages of Latin Square Design ? State its drawbacks. 2.5×4=10

4. (A) Define a linear contrast. When are two such contrasts said to be orthogonal ? A 2^2 -factorial experiment is arranged in an R.B.D. with r replicates. Show that in this experiment, the main effects A and B and interaction effects AB and ABC are orthogonal contrasts to each other. Also describe the procedure for testing the significance of various main effects and interaction effects. 10

OR

- (B) State the difference between simple experiments and factorial experiments. Carry out complete analysis of a 2^2 -factorial experiment arranged in an R.B.D. 10
5. Solve any **ten** of the following questions :
- (A) Define a linear fixed effect model.
- (B) Define a BLUE.
- (C) State the advantage of having multiple entries per cell in a two-way classified data.
- (D) What is a fertility contour map in design of experiments ?
- (E) Define the efficiency of a design of experiment.
- (F) In an experimental design, the blocks should be arranged one after the other along fertility gradient for better precision. Comment.
- (G) Give layout of a standard Latin Square Design with three treatments.
- (H) Give any one disadvantage of L.S.D. over R.B.D.
- (I) Give a real life situation where factorial experiment can be used.
- (J) State the advantage of factorial experiments over simple experiments.
- (K) Derive an expression for interaction effect AB in 2^2 -factorial experiment.
- (L) If 2^2 -factorial experiment is applied over L.S.D. then what should be the order of L.S.D. ? Why ? $1 \times 10 = 10$