Bachelor of Science (B.Sc.) Semester-VI (CBS) Examination

EXPERIMENTAL DESIGNS

Paper—2

(Statistics)

Time : Three Hours] [Maximum Marks : 50

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

1. (A) Give a complete statistical analysis of one-way classified data with unequal number of entries in different classes. 10

OR

(E) Give a complete statistical analysis of two way classified data with one observation per cell. 10

2. (A) Write short notes on each of the following terms used in design of experiment :

(i) Size and shape of the plots

(ii) Uniformity trials

(iii) Experimental error

(iv) Principle of local control

(v) Efficiency of a design. 10

OR

(E) What is meant by 'Design of experiment' ? Give a complete statistical analysis of C.R.D. State its advantages and disadvantages. 10

3. (A) Give a possible layout of 4×4 Latin square design. Explain a mathematical model of L.S.D. Write an ANOVA table for L.S.D. stating formulae for sum of squares, mean sum of squares and F-statistic. Obtain expected value of mean sum of squares due to treatment. State the advantages and disadvantages of L.S.D. 10

OR

(E) Which basic principles of design of experiment are used in an R.B.O. ? Explain how these principles are used in R.B.D. giving a layout.

(F) Obtain the least square estimates of different effects involved in linear model of an R.B.D. Derive an expression for S.S.E. in R.B.D. in terms of T.S.S., S.S.B. and S.S.T.

(G) Derive an expression for expected value of sum of squares due to treatment in R.B.D.

(H) Derive an expression for estimate of relative efficiency of R.B.D. over C.R.D. 2.5×4=10

4. (A) Distinguish between simple experiments and factorial experiments. State the advantage of factorial experiment over simple experiment. A 2^2 – factorial experiment is arranged in an R.B.D. with r replicates. Carry out its complete analysis. 10

OR

(E) Write the ANOVA table for a 2^3 – factorial experiment applied over an RBD with 5 blocks.

(F) Define orthogonal treatment contrast. Show that in a 2^2 factorial experiment with factors N and P, the main effect of N and interaction effect NP are orthogonal contrast of treatment means.

(G) Explain Yates method of computing factorial effect totals in 2^3 – factorial experiment.

(H) If a 2^2 – factorial experiment is carried out in L.S.D. then state the order of this L.S.D. and write an ANOVA table in this case. 2.5×4=10

5. Solve any **ten** of the following questions :

(A) Define a B.L.U.E.

(B) State any one assumption involved in analysis of variance technique.

(C) Define a linear mixed effect model.

(D) In an experimental designs, long and narrow plots give better precision. Comment.

(E) What is the principle of Randomization ?

(F) Write a possible layout of R.B.D. with 4 treatments A, B, C, D and 3 replicates.

(G) Give an expression for S.E. of difference between two treatment means in case of an R.B.D.

(H) Explain the mathematical model in an R.B.D.

(I) State one disadvantage of C.R.D. with reference to an RBD.

(J) Give a real life situation where factorial experiment can be used.

(K) Write an expression for main effect A in 2^2 factorial experiment with factors A and B.

(L) If 2^2 – factorial experiment is applied over L.S.D. then what should be order of L.S.D. ?

1×10=10