বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2022

(Under CBCS Pattern)

Semester - VI

Subject : STATISTICS

Paper : C 13-T

Full Marks : 40

Time : 2 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

[DESIGN OF EXPERIMENTS]

1. Answer any ***four*** questions : 5×4=20

(a) What do you mean by mutually orthogonal Latin squares ? Give a set of four 3×3 mutually orthogonal Latin squares. 2+3

(b) Given for a design A, number of replications is 4 and error variance is 9 and for another design B, number of replications is 4 and error variance is 16, obtain the precisions of designs A and B. Also compare the efficiency of design A with respect to design B and hence comment on it. 5

(c) The cutting speeds of four types of tools are being compared in an experiment. Five cutting materials of varying hardness are to be used as experimental blocks. The data gives the measurements of cutting time in seconds. Identify the type of design used and give a brief analysis for the design. 1+4

(d) (i) One block of a 2^4 experiment is given by :

bc, ab, bd, abcd, acd, d, a, c

Identify the confounded effect.

(ii) Show that all the main effects and interactions of a 2^3 experiment form a set of mutually orthogonal contrasts among treatment means. 5

(d) What is local control ? How is this used in Latin square design and randomised block design ? 2+3

(f) Give a layout of a strip plot design with 5 treatments A, B, C, D, E with 3 rows and 4 columns. Write down the corresponding ANOVA table for this design. 3+2

2. Answer any *two* questions : 10×2=20

(a) What is missing plot technique ? Describe briefly how you can estimate the missing observation corresponding to treatment C and block I in a randomised block design with three treatments A, B, C and four blocks I, II, III and IV. 2+8

(b) (i) Discuss partial and complete confounding with example. Construct a 2^6 design confounding ABC, CDE, ADF and their generalized interactions (Give principal block only)

(ii) Discuss Yates' algorithm for obtaining factorial effect total for a 2^3 experiment. 4+6

(c) How does a split plot design differ from a factorial experiment ? Give the layout of a split plot experiment in a Latin square design. How do you perform whole plot analysis in split plot design ? 2+2+6

(d) Give in detail the analysis of a 2^3 factorial experiment conducted in randomized blocks. 10