2024
B.A/B.Sc.
Sixth Semester
CORE – 13
STATISTICS
Course Code: STC 6.11
(Design of Experiments)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) What do you understand by experimental design? Explain the term 'experiment' in an experimental design. 3+2=5
   (b) Describe the three fundamental principles of design of experiment. 9

2. (a) What is Latin square design? Give the layout and analysis of a Latin square design. 2+8=10
   (b) Draw the analysis of variance table of a randomised block design (RBD). How would you test the critical difference between treatment variations in an RBD? 2+2=4

UNIT–II

3. (a) What is the use of missing plot technique? Explain how this method can be used to estimate the missing yield of two plots in case of a randomized block design. 2+6=8
   (b) Describe a split plot design. Give some situations in which the use of split plot design may be recommended. 6

4. (a) Discuss the advantages and disadvantages of split plot design. 8
   (b) In your own words, differentiate between the use of a split plot design and RBD in experimental design. 6

UNIT–III

5. (a) What is BIBD? Give the statistical analysis of a BIBD. 2+6=8
   (b) Prove the relation $\lambda(a-1) = r(k-1)$. 6

6. (a) Discuss the efficiency of balanced incomplete block design relative to randomised block design. 7
   (b) Define the following terms: 3½×2=7
   (i) Residual derived BIBD
   (ii) Dual BIBD

UNIT–IV

7. (a) Define treatment contrast for a factorial design. 1
   (b) How many treatment combinations are there in 2^2 factorial design? Write along with examples. Also give the ANOVA table for 2^2 factorial design. 2+4=6
   (c) Define 2^3 factorial design. Give the Yate's table for 2^3 factorial design. 3+4=7

8. (a) Give the statistical analysis for 2^2 factorial experiment. Also explain the conclusions to be made for calculated *F* and tabulated *F* at á level of significance. 6+2=8
   (b) What is the total number of 2^{nd} and 3^{rd} order interaction effect in 2^6 factorial experiment? 3
   (c) Explain in detail the general term used in 2^n factorial experiment. 3

UNIT–V

9. (a) Write a short note on confounding in factorial experiment. Explain in detail confounding of single effect in 2^3 design. 2+6=8
   (b) Mention the two types of confounding. Explain in detail the process of confounding subgroups. 1+3=4
   (c) Prepare the ANOVA table for a completely confounded 2^3 design. 2

10. (a) Discuss in detail how confounding increases the precision of the design. 4

(b) How do we confound several effects simultaneously for a 2^4 design? Prove that block contrast (I+II) ≈ (III+IV) represents the interaction effect CD. 3+5=8

(c) Define generalized interaction in confounding. 2
