PG Even Semester Examination, May 2025

STATISTICS

4th Semester

Course No. : STS - 651

(Design & Analysis of Experiments)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions taking one from each unit)

Unit - I

1. (a) What is a linear model? Clearly bring out the differences among the different types of statistical model for experimental designs. 4

   (b) What do you mean by analysis of variance (AOV)? Discuss with the help of analysis of variance table, the tests in the case of a two-way classified data with more than one observations per cell. 2+8=10

2. (a) What is analysis of covariance (AOCOV)? Mention its uses. 3+2=5

(b) Give an outline of AOCOV for completely randomized design. 9

Unit - II

3. (a) Discuss the technique of analysis of variance (AOV) for testing the linearity of regression model. 7

   (b) What is an orthogonal contrast? Discuss briefly the technique of AOV for testing homogeneity of a group of regression coefficients. 7

4. (a) Discuss briefly the application of analysis of variance and regression analysis. 7

   (b) Use the technique of analysis of variance for testing the linear multiple regression model. 7

Unit - III

5. (a) What is the importance of Latin square design (LSD)? Give the statistical analysis of LSD. 2+8=10

   (b) Discuss the principles of randomisation and replication of design of experiments. 4

6. (a) Obtain efficiency of randomised block design (RBD) relative to completely randomised design (CRD). 8

(b) What is the difference between Graeco-Latin square design and Quasi-Latin square design? 6

Unit - IV

7. (a) Give in detail the analysis of a 2^3-experiment conducted in RBD with r-replication. 8

   (b) Define confounding. What are the types of confounding? Discuss in detail. 6

8. (a) Give in detail the analysis of a 3^2-factorial experiment conducted in RBD. 8

   (b) Write down the advantages and disadvantages of a factorial experiment over a simple experiment. 6

Unit - V

9. In case of BIBD, prove that 4+4+6=14
   i) $bk = vr$
   ii) $\lambda (v - 1) = r (k - 1)$
   iii) $b \geq v$, where symbols have their usual meanings

10. Define the following : 5+5+4=14
   i) BIBD
   ii) Symmetric BIBD
   iii) Resolvable design and their relationship.

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