UG – 098

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# V Semester B.Sc. Examination, March/April 2021
## (CBCS) (Fresh) (2019 – 20 and Onwards)
## STATISTICS – VI
## Design and Analysis of Experiments

Time : 3 Hours Max. Marks : 70

***Instructions :*** *i) Answer **any five** questions from Section – **A** and **five** questions from Section – **B**.*
*ii) Scientific calculators are **permitted**.*



SECTION – A **(5×5=25)**

1. What is a linear model ? Explain various types of linear models. **5**

2. Explain the linear model and assumptions for the two-way classification with multiple observations per cell. **5**

3. What is design of experiments ? Discuss the basic principles associated with an experimental design. **5**

4. a) What is a Latin Square Design (LSD) ? Give a layout of a LSD of order (5×5).
   b) Mention the advantages of LSD over CRD. **(3+2)**

5. Explain the efficiency of a design and also obtain the relative efficiency of RBD over CRD. **5**

6. Describe a $2^2$ factorial experiment and obtain the expression for main and interaction effects. **5**

7. Explain factorial experiments. Mention its advantages. **5**

8. a) What is confounding ? State its need.
   b) Distinguish between complete and partial confounding. **(2+3)**

SECTION – B **(5×9=45)**

9. a) Give a layout of one-way classification.
   b) Explain the two-way classification with single observation per cell and give its layout and mathematical linear model along with notations. **(6+3)**

P.T.O.

10. a) Obtain the expectation of treatment sum of squares in ANOVA for two-way classified data with single observation per cell.

    b) Derive least square estimates of parameters of one-way classification. **(6+3)**

11. Describe the statistical analysis of a CRD. **9**

12. What is a Randomized Block Design (RBD) ? Discuss the role of the basic principles of experimental design in RBD. Write the layout of a RBD with five treatments and four blocks. Also write down the corresponding ANOVA table. **9**

13. a) Obtain the efficiency of LSD over RBD if rows are used as blocks.

    b) Obtain an expression for estimating a missing observation in a LSD. **(4+5)**

14. a) For a $2^3$ factorial experiment derive an expression for interaction effects AB and ABC.

    b) Explain Yates method of computing factorial effect totals in a $2^2$ factorial experiment. **(5+4)**

15. Explain the procedure of confounding an effect in a $2^3$ factorial design. Describe the analysis of $2^3$ factorial experiment by confounding the highest order interaction effect in all the 'r' replicates. **9**

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