



Reg. No. :

Name :

VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improve.)
Examination, April 2021
(2014 – 2018 Admissions)
CORE COURSE IN STATISTICS
6B12STA : Design of Experiments
(Use of Calculators and Statistical Tables are Permitted)

Time : 3 Hours

Max. Marks : 48

PART – A
(Short Answer)

Answer **all** the 6 questions. **Each** question carries **1** mark.

1. What is linear parametric function ?
2. Define completely randomized design.
3. What is a comparative experiment ?
4. What are the basic and common assumptions made for ANOVA ?
5. Write down the mathematical model for a one way classified data with a single observation per cell.
6. Define Greaco-Latin square design. (6×1=6)

PART – B
(Short Essay)

Answer **any 7** questions. **Each** question carries **2** marks.

7. What do you understand by analysis of variance ? Explain its uses and importance.
8. What is Latin square ? Point out its significance and limitations.
9. Give an analysis of variance table for randomized block design and state the assumptions and the hypothesis to be tested.



10. Write a short note on :

- i) Principle of replication.
- ii) Local controls.

11. Explain the test procedure of two way ANOVA.

12. What do you mean by randomization in experimental design ?

13. What is the necessary and sufficient condition for estimability of a linear parametric function ?

14. What are the advantages of a completely randomized experimental design ?

15. Compare the relative efficiency of Latin square design over Randomized block design.

16. Explain the meaning of F coefficients used in ANOVA.

17. Discuss the concept of BLUE.

18. State and prove Gauss Markove's theorem.

19. Explain the following :

- i) Experimental design.
- ii) Experimental unit.

20. Explain the method of estimation of missing single observation in Randomized block design. **(7×2=14)**

PART – C
(Essay)

Answer **any 4** questions. **Each** question carries **4** marks.

21. What factors are responsible for determining the number of replications ?

22. Explain clearly the difference between analysis of variance and analysis of covariance technique for testing the significance of class differences in one way classification.



23. Let the model equation be $y_1 = 3\alpha_1 + 2\alpha_2 + \varepsilon_1$, $y_2 = 4\alpha_1 + 3\alpha_2 + \varepsilon_2$ and $y_3 = 5\alpha_1 + 4\alpha_2 + \varepsilon_3$. Find the class of estimable parametric functions and their best estimates.

24. Briefly explain the importance of auxiliary variable in one way classified data.

25. In a randomized block design with 8 treatments, if the error degrees of freedom is 16, then find the number of blocks.

26. What are the advantages and disadvantages of Latin square design ?

27. Discuss the relative efficiency of RBD over CRD.

28. What is meant by factorial design ? What is their utility ? How are they analysed ?

(4×4=16)

PART – D
(Long Essay)

Answer **any 2** questions. **Each** question carries **6** marks.

29. Discuss the analysis of variance table for a randomized block design with k treatments and b blocks with one observation per experimental unit.

30. Give an example of 2^2 factorial experiment and explain the meaning of main effects and interactions.

31. Explain how size and shape of plots and blocks affect the efficiency of an experiment. Illustrate your answer with the help of examples.

32. Explain with illustration, the procedure of constructing a Latin square.

33. Describe the technique of an ANOVA with an illustration for a one way classification.

34. Write a note on utility of three basic principles given by Fischer in design of experiments. **(2×6=12)**