Model Question Paper

Second Semester M.Sc. Degree Examination

Statistics with Specialization in Data Analytics

STSD 222 : Design of Experiments and Theory of Sampling

(2020 Admission onwards)

Time: 3 Hours *Max. Marks: 75*

PART -A

Answer **any five** questions. **Each** question carries **3** marks.

1. Illustrate the layout of an RBD.
2. Explain basic principles of experimental designs.
3. What are factorial experiments? Define main effects and interaction effects ?
4. What do you mean by confounding?
5. For a BIBD with parameters $v, b, r, k \wedge \lambda$ prove that $b \geq v$.
6. Explain nested designs.
7. Describe simple random sampling method.
8. Compare systematic sampling with simple random sampling.
9. Define cluster sampling.
10. Describe PPS sampling method.

PART -B

Answer **any three** questions. **Each** question carries **12** marks.

11. Define Latin square design. Give an example of Latin square of order 4.Mention the advantages and disadvantages of a Latin square design.
12. Describe the analysis of covariance technique for RBD with one concomitant variable.
13. a) Distinguish between symmetrical and asymmetrical factorial experiments.
    b) Give the analysis of 2^3 experiment using an RBD.
14. Construct a 2^5 design in blocks of 8 plots confounding ABC, ADE and BCDE. Give the analysis of such a design with r replications.
15. What are incomplete block designs? Give the intrablock analysis of BIBD.
16. Explain split plot and strip plot design with examples.

PART -C

Answer **any two** questions. **Each** question carries **12** marks.

17. Describe proportional allocation. Suggest an unbiased estimator for population mean under stratified random sampling. Also derive its variance under proportional allocation.

18. In a linear systematic sample with N=nk, show that sample mean is an unbiased estimator for population mean. Also find its variance.

19. Derive the conditions under which regression estimator is more precise than ratio estimator.

20. Obtain Des Raj's ordered estimator for population mean in the case of two draws. Also derive its variance.