D1AST2504 **(2 Pages)** **Name.....**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025
(Regular/Improvement/Supplementary)
STATISTICS
FMST1C04- SAMPLING THEORY

Time: 3 Hours **Maximum Weightage: 30**

Part A: Answer any *four* questions. Each carries *two* weightage.

1. Distinguish between census and sampling.
2. Explain circular systematic sampling.
3. Differentiate between cluster and stratum.
4. Explain stratified sampling. What are the advantages of this method?
5. What is regression method of estimation? Is regression estimator unbiased?
6. Briefly explain multistage and multiphase sampling.
7. Explain pps sampling. How it is different from SRS.

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries *three* weightage.

8. Discuss a method to find sample size in the case of SRSWOR.
9. What is optimum allocation? Derive the variance of the unbiased estimator of population mean under this allocation.
10. Derive Horvitz-Thompson estimator of population total.
11. What is cluster sampling? Find the variance of unbiased estimator of population mean under this method.
12. Compare the ratio and regression estimators with sample mean per unit method.
13. Explain cumulative total method of selection in probability proportional to size sampling.
14. What is Des-Raj's ordered estimator? Show that this estimator of population total is unbiased.

(4 × 3 = 12 weightage)

(P.T.O.)

Part C: Answer any *two* questions. Each carries *five* weightage.

15. Explain simple random sampling with and without replacement. Derive the variances of sample mean under these two methods and compare them.
16. Derive the approximate expression for variance of ratio estimator of population total. Also derive the expression for bias of it.
17. Find the variance of an unbiased estimator of population mean under PPSWR. Also derive an unbiased estimator of this.
18. Give an unbiased estimator of population Mean by Two-stage sampling with SRSWOR at both the stages. Derive the sampling variance.

(2 × 5 = 10 weightage)