FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021
(Regular/Improvement/Supplementary)

STATISTICS
FMST1C04-SAMPLING THEORY

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

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

1. What are the basic principles of Sampling? Explain.

2. What are the different types of ratio estimators in stratified random sampling?

3. What is Multi-Phase Sampling? Why it is differ from Multistage Sampling?

4. Compute the gain due to PPS sampling with replacement compared to simple random sampling.

5. Explain Murthy's unordered estimator.

6. Cluster sampling will be efficient only when the variation between clusters is as small as possible; Prove.

7. Prove that in SRS the bias of regression estimator $\overline{y_{lr}}$ is approximately $-$ Cov $(\overline{x}, b)$**.**

(4 × 2 = 8 weightage)

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

8. Prove that in PPS sampling without replacement, Desraj ordered estimator is unbiased for population total. Derive its sampling variance.

9. Give an unbiased estimator of population proportion in SRSWOR.

10. Differentiate between Hansen & Hurwitz method and Politz- Simmon's technique.

11. Show that in SRSWOR sample mean $\overline{y}$ is the BLUE of $\overline{Y}$.

12. Carry out a comparison between the mean per unit and ratio estimator with regression estimator.

13. Explain Lahiri's total method of drawing a PPS sampling with the help of an example.

14. Differentiate between linear and circular systematic sampling. Explain them with the help of examples. Also explain Periodic trends in Systematic Sampling.

(4 × 3 = 12 weightage)

(P.T.O.)

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

15. Explain the methods of allocation in stratified sampling and find efficiency of variances.

16. (a) What are the principle steps in sampling?

    (b) Explain any two methods of determining the sample size in SRSWOR.

17. Give any three estimators of population mean in cluster sampling where clusters are of unequal size and discuss their properties.

18. (a) What do you mean by Midzuno – Sen scheme of sampling?

    (b) Derive Yates-Grundy form of estimated variance of Hurvitz-Thomson estimator of population mean upon a PPS sample without replacement.

(2 × 5 = 10 weightage)