**D1AST2204** **(1 Page)** **Name.....**

**Reg.No.....**

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022**
**(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 principles of sampling? Explain.
2. Write about any two probability sampling. Explain them with the help of an example.
3. Give a note on relative efficiency of cluster sampling.
4. Define ratio estimator. Derive its bias.
5. What are the principles of stratification? What are the advantages and disadvantages of stratified sampling?
6. Write about two stage sampling with equal first stage unit and derive its variance.
7. What are non-sampling errors? Explain its sources.

**(4 × 2 = 8 weightage)**

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

8. Obtain an unbiased estimate of population mean in simple random sampling with replacement. Find the variance of the estimate.
9. Explain Des Raj's ordered estimator. Derive its variance.
10. Show that for a population with linear trend $V_{st} : V_{sy} : V_{ran} = 1/n : 1 : n$.
11. Derive Hartley - Ross unbiased ratio type estimator.
12. Explain regression estimator. Derive its bias.
13. Write about Simple random sampling. Explain any two sample selection procedures.
14. a) Write about inclusion probability proportional to size sampling.
    b) Write about Sen-Midzuno method.

**(4 × 3 = 12 weightage)**

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

15. Prove that $V(ran) \geq V(prop) \geq V(opt)$.
16. a) Explain Cumulative Total Method with the help of an example.
    b) Explain the general selection procedure in PPS sampling.
    c) Compute the gain due to PPS sampling with replacement compared to simple random sampling.
17. a) Derive the sampling variance of regression estimator.
    b) Differentiate between Hansen & Hurwitz method and Politz-Simmon's technique.
18. a) Show that in SRSWOR Sample mean $\bar{y}$ is the BLUE of $\bar{Y}$.
    b) Give any three estimators of population mean in cluster sampling where clusters are of unequal size and discuss their properties.

**(2 × 5 = 10 weightage)**