

**20P260**

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Name: .....

Reg. No: .....

**SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2021**

(CUCSS - PG)

(Regular/Supplementary/Improvement)

**CC19P MST2 C08 - SAMPLING THEORY**

(Statistics)

(2019 Admission onwards)

Time: Three Hours

Maximum: 30 Weightage

**Part A**

Answer any *four* questions. Each question carries 2 weightage.

1. Explain Systematic sampling. What are the advantages of systematic sampling?
2. Distinguish between stratum and cluster. Also give suitable examples.
3. Write about sampling frame. Explain various defects associated with it.
4. Explain Census and Sampling. Why sampling is preferred?
5. What is  $\Pi$  PS sampling?
6. Explain separate and combined ratio estimator in stratified sampling
7. Define regression estimator.

**(4 × 2 = 8 Weightage)**

**Part B**

Answer any *four* questions. Each question carries 3 weightage.

8. (a) Explain Principles of Sampling theory.  
(b) Explain various factors of non-sampling errors.
9. Explain Hartley –Ross estimator; obtain the corresponding unbiased estimator of the population total.
10. (a) Show that  $\text{Var}(\bar{y}_{\text{sys}}) = \frac{N-1}{Nn} (1 + (n-1) \rho) S^2$ , where  $\rho$  is the interclass correlation between the units of the same systematic sample.  
(b) Explain Circular systematic sampling with the help of an example.
11. (a) Carry out a comparison between the mean per unit and ratio estimator.  
(b) Show that in SRSWOR Sample mean  $\bar{y}$  is the BLUE of  $\bar{Y}$ .
12. What is Multi-Phase Sampling? Why it is differ from Multistage Sampling; Explain?
13. Obtain the mean and its variance in equal cluster sampling. Suppose NM units in the population are grouped at random into N clusters of M units each. Show that the sampling of n clusters by SRSWOR should have the same efficiency as sampling of nM units by SRSWOR.

14. Differentiate between Cumulative Total Method and Lahiri's method with the help of an example.

(4 × 3 = 12 Weightage)

**Part C**

Answer any *two* questions. Each question carries 5 weightage.

15. (a) Explain the methods of allocation in stratified sampling and find efficiency of variances. (b) If the population consists of liner trend, then prove that  $\text{Var}(\overline{Y_{st}}) \leq \text{Var}(\overline{Y_{sys}}) \leq \text{Var}(\overline{Y_{ran}})$ .
16. (a) Explain Principle Steps in a Sample Survey.  
(b) A shelf in a library contains 48 books, numbered serially. Select (i) a simple random sample of books by 8 draws with replacement, and (ii) a simple random sample of 8 books without replacement.
17. (a) Give any three estimators of population mean in cluster sampling where clusters are of unequal size and discuss their properties.  
(b) Show that sample proportion,  $p$  is an unbiased estimate of population proportion,  $P$ . Also obtain the confidence interval for the population proportion.
18. (a) Prove that in PPS sampling without replacement, Desraj ordered estimator is unbiased for population total. Derive its sampling variance.  
(b) Explain Murthy's unordered estimator.

(2 × 5 = 10 Weightage)

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