21P255 (Pages: 2) Name: …….

Reg. No: ……..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2022

(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 the principles of Sampling Theory.
2. Write about sampling frame. Explain various defects associated with it.
3. Cluster sampling will be efficient only when the variation between clusters is as small as possible; Prove
4. Prove that in SRS the bias of regression estimator $\overline{yir}$ is approximately – Cov ($\overline{x}$, b**)**.
5. Define Hansen-Hurwitz estimator of population mean. Derive an unbiased estimator of its variance.
6. Explain Murthy's unordered estimator.
7. Prove that in PPs sampling, Wr, an unbiased estimator of the population total Y is $\hat{Y}$pps=1/n$\sum_1^n(\frac{yi}{pi})$ and its sampling variance V($\hat{Y}$pps)=1/n$\sum_1^n pi(Y_i/p_i - Y)^2$

(4 × 2 = 8 Weightage)

Part B

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

8. Explain the method of determining the sample size in SRSWOR
9. Explain any three procedures of selecting a random sample in SRS
10. Explain Lahiri's total method of drawing a PPS sampling with the help of an example
11. (a) Derive Hartley-Ross unbiased ratio type estimator

    (b) Prove that bias in the ratio estimator becomes zero when R=ρSy/Sx.
12. Derive sampling variance of Regression estimator.
13. Obtain the mean and its variance in equal cluster sampling.
14. Give an unbiased estimator of population proportion in SRSWOR

(4 × 3 = 12 Weightage)

Part C

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

15. Prove if sampling is done with replacement at every stage, $\bar{y}$ is an unbiased estimator of $\bar{Y}$ with sampling variance $V(\bar{y})=(S_b^2/n)+(S_w^2/nm)+(S_u^2/nml)$

16. (a) Explain Census and Sampling. Why sampling is preferred?

    (b) Write about Sampling and non sampling errors.

17. (a) Show that Var $(\overline{y_{sys}}) = \frac{N-1}{Nn}(1+(n-1)\rho)S^2$, where ρ is the interclass correlation between the units of the same systematic sample.

    (b) Explain Circular and Linear systematic Sampling with the help of examples.

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

(2 × 5 = 10 Weightage)

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