17P262 (Pages: 2) Name:…..……..……..…

Reg. No……..……..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, MAY 2018

(Regular/Supplementary/Improvement)

(CUCSS - PG)

CC15P ST2 C07 – SAMPLING THEORY

(Statistics)

(2015Admission onwards)

Time: Three Hours Maximum: 36 Weightage

PART A

Answer ***all*** questions. Each question carries 1 weightage.

1. Distinguish between complete enumeration and sampling study.
2. What is finite population correction?
3. Define Simple Random Sampling.
4. Explain the advantages of stratification.
5. What precautions make cluster sampling more efficient?
6. In what situation two stage sampling is better than single stage sampling.
7. Explain the proportional allocation in the stratified sampling.
8. What is mean by auxiliary variable? Give an example.
9. State the conditions under which the ratio estimate is optimum.
10. Explain cumulative total method of PPS selection.
11. Explain the bias and relative bias of a ratio estimator.
12. Discuss the various factors of non-sampling errors.

(12 x 1 = 12 Weightage)

PART B

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

13. For an SRSWOR with population size *N* and sample size *n*, show that the probability of a specified unit being selected at any given draw is $\frac{1}{N}$.
14. Suggest an unbiased estimator for the population proportion under simple random sampling without replacement and derive its variance and also obtain an estimator for the variance.
15. What is systematic sampling? Obtain the estimate of variance of a systematic sample with a random start?
16. Define ratio estimator of population mean. Show that it is not unbiased but consistent.
17. Show that regression estimator of population mean is always better than the simple arithmetic mean estimator.

18. Find an unbiased estimator of population mean square based on cluster sampling where clusters are of equal size.
19. Give an unbiased estimator of population mean square based on a stratified random sample. Hence find an estimate of relative gain in precision due to stratification.
20. What do you mean by Horvitz-Thompson estimator of population mean? Is it unbiased?
21. If the first unit in the sample is selected with PPS, the second with PPS of the remaining units, while the remaining (n-2) units are selected with equal probabilities without replacement. Prove that Yates and Grundy's variance estimator would be positive for this sampling system.
22. Explain Murthy's unordered estimator and its properties.
23. Obtain an unbiased estimator of population mean in two stage sampling.
24. Define multi-stage sampling and write its advantages over other sampling schemes. Write an unbiased estimator of the population total

(8 x 2 = 16 Weightage)

PART C

Answer ***two*** questions. Each question carries 4 weightage.

25. (a) Explain probability sampling and non probability sampling.
    (b). Propose an unbiased estimator of the population total Y and write down its variance under SRSWOR and SRSWR.
26. (a). What are the various steps in planning and execution of a large sample survey.
    (b). Let V_{ran} , V_{prop} and V_{opt} be the variances of the usual estimators under simple random sampling, proportional allocation and optimum allocation for a given sample size. If N is large then show that, $V_{opt} \leq V_{prop} \leq V_{ran}$.
27. (a). Show that under Lahiri's method of unequal probability sampling the probability of ultimate selection of a unit to the sample is proportional to the sample size.
    (b). Describe any one sampling procedure which gives a non-negative estimate of the variance of Horvitz-Thompson's estimator of population mean as given by Yates and Grundy. Establish your claim.
28. (a). Obtain the bias of regression estimator and its approximate variance.
    (b). Explain double sampling and elaborate its application in ratio method of estimation.

(2 x 4 = 8 Weightage)

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