LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

THIRD SEMESTER – **APRIL 2013**

ST 3504/ST 3502/ST 4500 - BASIC SAMPLING THEORY

Date: 02/05/2013   Dept. No.   Max. : 100 Marks

Time: 9:00 - 12:00

PART – A

Answer **ALL** the questions: **(10x2=20 Marks)**

1. What is meant by sampling frame?
2. Write down the advantages of sampling over census method.
3. Write down the merits of systematic sampling.
4. Distinguish between a questionnaire and schedule.
5. Show that in SRSWOR the sample mean is unbiased estimator of population φ mean.
6. In what situation cluster sampling is preferred?
7. Is systematic sampling superior to simple random sampling and stratified random sampling? Justify your answer.
8. Give a situation where you will be interested in estimating population proportion.
9. Give the expression for "intracluster correlation".
10. Mention any two points which should be kept in mind while framing strata.

PART – B

Answer any **FIVE** the questions: **(5x8=40 Marks)**

11. Explain the meaning of probability sampling and non-probability sampling. What are their advantages and disadvantages?
12. Derive any two properties of sample mean in SRSWR.
13. Write a note on simple random sampling of attributes.
14. What is proportional allocation? Write the properties of the conventional estimator under "proportional allocation"?
15. Write a descriptive note on cluster sampling.
16. Prove that in stratified sampling, sample mean is unbiased estimator of population mean. Also find its variance.
17. Explain cumulative total method of PPS selection.
18. With usual notations, prove that $v(\bar{y}_n)_R \geq v(\bar{y}_{st})_P$

PART – C

Answer any **TWO** questions: **(2x20=40 Marks)**

19. (a) What are non-sampling errors? Explain its sources.
    (b) Explain how sample size is determined in "multi item" studies.
20. Derive $v(\bar{y})$ under SRSWOR and obtain its unbiased estimator.
21. (a) Derive the formula for n_h under Neymann allocation and also obtain $v(\bar{y}_{st})$ under Neymann allocation.
    (b) Compare $V_{prop}(\bar{y}_{st})$ and $V_{Neymann}(\bar{y}_{st})$.
22. (a) Derive the variance of unbiased estimator for mean per element under cluster sampling in terms of intracluster correlation.
    (b) If the population consists of linear trend, then prove that $V(\bar{y}_{st}) \leq V(\bar{y}_{sys}) \leq V(\bar{y}_R)$.

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