LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2016**

ST 3505/ST 3504/ST 3502/ST 4500 – SAMPLING THEORY

Date: 08-11-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

Part – A

Answer ALL the Questions   **(10 x 2 = 20 marks)**

1. Define population with example.
2. Differentiate between parameter and statistic.
3. What is meant by random sampling?
4. Define the term Census.
5. Define strata with an example.
6. What is sampling interval?
7. Define systematic sampling.
8. State the merits and demerits of systematic sampling.
9. Define ratio estimator.
10. Find the approximate bias in regression estimator.

Part – B

Answer any FIVE Questions   **(5 x 8 = 40 marks)**

11. Discuss the need of sampling techniques with an example.
12. Explain the sampling theory based on the principles of sample survey.
13. Describe the selection procedure of a sample in simple random sampling.
14. Show that, in SRSWOR, the sample mean is an unbiased estimate of the population mean.
15. Discuss the advantage of stratified random sampling over other sampling methods.
16. Explain the concept of systematic sampling procedure in selection of a sample.
17. Obtain Neyman's formula for optimum allocation.
18. Describe the conditions under which the ratio estimator is better than regression estimator.

Part – C

Answer any TWO Questions   **(2 x 20 = 40 marks)**

19. (A) Discuss about sampling error and non-sampling errors.

    (B) Prove that, in SRSWOR, Var $(\overline{y_n}) = \left(\dfrac{1}{n} - \dfrac{1}{N}\right)S^2$

20. (A) Explain about the principal steps involved in the planning and execution of a sample survey.
    (B) Show that in SRSWOR, the probability of selecting a specified unit in the population is equal to the probability of its being selected at the first draw.
21. If the population consists of a linear trend then prove that
    $$\text{var}(\overline{y_{st}}) \le \text{var}(\overline{y_{sys}}) \le \text{var}(\overline{y_n})_R.$$
22. (A) Derive the bias of the ratio estimate.
    (B) Discuss about the regression estimate and find its mean square error.

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