PG (CBCS) Even Semester Examination, May 2025

STATISTICS

2nd Semester

Course No. : STSCC - 202

(Survey Sampling)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions taking one from each unit)

Unit - I

1. (a) Define simple random sampling. State its advantages and disadvantages. 7

   (b) Prove that the sample mean is an unbiased estimate of population mean in case of SRSWR and SRSWOR. 7

2. (a) Describe the procedure of stratified random sampling with a cost function

$$C = \mathrm{a} + \sum_{\mathrm{i}=1}^{\mathrm{k}} c_i n_i$$

   prove that the variance of the estimated mean

$\bar{y}_{st}$ is minimum when n_i is proportional to $N_i S_i/\sqrt{C_i}$ 3+4=7

(b) Establish the relation between $v(\bar{y}_n)$ random, $v(\bar{y}_{st})$ proportion and $v(\bar{y}_{st})$ Neyman. 7

Unit - II

3. (a) Discuss probability proportional to size sampling and give a method of drawing such a sample. 7

(b) Give the comparison of PPS sampling with simple random sampling. 7

4. Discuss clearly Horvitz-Thompson estimator for PPS sampling. 14

Unit - III

5. Describe mean and mean square error (mse) for ratio estimator and compare its efficiency with simple random sampling (SRS). 4+7+3=14

6. Describe the mean and MSE for regression estimator and compare its efficiency with simple random sampling (SRS). 4+7+3=14

Unit - IV

7. (a) Define cluster sampling. Write down the applications of cluster sampling. 3+3=6

(b) Obtain the efficiency of cluster sampling in terms of interclass correlation coefficient. 8

8. (a) Define systematic sampling. Also discuss the advantages and disadvantages of systematic sampling. 2+5=7

(b) Prove that if population consists of a linear trend then, 7

$$V(\bar{Y}_{st}) \leq V(\bar{Y}_{sys}) \leq V(\bar{Y}_n)_R$$

Unit - V

9. (a) Mention any five differences among sampling non-sampling errors. 5

(b) Define specification, tabulation and assignment errors. 9

10. What do you mean by observation error and give an example and describe the mathematical model for the same. 3+11=14

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