

6. (a) What are the principles of sample survey?
- (b) In stratified random sampling with given cost function of the form

$C = a + \sum_{i=1}^k C_i n_i$, where 'a' is the overhead cost and C_i is the cost per unit in the i^{th} stratum, prove that $\text{Var}((\bar{y}_{st}))$ is minimum if

$$n_i = \frac{N_i S_i}{\sqrt{C_i}}$$

Also what will happen in the case when

$$C_i = C_0 \quad \forall i = 1, 2, \dots, k. \quad (7, 8)$$

7. (a) Write a short note on sample size determination.
- (b) What is the background and objectives of NSSO, of India.
- (c) Discuss briefly about the statistical wings of MoSPI and its functions. (5, 5, 5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 8090

J

Unique Paper Code : 2372573601

Name of the Paper : Survey Sampling

Name of the Course : B.A./B.Sc. (P) under NEP

Semester : VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. Attempt **six** questions in all.
3. **Question 1** is compulsory. Attempt **any five** questions from the remaining questions.
5. Use of non-programmable **Scientific Calculator** allowed

1. (a) A sample of 30 students is to be drawn from a population consisting of 300 students are given below:

Institute	Total number of students	Mean	Standard Deviation
IIT-Delhi	200	30	10
IIT-Mumbai	100	60	40

Draw sample from each Institute using proportional and Neyman allocations.

- (b) Define sampling and non-sampling errors. What are their different sources?
- (c) Explain:

(i) Sampling units and sampling frame

(ii) Simple Random Sampling. (5, 5, 5)

2. (a) In a population of N units, the number of units possessing a certain characteristic is A and, in simple random sample of size n from it, the number of units possessing the characteristic is a . Obtain an unbiased estimator $\hat{A}$ of A along with its variance. Also obtain an estimate of this variance.

- (b) Discuss advantages of sample survey over complete enumeration. (8,7)
3. (a) Write a short note on method of collecting official statistics.
- (b) Define proportional and Neyman allocations. Compare stratified sampling under Neyman and proportional allocation with SRSWOR. (7, 8)
4. (a) Define SRSWOR from a finite population. Show that sample mean is an unbiased estimator of the population mean and find its sampling variance.
- (b) Differentiate between linear and circular systematic sampling. Show that the sample mean is an unbiased estimator of the population mean under the systematic sampling. (7, 8)
5. (a) Show that systematic sampling is more efficient than the SRSWOR only if $S^2_{wsy} > S^2$, the symbols have their usual meanings.
- (b) In SRSWOR, find the probability that:
- (i) i -th unit of the population is included in the sample,
- (ii) i -th and j -th ($i \neq j$) units of the population are included in the sample. (7,8)