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3 (Sem-3/CBCS) STA HC 2

2022

STATISTICS

(Honours)

Paper : STA-HC-3026

**(Sampling and Indian Official
Statistics)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate
full marks for the questions.**

1. Answer **any seven** : 1×7=7

(a) Finite population correction factor is

(i) $\frac{n}{N}$

(ii) $1 - \frac{n}{N}$

(iii) $1 + \frac{n}{N}$

(iv) None of the above
(Choose the correct option)

Contd.

(b) Judgement sampling is

- (i) probabilistic
- (ii) non-probabilistic
- (iii) mixed

(Choose the correct option)

(c) Simple random sampling is also known as _____ random sampling.

(Fill in the blank)

(d) A complete list of sampling units which represents the population to be covered is called the _____. *(Fill in the blank)*

(e) Sub-sampling is also known as two-stage sampling. *(State True or False)*

(f) Systematic sampling is more precise than simple random sampling only if units within the sample are _____. *(Fill in the blank)*

(g) State the condition under which the regression estimator reduces to the ratio estimator.

(h) Name different series of random sampling numbers.

(i) In two-stage sampling, what sampling design is used to select second-stage units from the selected first-stage units ?

(j) Name *any two* principles to be followed in stratifying a population.

(k) Name the sampling procedure where the probability of selection is proportional to the size of the unit.

(l) If all the units of a population are surveyed, it is called _____. *(Fill in the blank)*

2. Answer **any four** : 2×4=8

(a) Show that in stratified random sampling, with usual notations

$$V(\bar{y}_{st}) = \frac{1}{N^2} \sum_{i=1}^k N_i (N_i - n_i) \frac{S_i^2}{n_i}$$

(b) Obtain an unbiased estimate of the population in case of systematic sampling, when the population consist of $N = nk$ units.

(c) Define two-stage sampling.

(d) What is the basic difference between simple random sampling and P.P.S sampling procedures ?

- (e) How does sample survey differ from complete census ?
- (f) When does one go for stratification in sample surveys ?
- (g) Define sampling unit and sampling frame.
- (h) Define sampling and non-sampling errors in sample survey.

3. Answer **any three** : 5×3=15

- (a) With usual notations, show that in stratified random sampling variance of \bar{y}_{st} is minimum for fixed total size of the sample.
- (b) Discuss the basic principles of a sample survey.
- (c) Show that in SRSWOR and SRSWR the sample mean is an unbiased estimate of the population mean, i.e., $E(\bar{y}_n) = \bar{Y}_N$.
- (d) What are the advantages of sample survey over complete enumeration (census) ?

- (e) Show that the systematic sampling is more precise than the simple random sampling, if the variance within the systematic sampling is larger than the population mean square.

- (f) In what situations the cluster sampling is preferred ? Comment on the efficiency of cluster sampling as compared to simple random sampling.

- (g) In what situation systematic sampling is preferred over other sampling procedures ? Discuss the advantages and disadvantages of systematic sampling.

- (h) Describe the method of collection of official statistics in India.

4. Answer **any three** of the following questions : 10×3=30

- (a) Explain the principal steps involved in the planning and execution of a sample survey.

- (b) Prove that in simple random sampling, the sample mean is the best linear unbiased estimate (blue) of the population mean. What do you mean by margin of errors in the estimate ?
- (c) Carry out the comparison of simple random sampling, stratified random sampling and systematic sampling in the presence of linear trend.
- (d) With usual notation, show that

$$V_{rad} \geq V_{prop} \geq V_{opt}$$
- (e) Explain ratio estimator and regression estimator. When is regression estimator preferred over ratio estimator ?
- (f) Write notes on :
- (i) Origin and function of Central Statistical Organisation (CSO) and its publications
 - (ii) Directorate General of Commercial and Intelligence Statistics (DGCIS) and its publications

- (g) Write a note on the origin and function of National Sample Survey Office (NSSO).
- (h) Write notes on :
- (i) Indian Statistical Service
 - (ii) Role of Ministry of Statistics and Program Implementation (MoSPI).