

BASIC SAMPLING THEORY

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 2 = 20)

- 1 In which situations sampling is inevitable?
- 2 Distinguish between questionnaire and schedule.
- 3 State the demerits of simple random sampling.
- 4 What do you mean by sampling with replacement?
- 5 Define sample frame and finite population correction.
- 6 State any two merits of stratified random sampling.
- 7 Express standard error of sample mean in terms of S^2 .
- 8 In which situations systematic sampling is preferred over the other sampling procedures.
- 9 Give the formula for mean and variance of systematic sample.
- 10 Write the merits of cluster sampling.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

- 11 a Distinguish between completed enumeration and sampling study.
OR
b Write a short note on the important of random sample.
- 12 a Discuss the method of selecting a simple random sample.
OR
b Show that $\frac{N-n}{N}s^2$ is biased for $\text{var}\left(\bar{x}\right)$ in case of simple random sampling without replacement.
- 13 a Prove that $\text{var}\left(\bar{y}_{st}\right) = \frac{1}{N^2} \sum_{h=1}^L \frac{N_h(N_h - n_h)}{n_h} S_h^2$ in stratified random sampling.
OR
b prove that under proportional allocation $\text{var}\left(\bar{y}_{st}\right) = \frac{1-f}{n} \sum_{h=1}^L W_h S_h^2$.
- 14 a Obtain the variance of sample mean under systematic sample.
OR
b What are the advantages and disadvantages of systematic sample?
- 15 a What are the main differences between cluster sampling and stratified sampling?
OR
b Distinguish between ratio and regression estimators.

SECTION - C (30 Marks)Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Discuss briefly about the two types of errors in sampling.
- 17 Derive the expression for $V\left(\bar{y}_n\right)$ in simple random sampling with and without replacement and compare the results.
- 18 Prove that $V\left(\bar{Y}_n\right) \leq V\left(Y_{\text{sys}}\right) \leq V\left(Y_{\text{ran}}\right)$, when population in linear trend.
- 19 Obtain the relative precision on stratified random sampling and simple random sampling.
- 20 A simple random sample of n clusters, each containing M elements, is drawn from the N clusters in the population. Then prove that, the variance of sample mean per element \bar{y} is $\text{var}(\bar{y}) = \left(\frac{1-f}{nM}\right)^2 [1 + (M-1)\rho]$.

Z-Z-Z

END