

## B.Sc. Sem.-6 Examination

CC-308

Statistics

April-2025

Time : 2-30 Hours]

[Max. Marks : 70

- Q.1 (a) Explain Simple random sampling. Give merits and demerits of simple random sampling. 7
- (b) Show that for SRSWOR, sample variance is an unbiased estimate of population variance. 7

OR

- (a) Show that for SRSWOR, sample mean is an unbiased estimate of population mean. 7
- (b) Derive the formula for variance of mean of simple random sample. 7

- Q.2 (a) Prove that for stratified random sampling the variance of estimate  $\bar{y}_{st}$  is  $\sum_{h=1}^l w_h^2 \frac{S_h^2}{n_h} (1 - f_h)$ . 7

- (b) Write a short note on "Estimation of sample size with continuous data while estimating population mean with proportional allocation." 7

OR

- (a) Write detailed note on estimating size of the sample by using stratified sampling. 7
- (b) Obtain  $V(\bar{y}_{st})$  under Neyman Allocation. 7

- Q.3 (a) Explain in detail systematic sampling Method. 7
- (b) If the population consists of linear trend give the relationship between variance of stratified sampling, simple random sampling and systematic sampling. 7

OR

- (a) Prove that the mean of systematic sample is more precise than mean of simple random sample if  $S_{wsy}^2 > S^2$ . Where  $S_{wsy}^2$  = variance among units that lies within the systematic sample. 7
- (b) Prove that a systematic sample has same precision as a corresponding stratified random sample with 1 unit per stratum if  $\rho_{wst} = 0$ . 7

- Q.4 (a) Write a note on two stage sampling. 7
- (b) If n units and m subunits from each chosen unit are selected by SRS then ,  $V(\bar{y}) = \frac{N-n}{N} \frac{S_1^2}{n} + \frac{M-m}{M} \frac{S_2^2}{mn}$  7

- (a) Discuss the variance of sample proportion in two stage sampling. 7
- (b) Show that in two stage sampling  $V(\hat{\theta}) = V_1 [E_2(\hat{\theta})] + E_1 [V_2(\hat{\theta})]$  7

## Q.5 Attempt any Seven

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- 1 Give the formula of Finite Population Correction if the sample of size n is drawn from population of size N.
- 2 How many possible sample of size n can be drawn from population of size N without replacement?

(P.T.O)

- 3 In which sampling method, Probability of drawing a unit at each selection remains same.
  - 4 State any one limitations of systematic sampling.
  - 5 State any one limitations of stratified random sampling.
  - 6 Give the confidence limits for population mean and population total for stratified random sampling.
  - 7 When the systematic random sampling is more précised than the simple random sampling.
  - 8 Write one real life situation where simple random sampling with replacement can be used.
  - 9 Write one real life situation where simple random sampling without replacement can be used.
  - 10 Write one real life situation where systematics sampling can be used.
  - 11 Write one real life situation where stratified sampling can be used.
  - 12 Write one real life situation where two stage sampling can be used.
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