

AU-249

M.A./M.Sc. (Part—I) Semester—I (C.B.C.S. Scheme) Examination

ISCA4 : STATISTICS

(Sampling Theory)

Paper—IV

Time : Three Hours]

[Maximum Marks : 80

N.B. :— Solve either A or B from each question.

1. (A) (i) Define SRSWOR. Show that the variance of sample mean in it is given by :

$$V(\bar{y}_n) = \frac{N-n}{Nn} S^2$$

- (ii) Explain systematic and stratified sampling. Show that there is only casual resemblance between them. 8+8

OR

- (B) (i) Describe the technique of allocation of the sample size for different strata in case of stratified sampling.

- (ii) State and prove the sampling variance of systematic sample mean. 8+8

2. (A) (i) Explain general selection procedure with an example in PPSWOR.

- (ii) Define Murthy's Estimator. Obtain its variance. 8+8

OR

- (B) (i) Define ordered and unordered estimators. Define Des Raj estimator. Obtain its variance for $n = 2$.

- (ii) Explain :

(a) Cumulative total method in PPS sampling.

(b) Lahiri's method in PPS sampling. 8+8

3. (A) (i) Explain difference estimator and obtain its variance.

- (ii) Define ratio estimator, derive the bias of ratio estimator.

OR

- (B) (i) Define regression estimator and derive the bias of regression estimator.

- (ii) What are auxiliary variables ? Explain its use in ratio estimator. Is ratio estimator unbiased ? Derive its mean square error. 8+8

4. (A) (i) Define two stage sampling. What is the difference between two stage sampling and cluster sampling ? Explain one case where two stage sampling is useful. .
 (ii) If clusters are of unequal sizes and n clusters are selected by SRSWOR describe 3 estimators that are commonly used. 8+8

OR

- (B) (i) Explain two stage sampling with equal first stage units. State the advantages of it.
 (ii) Derive $V(\bar{y}_{rm})$ in case of two stage sampling. 8+8
5. (A) (i) Explain the Randomised Response Technique.
 (ii) What is difference between double sampling and two stage sampling ? 8+8

OR

- (B) (i) Explain the use of unrelated questions in dealing with sensitive issues using Warner's Model.
 (ii) Explain the use of double sampling when auxiliary information is available but not fully known. 8+8