

M.Sc. (Part-I) Semester-I (C.B.C.S. Scheme) Examination
STATISTICS
(Sampling Theory)
Paper-IV (1 SCA 4)

Time : Three Hours]

[Maximum Marks : 80

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

1. (A) (a) Explain systematic sampling with an example. Derive the variance of sample mean in systematic sampling.
(b) Define SRSWR and SRSWOR with an example. Show that in SRSWOR $E(s^2) = S^2$.
8+8

OR

- (B) (i) Define stratified random sampling, with an example and obtain an unbiased estimator of population mean and its variance in stratified random sampling.
(ii) Carry out the comparison of systematic sampling with stratified sampling and simple random sampling for population with linear trend. 8+8
2. (A) (a) Explain PPS sampling procedure with an example. State the basic difference between simple random sampling and PPS sampling.
(b) Explain Lahiri's method in PPS sampling with an example. 8+8

OR

- (B) (i) Explain H-T estimator and derive its variance.
(ii) Explain cumulative total method with an example in PPS sampling. 8+8
3. (A) (a) Define ratio estimator and derive the expression for bias of ratio estimator.
(b) Explain the concept of regression method of estimation. Derive an estimate of variance of regression estimator. 8+8

OR

- (B) (i) Define regression estimator. Compare it with that of ratio estimator.
(ii) Explain and derive the bias of regression estimator. 8+8
4. (A) (a) Define cluster sampling with equal and unequal cluster sizes with examples.
(b) Explain two stage sampling with equal first stage units. Derive $v(\bar{y}_n)$ in two stage sampling. 8+8

OR

- (B) (i) Explain three estimators defined in unequal cluster sampling. Obtain variance of any one.
(ii) Describe the method of two stage sampling with advantages and disadvantages. 8+8
5. (A) Explain double sampling procedure for estimating strata sizes in ratio regression method of estimation. Also describe its application. 16

OR

- (B) Explain the technique of randomised response. Describe Warner's model for related and unrelated questionnaires methods. Obtain an estimate of population proportion of the members in the sensitive group. 16

