Bachelor of Science (B.Sc.) Semester-V (C.B.S.) Examination

SURVEY SAMPLING TECHNIQUES

Compulsory Paper—2

(Statistics)

Time : Three Hours] [Maximum Marks : 50

N.B. :— ALL the questions are compulsory and carry equal marks.

1. (A) What is the purpose of establishing NSSO ? State its divisions. Describe its functions and important aspects. 10

OR

(E) Discuss the steps involved in the analysis and reporting stage of a large scale sample survey.

(F) Explain the following terms with reference to sampling :

(i) Frame

(ii) Sampling unit

(iii) Probability sampling

(iv) Sampling error

(v) Non-sampling error. 5+5

2. (A) Distinguish between SRSWOR and SRSWR. Show that sample mean is an unbiased estimator of population mean in both the cases. State the expressions for variance of sample mean when SRSWR is used. Derive the expression for unbiased estimate of the variance. 10

OR

(E) In sampling for attributes, show that sample proportion is an unbiased estimator of population proportion when SRSWR is used. Derive the expression for its variance. Also obtain an unbiased estimator of the variance. 10

3. (A) Explain the procedure of selecting a stratified sample. Derive the expression for the number of units to be selected from each stratum under optimum allocation, with fixed cost. Also obtain the expression for the variance under this allocation. 10

OR

(E) Derive the expression for the estimated gain in precision due to stratification. 10

4. (A) Explain the procedure of cluster sampling. Obtain an unbiased estimator of population mean. Derive its variance. Also obtain an unbiased estimator of the variance.

(B) Describe the procedure of systematic sampling. Show that systematic sample mean is an unbiased estimator of population mean. Derive its variance. Can it be estimated on the basis of a systematic sample ? 5+5

OR

(E) Derive an expression for efficiency of cluster sampling w.r.to SRS in terms of intraclass correlation coefficient. 10

5. Solve any **TEN** of the following questions

(A) State the advantage of probability sampling over judgement sampling.

(B) Define standard error of an estimator.

(C) Fill in the blanks :

In SRS, if the confidence coefficient increases, the sample size _____ and if the permissible margin of error increases, the sample size _____.

(D) State the variance of $\bar{y}_w$, when stratified sampling with Neyman allocation is used.

(E) Define finite population connection factor.

(F) What is the purpose of stratification of the population ?

(G) Let (y_1, y_2) be a simple random sample from a population. Let $e_1 = \frac{y_1 + y_2}{2}$ and $e_2 = \frac{1}{3} y_1 + \frac{2}{3} y_2$ be two estimators of population mean. Which of the two is better ? Justify.

(H) The results of B.Sc. Final are tabulated by a university in two formats :

(i) The results are available collegewise.

(ii) The results are available performance wise (i.e. students passing with distinction, passing in the first division etc.)

If stratified sampling is to be used for estimating average marks scored in the examination which format should be used ?

(I) When was C.S.O. established in India ?

(J) When a list of households is available and observations are to be taken on individuals which sampling procedure should be used ?

(K) Give a practical situation where systematic sampling is used.

(L) State True or False :

(i) When the population has linear trend, systematic sampling is more efficient than SRS.

(ii) Cluster sampling is more efficient than SRS. 1×10=10