TKN/KS/16–5900

Fifth Semester B. Sc. Examination

STATISTICS

Paper – II

(Survey Sampling Techniques)

Time : Three Hours] [Max. Marks : 50

N. B. : All questions are compulsory and carry equal marks.

1. (A) Explain various steps in planning and execution of sample survey. 10

OR

(E) Explain :—

(i) Probability sampling.

(ii) Judgement sampling.

(iii) Sampling error.

(iv) Non sampling error.

(F) State the different divisions of NSSO and explain its functions. 5+5

2. (A) Distinguish between SRSWR & SRSWOR. In SRSWOR, show that sample mean ($\overline{y}_n$) provides an unbiased estimator for population mean ($\overline{y}_N$). Also derive the expression for variance of sample mean. 10

OR

(E) Describe the procedure of selecting a sample using SRSWOR by the lottery method. In sampling for attributes, show that sample proportion (p_n) is an unbiased estimate of population proportion (P) when SRSWOR is used. Derive V(Pn). 10.

3. (A) Describe the procedure of stratified random sampling. Obtain an unbiased estimator of population mean and derive its variance. Prove that the variance under Neyman allocation is less than or equal to variance under proportional allocation. 10

OR

(E) Explain the concept of optimum allocation in stratified random sampling, and derive the expression for n_i

(i) When the total cost is fixed.

(ii) The variance of sample mean is fixed.

Further prove that $Var(\overline{y}_n)_R \geq Var\ (\overline{y}_{st})_P$. 10

4. (A) Explain systematic sampling. Discuss the resemblance of systematic sampling with cluster sampling and also with stratified sampling.

(B) For a population with linear trend, compare the variances of sample mean under systematic sampling and SRSWOR. 5+5=10

OR

(E) Derive an expression for efficiency of cluster sampling in terms of intra-class correlation coefficient. 10

5. Attempt any **10** of the following questions :—

(a) Define a sampling unit.

(b) What is a sampling frame ?

(c) State any one advantage of sampling over census.

(d) What is the probability of selecting a specified unit in the sample of size 'n' when SRSWOR is used?

(e) What is finite population correction factor ?

(f) Give a situation suitable for use of stratified sampling.

(g) Define precision of an estimate.

(h) Define a cluster.

(i) State the expected value of sample mean square under (i) SRSWOR (ii) SRSWR.

(j) What is stratification ?

(k) Give a practical situation where cluster sampling can be used.

(l) Fill in the blank and rewrite the sentence :

For increasing the efficiency of the sampling method, clusters should be ———— . $1 \times 10 = 10$