Reg. No. | | | | | | | | | |

BSCSTC 252

Credit Based IV Semester B.Sc. Degree Examination, September 2022
(2019-20 and Earlier Batches)
STATISTICS
Sampling Theory (Paper – IV)

Time : 3 Hours Max. Marks : 80

Instructions : *1)* ***Single*** *answer booklet containing* ***40 pages*** *will be issued.*
2) ***No additional*** *sheets will be* ***issued****.*

PART – A

1. Answer **any ten** of the following : **(2×10=20)**

a) Define population and a sample.

b) What do you mean by judgement sampling ?

c) Define simple random sampling.

d) Under SRSWR prove that $E(\bar{y}) = \bar{Y}$.

e) Prove that SRSWOR is more precise than SRSWR.

f) List all possible samples of size three under SRSWOR from a population consisting of five units y_1, y_2, y_3, y_4 and y_5.

g) What is finite population correction ?

h) Briefly explain the need for stratification.

i) Describe optimum allocation in stratified random sampling.

j) Under systematic sampling with usual notation prove that $E(\bar{y}_{sys}) = \bar{Y}$.

k) State any one advantage and disadvantage of systematic sampling.

l) With usual notations prove that E(p)=P.

P.T.O.

PART – B

Answer **any five** of the following : **(6×5=30)**

2. Explain census survey and sample survey.
3. Explain the method of drawing a random sample from a frequency table.
4. Show that under SRSWR, $E(s^2)=\sigma^2$.
5. Under SRSWOR prove that sample mean is an unbiased estimator of the population mean.
6. With usual notations, show that $V(\bar{y}_{st})$ is minimum for a fixed sample size n if $n_h \alpha N_h S_h$.
7. Prove that $V(\bar{y}_{st})_{prop} \leq V(\bar{y})_{SRSWOR}$.
8. With usual notations, prove that systematic sampling is more efficient than simple random sampling if $S^2_{wsy} > S^2$.
9. With usual notations, show that $V(p) = \frac{N-n}{N-1} \cdot \frac{PQ}{n}$.

PART – C

Answer **any three** of the following : **(10×3=30)**

10. Explain the principal steps in a sample survey.
11. Show that $V(\bar{y}) = \frac{N-n}{Nn} S^2$ under SRSWOR.
12. Prove that in stratified random sampling with given cost function of the form $C = a + \Sigma c_i n_i$, i = 1 to k, $V(\bar{y}_{st})$ is minimum if $n_i \, \alpha \, \frac{N_i S_i}{\sqrt{C_i}}$.
13. With usual notations prove that $V(\bar{y}_{sys}) = \frac{N-1}{N}.S^2 - \frac{k(n-1)}{N}.S^2_{wsy}$. Also compare $V(\bar{y}_{sys})$ with $V(\bar{y})_{SRSWOR}$.