

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(Fourth Semester)

Branch - **STATISTICS**

BASIC SAMPLING THEORY

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks!)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10x2 = 20)

- 1 What is meant by sample survey?
- 2 Define sampling frame.
- 3 Define simple random sampling.
- 4 What is finite population?
- 5 What is stratified random sampling?
- 6 Define proportional allocation.
- 7 Give the formula for mean and variance of systematic sampling.
- 8 Write any two merits of systematic sampling.
- 9 State any two applications of two stage sampling.
- 10 Define Regression estimator.

SECTION - B 125 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5x5 = 25)

- 11 a Explain advantages of sample survey over census survey.
OR
b Describe the sampling and non-sampling errors.
- 12 a Prove that in simple random sampling without replacement the sample mean is an unbiased estimate of the population mean.
OR
b Explain the method of selecting samples using Lottery method.
- 13 a Explain the advantages of stratification.
OR
b In stratified random sampling, Estimate $v(Y_{st})$.
- 14 a Prove the mean of a systematic sample is more precise than the mean of a SRS iff $S^2_{wsy} > S^2$.
OR
b Describe the procedure of the linear systematic sampling.
- 15 a Discuss the comparison of ratio estimator with mean per unit.
OR
b Write a note on bias of ratio estimator.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3x10 = 30)

- 16 Explain the principles of sampling theory.
- 17 In SRSWOR, prove that $v(y) = \frac{1-f}{n} \frac{S_y^2}{N} = (1-F) \frac{S_y^2}{N}$
- 18 If FPC is ignored show that $V_{opt} < V_{prop} < V_{SR}$.
- 19 Describe the comparison between systematic sampling and stratified random sampling.
- 20 Prove that the relative bias of the ratio estimator in SRSWOR is approximately

$$\left(\frac{1-F}{n} \right) (C_x^2 - PC_x C_y)$$