G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 2025.
(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., STATISTICS

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
III	PART - III	CORE-6	U23ST306	SAMPLING TECHNIQUES

Date & Session: 24.04.2025/AN   **Time : 3 hours**   **Maximum: 75 Marks**

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer ALL Questions.
CO1	K1	1.	A sample survey is conducted to: a) Collect data from the entire population b) Collect data from a subset of the population c) Ignore data collection d) None of the above
CO1	K2	2.	A sampling frame is: a) A list of all units in the population b) The result of a sample survey c) The final report of the survey d) A type of error in sampling
CO2	K1	3.	In sampling with replacement, a selected unit: a) Can be chosen more than once b) Is removed from the population c) Cannot be chosen again d) Is not recorded in the sample
CO2	K2	4.	A good estimator should be: a) Unbiased and consistent b) Biased and unpredictable c) Dependent on the sample size only d) Difficult to calculate
CO3	K1	5.	In Stratified Random Sampling, the population is divided into: a) Random subgroups without criteria b) Homogeneous groups called strata c) Only two equal parts d) Independent clusters
CO3	K2	6.	Neyman Allocation minimizes: a) Variance within each stratum b) Sample size requirements c) The need for stratification d) The need for statistical estimation
CO4	K1	7.	The first unit is selected at random and other units are selected automatically (systematically). This systematic sample is called as k^{th} systematic sample and 'k' is termed as_____. a) scale interval b) ratio interval c) sampling interval d) confidence interval
CO4	K2	8.	The systematic sampling is more efficient than stratified sampling, when____ a) $\rho_{wst} < 0$ b) $\rho_{wst} \neq 0$ c) $\rho_{wst} = 0$ d) $\rho_{wst} > 0$
CO5	K1	9.	In Varying Probability Sampling, each unit in the population: a) Has an equal chance of selection b) Has a different probability of being selected c) Is always selected with certainty d) Is selected based on systematic intervals
CO5	K2	10.	If y is the variable under study and x is an auxiliary variable related to y, then in the most commonly used using varying scheme, the units are selected with probability proportional to the value of x, called as_____. a) interval b) ratio c) size d) scale

Course Outcome	Bloom's K-level	Q. No.	SECTION – B (5 X 5 = 25 Marks) Answer **ALL** Questions choosing either (a) or (b)
CO1	K3	11a.	List the advantages of sampling method.
			(OR)
CO1	K3	11b.	Write the advantages of census survey method.
CO2	K3	12a.	Explain the methods of selection of the simple random sampling.
			(OR)
CO2	K3	12b.	Prove that the sample mean is an unbiased estimator of population mean under Simple Random Sampling Without Replacement (SRSWOR).
CO3	K4	13a.	Write the advantages of stratified sampling.
			(OR)
CO3	K4	13b.	Explain the principles of stratified random sampling.
CO4	K4	14a.	Explain systematic sampling in two dimensions.
			(OR)
CO4	K4	14b.	Describe about linear systematic sampling.
CO5	K5	15a.	Assess the Lahiri's method.
			(OR)
CO5	K5	15b.	Explain the steps involved in cumulative total method under pps sampling.

Course Outcome	Bloom's K-level	Q. No.	SECTION – C (5 X 8 = 40 Marks) Answer **ALL** Questions choosing either (a) or (b)
CO1	K3	16a.	Explain the principal steps involved in the sample survey.
			(OR)

CO1	K3	16b.	Explain the following:
			    i. Probability sampling
			    ii. Non-probability sampling.

CO2	K4	17a.	Construct variance of the sample mean, $V(\bar{y})$ under Simple Random Sampling Without Replacement (SRSWOR).
			(OR)
CO2	K4	17b.	Illustrate the estimation of sample size in Simple Random Sampling Without Replacement (SRSWOR).
CO3	K4	18a.	Explain any two types of allocation techniques of stratified random sampling.
			(OR)
CO3	K4	18b.	Obtain the estimation of sample size for continuous data.
CO4	K5	19a.	Derive the variance of the systematic sample mean as $$Var(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{(n-1)}{n}S^2_{wsy}$$
			(OR)
CO4	K5	19b.	Describe the systematic sampling comparison with stratified sampling in detail.
CO5	K5	20a.	Prove that, in pps sampling with replacement an unbiased estimator of the population mean $\bar{Y}$ is $E(\bar{y}_{pps}) = \bar{Y}$ with variance $V(\bar{Y}_{pps}) = \frac{1}{n}\sum_i^N p_i \left(\frac{y_i}{Np_i} - Y\right)^2$ where $\bar{y}_{pps} = \frac{1}{n}\sum_{i=1}^n (y_i/Np_i)$.
			(OR)
CO5	K5	20b.	Under varying probability scheme and with a replacement for a sample size of n, define the population total $\hat{Y}_{total}$ and obtain $V(\hat{Y}_{total})$.