(Master of Science in Statistics) (Master of Science) (M. Sc.) (Statistics) Semester (I)

Course Code	PS01CSTA54	Title of the Course	THEORY OF ESTIMATION
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To know data summarization and construction of estimators with desirable properties. 2. To learn classical and Bayesian approaches of estimation. 3. To known various estimation techniques.

Course Content		
Unit	Description	Weightage* (%)
1.	Sufficiency principle, factorization theorem, minimal sufficiency, minimal sufficient partition, construction of minimal sufficient statistics, minimal sufficient statistic for exponential family, power series family, curved exponential family, Pitman family. Completeness, bounded completeness, ancillary statistics, Basu's theorem and applications.	25
2.	Unbiased estimators; Uniformly Minimum Variance Unbiased Estimators (UMVUE); Rao-Black and Lehmann-Scheffee theorems. Problem of point estimation, unbiased estimators, minimum variance unbiased estimator, Rao- Blackwell theorem and Lehmann-Scheffe theorem and their uses. Fisher information and information matrix, Cramer-Rao inequality, Chapmann Robinson bounds, Bhattacharya bounds, their applications.	25
3.	Method of maximum likelihood (MLE) and large sample properties of MLE, method of scoring and application to estimation in multinomial distribution.MLE in non-regular families. Other methods of estimation: method of moments, minimum Chi square and modified minimum chi-sqaure.	25
4.	Baye's estimators: Statistical Problems viewed as problems of game theory; loss function; risk function; prior and posterior distributions; Bayes risk; Baye's estimators of parameters and parametric functions for squared error loss functions. Equivariance; the principle of equivariance; location–scale family and their properties; Pitman's minimum risk equivariance estimators.	25

Teaching-Learning	

Methodology	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will	
1.	have basic knowledge on concepts of sufficiency and completeness
2.	have knowledge on important families of regular and non-regular distributions
3.	able to know various approaches of estimation and their merits and demerits
4	be able to distinguish between classical inference and Bayesian inference and know basic concepts of Bayesian inference

Suggested References:	
Sr. No.	References
1.	Patel, S. R. (2021). Classical and Bayesian Inference, IK International, New Delhi.
2.	Kale, B. K. and Muralidharan, K. (2015).Parametric Inference: An Introduction, Alpha Science International Ltd.
3	Dudewicz, E. J. and Mishra, S.N.(1988) Modern Mathematical Statistics (John Wiley)
4	Wilks, S. S. (1962) Mathematical Statistics (John Wiley)
5	Lehmann, E. L. (1988) Theory of Point Estimation (John Wiley)
6	Rohatgi, V. K. (1976) Introduction to theory of probability and Mathematical Statistics (John Wiley & Sons)
7	Michael J. Panik (2012). Statistical Inference :A Short Course , John Wiley & Sons,

	Inc., New
8	Mukhopadhyay, N. (2000). Probability and Statistical Inference, CRC Press
9	Rajagopalan, M. and Dhahavanthan, P (2012). Statistical Inference, PHI, New Delhi.
10	Srivastava, M, Khan, A. K. and Srivastava, N (2012). Statistical Inference (Theory of Estimation), PHI, New Delhi

On-line resources to be used if available as reference material
On-line Resources

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