

Semester	FIVE
Paper Number	HSTDS5022T & HSTDS5022P
Paper Title	Large Sample Theory
No. of Credits	6
Theory/Composite	Composite
No. of periods assigned	Th: 4 Pr: 3
Module	Single
Course description/objective	<p><i>At the end of the course students should</i></p> <ul style="list-style-type: none"> ○ Understand different modes of convergence of statistics and inter-relationship among them. ○ Know about Central Limit Theorem and its applications. ○ Understand the large sample behaviour of different statistics (based on both moments and quantiles) relating to estimation and tests of hypothesis. ○ Know about various transformations on statistics and their use in inferential problems. ○ Know about Pearsonian Chi-Square statistic and its uses. ○ Know about different asymptotic properties of estimators.
Syllabus	<p>UNIT 1: <i>Limit Theorems:</i> Convergence in Probability, Weak Laws of Large Numbers and their applications, Convergence in Distribution, relation between two kind of convergence, Slutsky's Theorem, De-Moivre-Laplace Limit Theorem. Normal approximation to Poisson distribution, Statement of Central Limit Theorem (iid case) and its use in test and confidence interval for binomial proportions and Poisson means. [10L]</p> <p>UNIT 2: <i>Standard Errors of Statistics:</i> Derivation and uses of large sample standard error of sample moments, Standard deviation, Coefficient of variation, b_1 & b_2 measures, Correlation coefficient. Asymptotic distribution of sample quantiles. [14L]</p> <p><i>Variance Stabilization:</i> Transformation of Statistics, Derivation and use of \sin^{-1}, square root, logarithmic & Fisher's Z transformations. [10L]</p> <p>UNIT 3: <i>Asymptotic Property of Estimators:</i> Consistency, Asymptotic efficiency, ARE, CAN and BAN estimators. Properties of MLE (statement only) and their uses in testing and confidence interval. [8L]</p> <p>UNIT 4:</p>

	Pearsonian χ^2 : Large Sample distribution of Pearsonian χ^2 statistic & its uses (goodness of fit, independence, homogeneity). Yates' correction in a 2x2 contingency table. [10L]	
List of Practical	<ol style="list-style-type: none"> 1. Testing of significance and confidence intervals for single proportion and difference of two proportions using CLT. 2. Testing of significance and confidence intervals for single Poisson mean and difference of two Poisson means using CLT. 3. Testing of significance and confidence intervals concerning sample standard deviation, coefficient of variation and correlation coefficient (both single sample and two sample cases). 4. Testing of significance and confidence intervals using variance stabilizing transformations. 5. Determination of the minimum sample size required to achieve normality by sample proportion, mean and standard deviation. 6. Tests for goodness of fit, independence and homogeneity using Pearsonian chi-square statistic. 	
Reading/Reference Lists	<ol style="list-style-type: none"> 1. A.M.Gun, M.K. Gupta & B.Dasgupta (2003): An Outline of Statistical Theory, Vol 1 , 4th Edn World Press. 2. A.M.Gun, M.K. Gupta & B.Dasgupta (2005): An Outline of Statistical Theory Vol. 2 , 3rd Edn World Press. 3. P. Mukhopadhyay (2006): Mathematical Statistics. 3rd Edn, Books and Allied Limited 4. V.K. Rohatgi & A.K.M.E. Saleh (2003): An Introduction to Probability and Statistics, 2nd Edn, Wiley. 5. C.R. Rao (1983): Linear Statistical Inference and its Application. 3rd Edn, Wiley Eastern Limited. 6. R.V. Hogg and A.T. Craig (2002): Introduction to Mathematical statistics. 5th Edn, Pearson Education. 	
Evaluation	Theory CIA: 10 End-Sem: 50 Total: 60	Practical Continuous assessment: 40
Paper Structure for End Sem Theory	Short questions (5 marks each)	Long questions (15 marks each)
	4 out of 6	2 out of 3