Session: 2026-27			
Part A – Introduction			
Subject	Statistics		
Semester	V		
Name of the Course	Elementary Inference		
Course Code	CC-A5		
Course ID	240/STAT/CC501		
Course Type: (CC/MIC/ MDC/ /VOC/AEC/VA C/SEC)	CC		
Course Learning Outcomes(CLOs)	After completing this course, the learner will be able to: 1. Students will be able to understand the concepts of parameters, statistics, sampling distributions, point estimation, bias, and standard error. 2. Students will be able to explain the properties of estimators such as unbiasedness, efficiency, consistency, and sufficiency. 3. Students will be able to estimate unknown parameters using Method of Moments and Maximum Likelihood Estimation (MLE). 4. Students will be able to formulate and perform hypothesis testing using null and alternative hypotheses, significance level, and critical region.		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Internal Assessment Marks	25	5	30
End Term Assessment Marks	50	20	70

Examination Time	3 Hours	---	100

Part B - Course Content

Instructions for Paper- Setter Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking Course Learning Outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topic	Contact Hours
I	Parameter and Statistic, Sampling Distribution of statistic. Point and estimate of a parameter, Concept of bias of Standard error of an estimate. Standard errors of mean (SEM), sample proportion, deviation, Unbiasedness, efficiency, consistency and sufficiency.	**45 hrs**
II	Method of moments and maximum likelihood Testing of Hypotheses: Null and alternative hypotheses. Simple and composite hypotheses, critical region, level of significance, one tailed and two tailed testing.	
III	Type I and type II errors, Neyman- Pearson Lemma, Test of simple hypothesis against a simple alternative in case of Binomial, Poisson and Normal distribution.	
IV	Large Sample Test: Testing and interval estimation of a single mean and a single proportion and difference of two means of two proportions. Fisher's Z transformation.	

Practical

The practical component of the course has two parts — **30 hrs**

(A) Problem Solving- Questions related to the following problems will be solved and their record will be maintained in the Practical Notebook.

1. To apply large sample test of significance for single proportion and difference of two proportions and obtain their confidence intervals.
2. To apply large sample test of significance for single mean and to obtain confidence interval.
3. To apply large sample test of significance for difference between two means and

standard deviations.

4. To Apply Fisher's Z transformation for testing correlation coefficients.
5. To Apply the Neyman–Pearson Lemma for testing simple hypotheses.
6. To estimate unknown parameters using the Method of Moments.

(B)The following practical will be done using mathematical software (such as Python with libraries like NumPy, SciPy, and Matplotlib or R) and their record will be maintained in the practical note book:

1. Write a Python program to apply large sample teat of significance for single proportion and difference of two proportions and obtain their confidence intervals.
2. Write a Python program to apply large sample teat of significance for single mean and to obtain confidence interval.
3. Write a Python program to apply large sample teat of significance for difference between two means and standard deviations.
4. Write a Python program to apply Fisher's Z transformation for testing correlation coefficients.
5. Write a Python program the Neyman–Pearson Lemma for testing simple hypotheses.
6. Write a Python program to estimate unknown parameters using the Method of Moments.

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory 25**

- Class Participation: 5
- Seminar/presentation/assignment/quiz/class test etc.: 10
- Mid-Term Exam: 10

➢ **Practicum 5**

- Seminar/Demonstration/Viva-voce/Lab records etc.: 5

End Term Examination:

➢ **Theory 50**

- Written Examination

➢ **Practicum 20**

- Lab record, viva-voce, write up and execution of the program

Part C-Learning Resources

Recommended Books:

1. R. V. Hogg and A. T. Craig (1995), *Introduction to Mathematical Statistics*, Prentice Hall.
2. A. M. Mood, F. A. Graybill and D. C. Boes (1974), *Introduction to the Theory of Statistics (3rd Edition)*, McGraw-Hill.
3. S. C. Gupta and V. K. Kapoor (2002), *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons.
4. J. N. Kapur and H. C. Saxena (1997), *Mathematical Statistics*, S. Chand & Company Ltd.
5. G. Casella and R. L. Berger (2002), *Statistical Inference (2nd Edition)*, Duxbury Press.