Course Objectives: To enable the students to

- Understand the fundamental concepts of informal logic, use of quantifiers within theorem statements, families of sets and their applications.
- Explore the relationships between statements, including logical connectives and truth values, set operations, including union, intersection, and complement, function composition and inverse functions.
- Learn to evaluate the validity of arguments based on logical reasoning, Analyze examples of relations to identify their properties.
- Introduce quantifiers and their role in logical statements, Familiarize with the axioms governing set theory.

Learning Outcomes:
After successful completion of the course, students will be able to

- Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- understand the basic rules of inference
- effectively develop and write mathematical proofs in a clear and concise manner
- understand the basic concepts of set theory
- understand the function, inverse function and set of functions
- understand the relations, congruencies, equivalence relations and learn the properties of relations

Unit – I
Informal Logic

Introduction, Statements, Relations between Statements, Valid Arguments, Quantifiers(Chapter 1 of the Text Book)

Unit – II
Strategies of Proofs

Mathematical Proofs- What they are and why we need them, Direct Proofs, Proofs by Contrapositive and Contradiction, Cases, and If and Only If , Quantifiers in Theorems,Writing Mathematics (Chapter 2 of the Text Book)

Unit –III
Sets

Introduction, Set – Basic Definitions, Set operations, Families of sets, Axioms for Set Theory(Chapter 3 of the Text Book)

Unit – IV
Functions

Functions, Image and Inverse Image , Composition and Inverse Functions , Injectivity, Surjectivity and Bijectivity, Sets of Functions (Chapter 4 of the Text Book)

Unit – V
Relations

Relations, Congruence, Equivalence Relations (Chapter 5 of the Text Book)

Activities:
1. Assignments
2. Student Seminars and Guest Lecturers
3. Problem Solving Sessions

Text Book:

1. Bloch, Ethan. Proofs and Fundamentals - A First Course in Abstract Mathematics,Springer London, 2011, Second Edition

Reference Text Book:

1. Chartrand, Gary. *Mathematical proofs : a transition to advanced mathematics*,Boston: Addison Wesley, 2003.
2. Copi, Irving. *Introduction to Logic*, Upper Saddle River, N.J. : Pearson/Prentice Hall,2009.
3. Copi, Irving. *Logic: Language, Deduction and Induction,* Singapore : PearsonEducation South Asia Pte Ltd., 2005
4. Cupillari, Antonella. *The nuts and bolts of proofs: an introduction to mathematicalproofs*, Waltham, MA : Academic Press, 2013.