

## Applied Logic

**Course Title:** Applied Logic  
**Course No:** CSC369  
**Nature of the Course:** Theory + Lab  
**Semester:** VI

**Full Marks:** 60 + 20 + 20  
**Pass Marks:** 24 + 8 + 8  
**Credit Hrs:** 3

### Course Description:

This course covers different concepts of logic including arguments, proposition and syllogism, symbolic logic, quantification, fallacies, and reasoning.

### Course Objectives:

The objectives of this course are to

- Understand Concept of Validity and Invalidity
- Discuss argument and fallacy analysis techniques
- Demonstrate proof of validity and invalidity
- Understand Syllogistic rules and immediate inferences
- Discuss inductive and casual reasoning

### Course Contents:

#### Unit 1: Argument Analysis (6 Hrs.)

- 1.1. Concept of Logic, Proposition and Arguments, Recognizing Arguments, Arguments vs Explanations, Validity and Truth, Deductive and Inductive Arguments
- 1.2. Paraphrasing Arguments, Diagramming Arguments, Complex Argumentative Passages, Problems in Reasoning

#### Unit 2: Categorical Propositions and Syllogisms (10 Hrs.)

- 2.1. Theory of Deduction, Classes of Categorical Propositions, Types Categorical Propositions, Quality, Quantity and Distribution, Square of Oppositions, Immediate Inferences, Venn Diagrams of Categorical Propositions.
- 2.2. Standard form of Categorical Syllogism, Mood and Figure, Testing Validity by Using Venn Diagrams, Syllogistic Rules and Fallacies
- 2.3. Syllogistic Arguments, Reducing Number of Terms, Translating Categorical Propositions into Standard Form, Enthymemes and Sorites

#### Unit 3: Symbolic Logic (12 Hrs.)

- 3.1. Modern Logic and Symbolic Language, Conjunction, Disjunction, negation, Material Implication, Material Equivalence
- 3.2. Argument Forms and Refutation by Analogy, Testing Validity of Arguments by using Truth Tables, Statement Forms, Logical Equivalences
- 3.3. Valid Argument Forms, Formal Proof of Validity, Replacement Rules, Proof of Invalidity, Inconsistency

#### Unit 4: Quantification Theory (6 Hrs.)

- 4.1. Need of Quantification, Singular Propositions, Types of Quantifiers, Representing Categorical Propositions in Quantification Theory
- 4.2. Generalization and Instantiation, Proving Validity, Proving Invalidity

**Unit 5: Fallacies (6 Hrs.)**

- 5.1. Concept and Classification of Fallacies, Fallacies of Relevance, Fallacies of Deductive Induction, Fallacies of Presumption, Fallacies of Ambiguity

**Unit 6: Analogical and Casual Reasoning (5 Hrs.)**

- 6.1. Review of Induction and Deduction, Arguments by Analogy, Analogical Arguments, Refutation by Logical Analogy
- 6.2. Cause and Effect, Casual Laws, Induction by Enumeration, Casual Analysis Methods, Limitations of Inductive Arguments

**Laboratory Works:**

The laboratory work includes realizing representation techniques and makes proper inferences. Student should be able to

- Represent complex argumentative Passages by using Symbolic Logic
- Generate proper reasoning and inferences to reach to the conclusion

**Recommended Books:**

1. Irving M. Copy, Carl Cohen, Priyadarshi Jetli, Monica Prabhakar, Introduction to Logic, Pearson Publication, 14<sup>th</sup> Edition, 2013
2. Patrick J. Hurley, A Concise introduction to Logic, Wadsworth Publication, 12<sup>th</sup> Edition, 2014
3. Peter Kreeft, Trent Dougherty, Socratic Logic: A Logic Text Using Socratic Method, Platonic Question, and Aristotelian Principles, St. Augustines Press, 3<sup>rd</sup> Edition 2010.