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, 14th Edition, 2013
2. Patrick J. Hurley, A Concise introduction to Logic, Wadsworth Publication, 12th Edition, 2014
3. Peter Kreeft, Trent Doughherty, Socratic Logic: A Logic Text Using Socratic Method, Platonic Question, and Aristotelian Principles, St. Augustines Press, 3rd Edition 2010.