Course Title	CS-814 Theory of Programming Languages
Credit Hours:	**3+0**
Objective:	• This course aimed to develop in-depth understanding of working, structure and features of different computer languages paradigms. It equips students with better understanding of each language's usefulness and its applications
Outcomes	• Develop in depth understanding of different programming language paradigms and their underlying structures. • Analyze different programming languages their features, constructs, and applications. • Apply programming language knowledge to solve real life computational problems effectively
Contents	• **Introduction** a. **Syntax** i. Context-Free Grammars ii. Regular Expressions iii. Attribute Grammars and Static Semantics b. **Semantics** i. Algebraic Semantics ii. Axiomatic Semantics **c. Operational Semantics Pragmatics** i. Bindings and Binding Times ii. Values and Types iii. Procedures and Functions iv. Scope and Blocks v. Parameters and Arguments vi. Safety • **Imperative Programming** i. Variables and Assignment ii. Control Structures iii. Exceptions iv. Aliasing v. Sequential Expressions vi. Structured Programming vii. Expression-oriented languages • **Object-Oriented Programming** **i.** Objects **ii.** Classes iii. Inheritance iv. Types and Classes v. Abstraction and Generalization vi. Encapsulation ADTs vii. Partitions viii. Scope Rules

	• **Functional Programming** i. The Lambda Calculus ii. Recursive Functions iii. Lexical Scope Rules iv. Functional Forms v. Evaluation Order vi. Values and Types vii. Type Systems and Polymorphism viii. Program Transformation ix. Pattern matching x. Combinatorial Logic xi. Scheme • **Logic Programming** i. Inference Engine ii. Syntax iii. Semantics iv. The Logical Variable v. Iteration vs Recursion vi. Backtracking • **Concurrent Programming** i. Concurrency ii. Issues in Concurrent Programming iii. Syntax iv. Interfering Processes v. Non-interfering Processes vi. Cooperating Processes vii. Synchronizing Processes
Textbook:	Programming Language Pragmatics by Michael L. Scott, Morgan Kaufmann; 3 Edition 2009. ISBN-10: 0123745144
Reference	1. Practical Foundations for Programming Languages, Harper, R., Cambridge University Press, 2016, ISBN: 9781107150300 2. Concepts of Programming Languages, Robert W. Sebesta, 8th ed, Addison-Wesley Higher Education, 2008, ISBN-10: 0-321-49362-1 ISBN-13: 978-0-321-49362-0 3. Programming Languages: Paradigm & Practice, Appleby, VandeKopple, 2nd Edition, McGraw-Hill 4. Programming Languages Concepts, Carlo Ghezzi and Mehdi Jazayeri, 3rd ed, John Wiley & Sons