

<b>4<sup>th</sup> Semester</b>	<b>RCS4D003</b>	<b>Principle of Programming Languages</b>	<b>L-T-P 3-0-0</b>	<b>3 CREDITS</b>
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**Objectives of the course**

The aim is to study and appreciate different types of languages and the underlying mathematical theories. This may help to design and also to appreciate new language features.

**Module - I (10 Hrs.)**

**Introduction:** Overview of different programming paradigms e.g. imperative, object oriented, functional, logic and concurrent programming.

**Syntax and semantics of programming languages:** A quick overview of syntax specification and semiformal semantic specification using attribute grammar.

**Module – II (08 Hrs.)**

**Imperative and OO Languages:** Names, their scope, life and binding. Control-flow, control abstraction; in subprogram and exception handling. Primitive and constructed data types, data abstraction, inheritance, type checking and polymorphism

**Module - III (12 Hrs.)**

**Functional Languages:** Typed-calculus, higher order functions and types, evaluation strategies, type checking, implementation, case study.

**Logic Programming Languages:** Computing with relation, first-order logic, SLD-resolution, unification, sequencing of control, negation, implementation, case study.

**Module - IV (07 Hrs.)**

**Concurrency:** Communication and synchronization, shared memory and message passing, safety and liveness properties, multithreaded program.

**Module - V (08 Hrs.)**

**Formal Semantics:** Operational, denotational and axiomatic semantics of toy languages, languages with higher order constructs and types, recursive type, subtype, semantics of nondeterminism and concurrency

**Books:**

- Glynn Winskel, A Formal Semantics of Programming Languages: An Introduction, MIT Press.
- John C. Mitchell, Foundations for Programming Languages, MIT Press.
- Daniel P. Friedman, Mitchell Wand and Christopher T. Haynes, Essentials of Programming Languages, Prentice Hall of India.
- Ravi Sethi, Programming Languages: Concepts and Constructs, Addison-Wesley