INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Electronics and Computer Engineering**

1. Subject Code**:** **EC - 352** Course Title**:** **Principles of Programming Languages**

2. Contact Hours: **L: 3** **T: 0** **P: 0**

3. Examination Duration (Hrs.): **Theory** 0 | 3 **Practical** 0 | 0

4. Relative Weightage**:** **CWS** 15 **PRS** 00 **MTE** 35 **ETE** 50 **PRE** 00

5. Credits**:** 0 | 3 6. Semester [ ] **Autumn** [√] **Spring** [ ] **Both**

7. Pre-requisite**:** **EC - 355**

8. Subject Area**:** **DCC**

9. Objective: To introduce the semantics of programming languages and develop skills in describing, analyzing, and using the features of programming languages.

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Lambda Calculus and Turing Machines:** Equivalence of Lambda calculus and Turing machines, free and bound variables, substitutions.	6
2.	**Sequential Programming Languages:** Constructs, programs as state transformers, denotational semantics.	6
3.	**Object-oriented Programming Languages:** Constructs, mathematical structures, implementation, constraint matching.	4
4.	**Type Theory:** Operational semantics, basic type systems and type soundness, advanced type systems.	6
5.	**Nondeterminism:** Predicate transformers, guarded command language, algebraic specification.	6
6.	**Program Correctness:** Program termination, well-foundedness, logics of programs, correctness proof.	6
7.	**Program Verification:** Hoare logic, model checking, model checkers, algorithmic versus deductive approaches.	8
	Total	**42**

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1.	Sethi, R., “Programming Languages: Concepts and Constructs”, Pearson Education.	2004
2.	Tucker, A. and Noonan, R., “Programming Languages: Principles and Paradigms”, Tata McGraw-Hill.	2007
3.	Van Roy, P. and Haridi, S., “Concepts, Techniques and Models of Computer Programming”, Prentice-Hall of India.	2005