# 20CS31E2 - PRINCIPLES OF PROGRAMMING LANGUAGES

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Knowledge in any programming language with Formal Languages and Automata theory basics may be required. | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | * To understand the basics of various programming languages. * To describe a common syntax and semantics among different languages * To explore the basic features of Subprograms, Object Orientation, Exception handling mechanisms and their comparisons. * To get the exposure on functional and imperative programming languages. | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Identify the basic language evaluation criteria among multiple Programming languages. |
| CO2 | Study various building blocks to construct different simple programs. |
| CO3 | Come across local referencing environments and parameter passing mechanisms for application development. |
| CO4 | Learn the concept of abstraction and encapsulation properties to explore the advantage of reusability. |
| CO5 | Acquire the list of essential elements of object oriented programming languages to develop day to day applications. |
| CO6 | Identify various Exception handling mechanisms and explore Functional programming language features for new domains. |
| Course Content | UNIT-I  **Preliminaries:** Necessity of programming languages andProgramming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Tradeoffs, Implementation methods and programming environments.  **Describing Syntax and Semantics:** Formal methods of describing Syntax, Attribute Grammars and Dynamic Semantics.  UNIT-II  **Data Types**: Primitive data types, Character string types, User-defined ordinal types, Arrays, Associative arrays, Record and Union types, Pointer and reference types.  **Expression statements and Assignment statements**: Introduction, Arithmetic expressions, Overloaded operators, Type conversions, Relational and Boolean expressions, Short-Circuit evaluation, Assignment and Mixed mode statements.  UNIT-III  **Subprograms**: Fundamentals, Design issues, Local referencing environments, Parameter passing methods, Parameters that are subprograms, Overloaded and Generic subprograms, Design issues for functions, User-defined Overloaded Operators, Co routines.  **Implementing Subprograms:** General semantics of calls and returns, Implementing simple subprograms, Subprogram implementation with stack dynamic local variables.  UNIT-IV  **Abstract Data Types:** Concepts of abstraction, Data Abstraction, Design issues, Language Examples, Parameterized Abstract data types.  **Encapsulation Constructs**: Introduction, Encapsulation Constructs, Naming Encapsulations.  UNIT-V  **OOP features**: Introduction, Object oriented programming concepts, Design Issues.  **OOP Languages:** Support for OOP in Smalltalk, C++, Java, C#, Ada95, Ruby and Object model of JavaScript, Implementation of Object Oriented constructs.  UNIT-VI  **Exception Handling**: Introduction, Exception handling In Ada, C++ and Java.  **Functional Programming Languages**: Overview, Fundamentals of Mathematical functions, introduction to LISP and Scheme, support for functional programming in primarily imperative languages, comparison of functional and imperative languages. | |
| Text Books &  Reference  Books | **TEXT BOOKS:**   1. Sebesta RW, Concepts of programming languages, 10th edition, Pearson Education 2021   **REFERENCE BOOKS:**   1. Practical Foundations for Programming Languages by Robert Harper, Cambridge University Press, 2nd edition 2016. 2. Kenneth Louden and Kenneth Lambert', Programming Languages: Principles and Practices, 3E, Course Technology publishers. 3. Pratt TW, Zelkowitz MV and Gopal TV, Programming Languages - Design and Implementation, 4th Edition, Pearson Education 2006. | |
| E-Resources | 1. <https://nptel.ac.in/courses> 2. <https://freevideolectures.com/university/iitm> | |