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**B.Tech. in Electronics and Communication Engineering**  
**II Semester Syllabus**  
**CM201ES: Python Programming**  
**(Common to CIVIL, EEE, MECH, ECE, MCT, MME)**

**Prerequisites:** Basic knowledge of computer fundamentals, C programming.

**Course Objectives:**

1. Develop skills to write structured, modular, and efficient Python code.
2. Enable students to use Python's built-in data structures and libraries effectively.
3. Provide knowledge on file handling, exception handling, and object-oriented programming in Python.
4. Equip students with the ability to apply Python for real-world applications including data processing and automation.

**Course Outcomes:**

1. Understand python programs using variables, operators, expressions, and control structures.
2. Implement Python programs using built-in data structures like lists, tuples, sets, and dictionaries.
3. Apply functions and modular programming concepts.
4. Use files, exceptions, and apply Python libraries for problem-solving.
5. Understand Object Oriented Programming concepts and develop small-scale applications in Python.

**Course Articulation Matrix**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO1 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | 2    |
| CO2 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | 2    |
| CO3 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | 2    |
| CO4 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | 2    |
| CO5 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | 2    |

**UNIT-1 – Introduction to Python and Basics of Programming**

**Introduction to Python:** Features, Applications, Installation, IDEs, Python Syntax, Indentation, Comments, Variables, Data Types, Type Casting, **Operators:** Arithmetic, Relational, Logical, Assignment, Membership, Identity, Bitwise, **Input/Output functions:** (input(), print()), **Control Structures:** if, if-else, if-elif-else, Nested Conditions, **Looping:** for, while, Nested Loops, break, continue, pass.

**UNIT-2 – Data Structures in Python**

**Strings:** Creation, Indexing, Slicing, Methods, String Formatting, **Lists:** Creation, Indexing, Slicing, List Comprehension, Methods. **Tuples:** Properties, Indexing, Methods, **Sets:** Creation, Operations, Methods, **Dictionaries:** Creation, Access, Methods, Dictionary Comprehension, Iterating over data structures.

**UNIT-3 – Functions and Modules**

**Functions:** Defining, Calling, Parameters, Return Values, **Types of Arguments:** Positional, Keyword, Default, Variable Length, **Scope of Variables:** Local and Global, Lambda Functions, Map, Filter, Reduce, Recursion in Python, **Modules:** Importing, Creating User-defined Modules, Standard Modules (math, random, datetime), Packages in Python.

**UNIT-4 – File Handling and Exception Handling**

**File Handling:** Opening, Reading, Writing, Appending, File Modes, File Methods, Working with CSV and JSON Files, **Exception Handling:** try, except, else, finally, Built-in Exceptions, Raising Exceptions, Introduction to Regular Expressions (re module).

**UNIT-5 – Object-Oriented Programming and Applications**

**OOP Basics:** Classes, Objects, Attributes, Methods, Constructor ( \_\_init\_\_ ), self keyword, **Inheritance:** Single, Multiple, Multilevel, Hierarchical, Method Overriding, Method Overloading (conceptual), Encapsulation and Polymorphism, **Application Development:** Data Processing Script, Basic Calculator, File Organizer, Simple Data Analysis with pandas.

**TEXT BOOKS:**

1. Python Programming: Using Problem Solving Approach by Reema Thareja.
2. Python Crash Course by Eric Matthes, Learning Python by Mark Lutz.

**REFERENCE BOOKS:**

1. Introduction to Python Programming by Gowrishankar S., Veena A.
2. Python Cookbook by David Beazley and Brian K. Jones.
3. Fluent Python by Luciano Ramalho, Automate the Boring Stuff with Python by Al Sweigart.