



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Syllabus

Subject Code : 3154702

Subject Name : Python Programming Fundamentals

WEF Academic Year :	2024-25
Semester :	5
Category of the Course :	Professional Core

Prerequisite : Fundamental knowledge about computer systems and positive aptitude to learn programming, Basic knowledge of C Programming.

Rationale :	Python is general purpose programming language becomes very popular in last decade. In this age, every Electronics, Electrical and Computer engineers must learn Python Programming to build applications in their core domain. Python is becoming popular in artificial intelligence and machine learning. MicroPython is sub-set of Python Programming useful to port in hardware for embedded and IoT applications.
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Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Introduction, Data Types and Operators: Installation and working with Python, Variables and data types in python, Perform computations and create logical statements using Python's operators: Arithmetic, Assignment, Comparison, Logical, Membership, Identity, Bitwise operators, list, tuple and string operations	6	10%



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2	Python Program Flow Control: Write conditional statements using If statement, if ...else statement, elif statement and Boolean expressions, While loop, For loop, Nested Loop, Infinite loop, Break statement, Continue statement, Pass statement, Use for and while loops along with useful built-in functions to iterate over and manipulate lists, sets, and dictionaries. Plotting data, Programs using decision making and loops	10	25%
3	Python Functions and Modules: Defining custom functions, Organising Python codes using functions, Create and reference variables using the appropriate scope, Basic skills for working with lists, tuples, work with dates and times, get started with dictionaries, Importing own module as well as external modules, Programming using functions, modules and external packages	8	20%
4	Python String, List And Dictionary Manipulations: String methods, String formatting, Regular expressions for advanced string manipulation, List methods, List slicing and manipulation techniques, Sorting and reversing lists, List comprehension for concise list creation and manipulation, Working with nested lists, Dictionary methods, Adding, removing, and updating dictionary elements, Iterating over dictionaries and accessing key-value pairs, Dictionary comprehension for creating dictionaries	8	20%
5	Python Object-Oriented Programming (OOP) concepts: Introduction to OOP concepts (classes, objects, inheritance, polymorphism), Defining classes and creating objects, Encapsulation and data hiding, Inheritance and method overriding, Application of OOP principles in engineering projects.	6	10%
6	Python File Operations: An introduction to file I/O, use text files, use CSV files, use binary files, Handle a single exception, handle multiple exceptions, Illustrative programs, Exercises	4	5%
7	MicroPython: Introduction, main difference between MicroPython and Python, Installation of MicroPython on Hardware, MicroPython libraries, GPIO programming on MicroPython Hardware, Sensor Programming using MicroPython	6	10%
Total			100



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Reference Book:

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Python Programming Fundamentals- A Beginner's Handbook by Nischay kumar Hegde
3. Kenneth A. Lambert, "Fundamentals of Python - First Programs", CENGAGE Publication
4. Introduction to Python for Engineers and Scientists, By. Sandeep Nagar, Apress
5. MicroPython for the Internet of Things (A Beginner's guide to programming with Python on microcontrollers) By. Charles Bell, Apress

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level*
01	Gain proficiency in Python syntax, data structures, and control flow, enabling them to write efficient and readable code.	
02	Develop the ability to manipulate strings, lists, and dictionaries effectively, using a variety of methods and techniques to process and analyze data	
03	Enhance problem-solving skills by applying Python programming concepts to real-world problems with hands-on exercises and projects	
04	Write programs for general purpose I/O devices using MicroPython	

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks:

R Level - 20

U Level - 20

A Level - 25

N Level - 15

E Level - 10

C Level - 10



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Suggested Course Practical List:

- [1] Write Python programs to understand control structures
- [2] Write Python programs to understand list and tuples
- [3] Use conditional statements and loops in Python programs
- [4] Write python programs to create functions and use functions in the program
- [5] Import module and use it in Python programs
- [6] Write a program to parse data from a CSV file and perform some data analysis tasks (e.g., calculating average, maximum, minimum)
- [7] Write python program to plot data using PyPlot
- [8] Write a program to demonstrate inheritance and polymorphism using classes
- [9] To become familiar with MicroPython and NodeMCU. Configure NodeMCU for MicroPython.
- [10] Write program in MicroPython to send digital data on GPIO pins of NodeMCU and glow LED connected with NodeMCU or any other MicroPython supported board.

List of Laboratory/Learning Resources Required:

- NPTEL Video lecture on Python Programming
- <https://www.coursera.org/learn/python-programming>
- Python Software
- Turtle- <https://docs.python.org/2/library/turtle.html>
- PyLab - <https://scipy.github.io/old-wiki/pages/PyLab> Anaconda software

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