INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)**
SEMESTER	**4**
COURSE TITLE	**INTRODUCTION TO PYTHON PROGRAMMING**
COURSE CODE	**01CI0411**
COURSE CREDITS	**1**

Objective:

1. To introduce the fundamentals of Python programming and problem-solving techniques
2. To familiarize students with Python syntax, data structures, and libraries through hands-on practice
3. To apply programming concepts to solve basic civil engineering–related computational tasks
4. To cultivate self-learning skills through exposure to open-source resources and applications.

Course Outcomes: After completion of this course, student will be able to:

1. Apply Python programming concepts to solve basic civil engineering computations (e.g., stress, strain, unit conversions)
2. Apply Python data structures to organize and process engineering data (e.g., material properties, IS codes, test results)
3. Analyze civil engineering datasets (e.g., rainfall, traffic, construction materials) using Python libraries like NumPy and Pandas.
4. Analyze structural and geotechnical problems by formulating them into computational tasks in Python
5. Evaluate alternative solutions to civil engineering problems through Python-based simulations, visualization, and mini-projects.

Pre-requisite of course: Introductory knowledge of C language and detailed knowledge of the subjects of civil engineering from semester 1 to 3

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	2	0	0	0	25	25

Contents : Unit	Topics	Contact Hours
Total Hours		

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment-1** Setting up Python environment (Anaconda/Jupyter), first program	2
2	**Experiment-2** Variables & data types: store material properties (density, compressive strength, etc.)	2
3	**Experiment-3** Operators: compute stress = Force/Area; unit conversions	2
4	**Experiment-4** Conditional statements: classify soil type from liquid limit	2
5	**Experiment-5** Loops: generate unit conversion tables, iterate test values	2
6	**Experiment-6** Functions: program for bending stress/deflection of beams	2
7	**Experiment-7** Strings & lists: store and sort construction materials	2
8	**Experiment-8** Tuples, sets, dictionaries: prepare dictionary of IS codes	2
9	**Experiment-9** File handling: write & read experimental test results (slump/sieve test)	2
10	**Experiment-10** NumPy arrays: solve structural equilibrium equations (2x2/3x3)	2
11	**Experiment-11** Pandas basics: analyze rainfall/traffic data from CSV	2
12	**Experiment-12** Matplotlib: plot stress–strain curve, rainfall variation, traffic flow trend	2
13	**Experiment-13** Mini-Project Part I: program for concrete mix material quantities (M20 grade)	2
14	**Experiment-14** Mini-Project Part II: integrate NumPy, Pandas, Matplotlib for data evaluation & visualization	2
Total Hours		**28**

Textbook :

1 Introduction to Computation and Programming Using Python, Introduction to Computation and Programming Using Python, Introduction to Computation and Programming Using Python, 2021

References:

1 Think Python: How to Think Like a Computer Scientist, Think Python: How to Think Like a Computer Scientist, Downey, A., O'Reilly Media, 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
15.00	25.00	20.00	20.00	10.00	10.00

Instructional Method:

1. Problem-Based Learning (PBL)
2. Demonstration + Hands-On Practice
3. Mini-Project Based Approach
4. Peer Learning & Pair Programming
5. Flipped Classroom with Self-Learning Resources

Supplementary Resources:

1. https://www.w3schools.com/python/python_intro.asp
2. https://www.coursera.org/learn/python-programming-intro

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