FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Mechanical Engineering)**

Semester: **V**

Course Code: **202040522**

Course Title: **Python for Engineers**

Course Group: **Open Elective Course - I**

Course Objectives: This course enables real-world programming skills, algorithmic thinking and problem solving capabilities of students. The course will help students to eagerly explore recent trends in programming with the backup of python programming skills.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
2	0	2	3	50/18	50/17	25/09	25/09	150/53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction and Python Installation:** Introduction about the language, Features of Python, Python Terminology, Python IDE's, Installation and Working with Python using different IDEs (Spyder, Atom, PyCharm).	02
2	**Python Data Types and Operators:** Variables and data types in python: Numeric, Text, Boolean, Sequence, Mapping and Set, Python's operators: Arithmetic, Assignment, Comparison, Logical, Membership, Identity and Bitwise operators, perform computations and create logical statements using Python's operators, list, tuple and string operations.	06
3	**Python Decision making and Loops:** 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. List Comprehensions, Dictionary Comprehension, Set Comprehension, Illustrative programs using decision making and loops. .	07

4	**Plotting Data in Python:** Matplotlib library, Pyplot module, Basic Plotting with Matplotlib, Plotting a Lines, Customization of Plots, Bar Chart, Pie Chart, Scatter Plot, Plotting Curves of Given Equation, Create Multiple Plots, Line Colors and Styles.	02
5	**Python Functions and Modules:** Defining custom functions, Organizing Python codes using functions, Create and reference variables using the appropriate scope (Local, Enclosed, Global and Built-in scope), Recursion, Basic skills for working with lists, tuples, work with dates and times, get started with dictionaries, importing own module as well as external modules, Exercise using functions, modules and external package (Numpy and Turtle), Lambda Functions and Map.	06
6	**Python File Operations and Exceptions:** An introduction to file I/O, Types of Files: text files, CSV files and binary files, File operations: Creation of files, opening files, eading files, Writing files, Appending data in files, Exceptions: Common built in Exceptions, Handle single exception (try and except block), handle multiple exceptions.	04
7	**GUI design using Tkinter:** Introduction, Components and Events, Adding Controls, Entry Widget, Text Widget, Radio Button, Check Button, List Boxes, Menus, Combo Box	03

List of Practicals / Tutorials:

1	Installation and working with Python.
2	Write Python programs to understand control structures.
3	Write Python programs to understand list and tuples.
4	Use conditional statements in Python programs.
5	Use loops (for and while) in Python programs.
6	Use List, Set and Dictionary Comprehensions.
7	Write Python Programs to Plot Data Using Pyplot.
8	Write Python programs to create functions and use functions in the program.
9	Import module and use it in Python programs.
10	Write Python programs on File Handling.
11	Write Python programs on Exception handling.
12	Develop programs to learn GUI programming using Tkinter.

Reference Books:

1	Introduction to Computation and Programming Using Python by John V Guttag, PHI Publisher.
2	Python Programming: Using Problem Solving Approach by Reema Thareja, Oxford University Press.

3	Python Programming Fundamentals- A Beginner's Handbook by Nischay Kumar Hegde, Educreation Publishing.
4	Fundamentals of Python – First Programs by Kenneth A. Lambert, CENGAGE Publication.
5	Introduction to Python for Engineers and Scientists by Sandeep Nagar, Apress.
6	R Nageswara Rao, Core Python Programming, 2nd Edition, Dreamtech Press

Supplementary learning Material:	
1	https://nptel.ac.in/courses/106106182 (The Joy of Computing using Python)
2	https://nptel.ac.in/courses/106106145 (Programming, Data Structures and Algorithms using Python)
3	https://www.coursera.org/learn/python (Programming for Everybody - Getting Started with Python)
4	https://www.coursera.org/learn/python-data (Python Data Structures)
5	https://nptel.ac.in/courses/106106182 (The Joy of Computing using Python)

Pedagogy:
• Direct classroom teaching
• Assignments/Quiz
• Continuous assessment
• Seminar/Poster Presentation
• Course Projects

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Seminar, Poster Presentation, Unit test, Quiz, Class Participation etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying;
R	**U**	**A**	**N**	**E**	**C**	N: Analyzing; E: Evaluating; C: Creating
15%	25%	25%	15%	20%	---	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Able to write, test and debug code written in python	**15%**
CO-2	Develop python programs using conditional statements and loops.	**25%**
CO-3	Define Python functions and use Python data structures–lists, tuples, dictionaries.	**25%**
CO-4	Perform file operations to read, write and append data in files	**20%**
CO-5	Create GUI applications in Python.	**15%**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025