**Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada**
**Department of Freshman Engineering**
**Problem Solving & Programming with Python**

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|---|---|---|---|---|---|
| **Course Code** | 20ES1102 | **Year** | I | **Semester** | I |
| **Course Category** | Engineering Science | **Branch** | ME | **Course Type** | Theory |
| **Credits** | 3 | **L-T-P** | 3-0-0 | **Prerequisites** | Nil |
| **Continuous Internal Evaluation** | 30 | **Semester End Evaluation** | 70 | **Total Marks** | 100 |

**Course Outcomes**

Upon successful completion of the course, the student will be able to

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|---|---|
| CO1 | Understand the basic concepts of visual programming and Python Programming. (L2) |
| CO2 | Apply visual programming/flowchart-based programming for a given problem. (L3) |
| CO3 | Apply Python Programming concepts to solve problems and make an effective report.. (L3) |
| CO4 | Analyze and choose appropriate data structure for solving problems (L4) |

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations** (3:High, 2: Medium, 1:Low)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | | | | | | 2 | |
| CO2 | 3 | | | | | | | | | | | | 2 | |
| CO3 | 3 | | | | | | | | 3 | 3 | | | 2 | |
| CO4 | | 2 | | | | | | | | | | | 2 | |

**Syllabus**

| Unit No. | Syllabus | Mapped CO's |
|---|---|---|
| 1 | **Computational Thinking and Visual Programming Concepts**<br><br>Introduction to computational thinking. Visual programming concepts. Scratch environment: sprites -- appearance and motion, angles and directions, repetition and variation, changing costumes, adding background, Input/output, variables and operators.<br><br>Example Problems-- draw geometrical shapes such as Circle, Triangle, Square and Pentagon, Make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result, make a sprite to ask the user to enter a number to display even and odd numbers. | CO1, CO2 |
| 2 | **Algorithms and Flowchart design through Raptor**<br><br>Introduction to the idea of an algorithm, Pseudo code and Flowcharts. | CO1, CO2 |

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|---|---|---|
| | Flowchart symbols, Input/output, Assignment, operators, conditional if, repetition, procedure and sub charts.<br><br>Example problems -- Finding maximum of 3 numbers, Unit converters, Interest calculators, and multiplication tables, GCD of 2 numbers, Fibonacci number generation, and prime number generation. Minimum, Maximum and average of n numbers. | |
| 3 | **Introduction to Python**<br><br>Features of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Reserved Words, Data Types, Input Operation, Operators and Expressions, Operations on Strings, Type Conversion, Conditional statements and iterative statements. | CO1, CO3 |
| 4 | **Functions and Strings in Python**<br>**Functions:** Introduction, Built-in Math Functions, User Defined Functions: Function Call, Variable Scope and Lifetime, The return statement, Lambda Functions, Packages in python.<br>**Strings:** Introduction, Built-in String Functions, Slice Operation, Comparing Strings, Iterating String, Regular Expressions. | CO1, CO3 |
| 5 | **Files and Data Structures in Python**<br><br>**File Handling: open, close, read and write operations.**<br><br>**Data Structures:**<br><br>**Lists:** Accessing values in lists, Nested Lists, Basic List Operations.<br>**Tuples:** Creating Tuple, Accessing values in a tuple, Basic Tuple Operations. **Dictionaries**: Creating and Accessing Dictionaries, Built-in Dictionary functions, List Vs Tuple Vs Dictionary. | CO1, CO3,CO4 |

**Learning Resources**

**Text Books**

1. An introduction to programming and algorithmic reasoning using raptor, Weingart, Dr. Troy, Brown, Dr. Wayne, 2018, CreateSpace (an Amazon.com Company)
2. Python Programming using Problem Solving Approach, Reema Thareja, 2017, OXFORD University Press

**Reference Books**

1. Core Python programming, R. Nageswara Rao, 2018, Dreamtech press.
2. Programming with python, T R Padmanabhan, 2017, Springer.

**e- Resources & other digital material**

1. http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf
2. https://raptor.martincarlisle.com/
3. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf