

<b>22EE350</b>	<b>PROBLEM SOLVING USING COMPUTERS</b>
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Category	L	T	P	Credit
ESC	3	0	0	3

### Preamble

The course on problem solving using computers is intended to introduce the students about the different problem solving strategies with emphasis on python coding. Upon completion of the course, the students would be able to master the principles of interpreted high-level programming and demonstrate significant experience in problem solving.

### Prerequisite

NIL

### Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	TCE Proficiency Scale	Expected Proficiency in %	Expected Attainment Level %
CO1	Describe the problem solving strategies and the key terms related to problem solving using computers	TPS2	80	70
CO2	Solve the given problem statement using python programming concepts such as objects, data types, expression, statements, looping.	TPS3	80	70
CO3	Apply the concepts of tuples, list, dictionary and string in design of simple applications	TPS3	80	70
CO4	Make use of functions while developing python scripts.	TPS3	80	70
CO5	Develop coding based on file I/O and exception handling in python.	TPS3	80	70
CO6	Apply the concepts of classes and objects in solving the problem using python programming.	TPS3	80	70

### Mapping with Programme Outcomes and Programme Specific Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	L										M	M	M
CO2	S	M	L		M							M	S	S
CO3	S	M	L		M							M	S	S

CO4	S	M	L		M							M	S	S
CO5	S	M	L		M							M	S	S
CO6	S	M	L		M			S	S	S	L	M	S	S

S- Strong; M-Medium; L-Low

### Assessment Pattern: Cognitive Domain

CO	CAT 1			CAT 2			ASSIGNMENT 1				ASSIGNMENT 2				TERMINAL			
TPS SCALE	1	2	3	1	2	3	3	4	5	6	3	4	5	6	1	2	3	4
CO1	5	10													2	5		
CO2	3	10	30				50									5	15	
CO3	2	10	30				50								2	5	15	
CO4				5	10	20					40				2	5	10	
CO5				3	10	20					30				2	5	10	
CO6				2	10	20					30				2	5	10	

**Assignment marks are based on python programming**

### Syllabus

**Introduction to Problem Solving:** Problem Analysis - Algorithms - Flowcharts, Verifying Algorithms - Comparison of Algorithm - Coding - Problem solving strategies - High level languages, syntax, semantics, compilation and execution, Debugging

**Introduction to Python :** Introduction - Python Overview - Comments - Python Identifiers - Reserved Keywords -Variables - Standard Data Types - Operators - Statement and Expression - Boolean Expressions - Control Statements - Iteration – while Statement - Input from Keyboard - Basic programming examples

Strings - Lists - Tuples - Dictionaries - Mutability - Development of simple applications

**Functions** : Introduction - Built-in Functions - Composition of Functions - User Defined Functions - Parameters and Arguments - Function Calls - The return Statement - Python Recursive Function - The Anonymous Functions - Writing Python Scripts

**Files and Exceptions:** Text Files - Directories - Exceptions - Exception with Arguments -- User-Defined Exceptions

**Classes and Objects** : Overview of OOP (Object-Oriented Programming) - Class Definition - Creating Objects - Objects as Arguments - Objects as Return Values - Built-in Class Attributes - Inheritance - Method Overriding - Data Encapsulation - Data Hiding

### Reference Books

1. John V.Gutttag, " Introduction to Computation and Programming Using Python : With Application to Understanding Data", Prentice-Hall International publishers, Second Edition, 2017.
2. E. Bala gurusamy, "Introduction to Computing and Problem Solving using Python", Mcgraw Higher Ed, First Edition, 2016.
3. ReemaThareja, "Python Programming using problem solving Approach", Oxford University, Higher Education Oxford University Press, First edition, 2017.
4. R.G.Dromey, "How to solve it by Computers", Pearson Education India , First Edition, 2008
5. NPTEL course "A joy of computing using python" , <https://nptel.ac.in/courses/106106182/>
6. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Updated for Python 3, Shroff/O,Reilly Publishers, Second Edition, 2016.
7. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., First Edition, 2016.
8. Mark Pilgrim, "Dive into Python 3", Apress, 2009

### Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours	Course Outcome
1	<b>Introduction to Problem Solving</b>		
1.1	Problem Analysis	1	CO1
1.2	Algorithms - Flowcharts	1	CO1
1.3	Verifying Algorithms - Comparison of Algorithm - Coding	1	CO1
1.4	Problem solving strategies	2	CO1
1.5	High level languages, syntax, semantics,	1	CO1

1.6	Compilation and execution, Debugging	1	CO1
2	<b>Introduction to Python</b>		
2.1	Introduction - Python Overview	1	CO2
2.2	Comments - Python Identifiers - Reserved Keywords	1	CO2
2.3	Variables - Standard Data Types - Operators	1	CO2
2.4	Statement and Expression	1	CO2
2.5	Boolean Expressions - Control Statements	1	CO2
2.6	Iteration – while Statement - Input from Keyboard	1	CO2
2.7	Basic programming examples	3	CO2
2.8	Strings	1	CO3
2.9	Lists - Tuples	1	CO3
2.10	Dictionaries - Mutability	1	CO3
2.11	Development of simple applications	3	CO3
3	<b>Functions</b>		
3.1	Introduction - Built-in Functions - Composition of Functions	1	CO4
3.2	User Defined Functions - Parameters and Arguments	1	CO4
3.3	Function Calls - The return Statement - Python Recursive Function	2	CO4
3.4	The Anonymous Functions - Writing Python Scripts	1	CO4
4	<b>Files and Exceptions:</b>		
4.1	Text Files - Directories	1	CO5
4.2	Exceptions - Exception with Arguments	1	CO5
4.3	User-Defined Exceptions	1	CO5
4.4	<b>Classes and Objects</b>		

4.5	Overview of OOP (Object-Oriented Programming)	1	CO6
4.6	Class Definition - Creating Objects	1	CO6
4.7	Objects as Arguments - Objects as Return Values	1	CO6
4.8	Built-in Class Attributes - Inheritance	2	CO6
4.9	Method Overriding - Data Encapsulation - Data Hiding	1	CO6
<b>Total Lecture Hours</b>		<b>36</b>	

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