Note: <mark>Removed Contents are marked in Yellow color</mark> and Added Contents are marked in red color

	L	T	P	Credits	Total Marks
SCS1101 **PROBLEM SOLVING TECHNIQUES**	3	0	0	3	100

COURSE OBJECTIVES

☐ To understand the basics of solving a problem through computing

☐ To study different algorithms for solving a given problem.

UNIT 1 PROGRAMMING TECHNIQUES   **9Hrs.**

Steps Involved in Computer Programming - Problem Definition - Outlining The Solution - Flow Chart - Developing Algorithms - Efficiency of Algorithms - Analysis of Algorithms - Step Count & Operation Count

UNIT 2 FUNDAMENTAL ALGORITHMS   **9 Hrs**.

Exchanging the Values - Counting - Summation of Set of Number - Factorial Computation - Sine Computation - Fibonacci Sequence - Reversing the Digits of an Integer - Base Conversion - Character to Number Conversion.

UNIT 3 FACTORING METHODS   **9 Hrs.**

Finding the Square Root of a Number - Smallest Divisor of an Integer - GCD of Two Integers - Generating Prime Numbers - Computing the Prime Factors of an Integer - Generation of Pseudo - Random Numbers - Raising a Number to a Large Power - Computing the Nth Fibonacci Number.

UNIT 4 ARRAY TECHNIQUES   **9 Hrs**.

Array Order Reversal - Array Counting or Histogramming - Finding the Maximum Number in a Set - Removal of Duplicates from an Ordered Array - Partitioning an Array - Finding the kth Smallest Element - Longest Monotone Subsequence.

UNIT 5 DESIGN OF ALGORITHMS- BACKTRACKING, BRANCH AND BOUND, SEARCHING   **9Hrs**

Backtracking - 8 Queens - Hamiltonian Circuit Problem, Branch and Bound - Travelling Salesman Problem, Searching - water jug problem, tic-tac-toe problem.

                                                            Max. 45 Hours

TEXT / REFFERENCE BOOKS

1. Dromey.R.G, "How to Solve it by Computer", Prentice-Hall of India, Eighth Indian Reprint,1996.

2. Ellis Horowitz,sartaj Sahni ,"Fundamentals of Data Structures", Computer Science Press,1983.

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END SEMESTER EXAM QUESTION PAPER PATTERN

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Max. Marks : 100 Exam   Duration : 3 Hrs.

PART A : 10 questions of 2 marks each- No choice   **20 Marks**

PART B : 2 questions from each unit of internal choice, each carrying 16 marks   **80 Marks**

SCSA1101	PYTHON AND PROBLEM SOLVING TECHNIQUES	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To learn fundamentals of PST and basics of python programming.
- To learn modular programming.
- To study in detailed data representation, operator, control structures, functions in python and apply it on problems.
- To learn in built functions in python and apply it on mathematical problem.
- To learn advanced algorithm by implementing lists, tuples and dictionaries.

UNIT 1 INTRODUCTION TO COMPUTER PROBLEM SOLVING   9 Hrs.

Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart), algorithmic problem solving for socio economic conditions in global perspectives, simple strategies for developing algorithms (iteration, recursion), the efficiency of algorithms.

UNIT 2 DATA, EXPRESSIONS, STATEMENTS   9 Hrs.

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments;
Algorithms: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT 3 CONTROL FLOW, FUNCTIONS   9 Hrs.

Conditional statements: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iterative statements: while, for, break, continue, pass, Applying for critical conditions. Algorithms: square root, exponentiation, sum an array of numbers, factorial computation-Sine function computation-Generation of the Fibonacci sequence-Reversing the digits of an integer.

UNIT 4 FACTORING METHOD   9 Hrs.

Functions: return values, parameters, local and global scope. Lambda, filter, map and reduce functions. Algorithms: The smallest divisor of an integer-The greatest common divisor of two integers-Generating Prime Numbers-Computing the Prime Factors of an integer- Raising a Number to a Large Power

UNIT 5 LISTS, TUPLES, DICTIONARIES   9 Hrs.

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Algorithms: Removal of Duplicates - Partitioning - Finding the kth smallest Element- histogram.

Max.45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Design a modular solution for a given problem.

CO2 - Choose appropriate algorithm for each module considering economic and social aspects.

CO3 - Employ multiple critical and creative thinking strategies in reasoning and problem solving.

CO4 - Evaluate and choose an appropriate problem-solving strategy.

CO5 - Document the approach to be implemented in any language.

CO6 - Apply to the problem-solving techniques on real world problems.

TEXT / REFERENCE BOOKS

1. Dromey R.G., "How to Solve it by Computer", Prentice Hall of India, 8th Indian Reprint, 2008.
2. Aho A.V., Hopcroft J.E. and Ullman J.D,, "The Design and Analysis of Computer Algorithms", Pearson Education, 2004.
3. Martin C. Brown, "Python: The Complete Reference", McGraw Hill, 2018.
4. John M. Zelle, "Python Programming: An Introduction to Computer Science", Library of Congress.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 Questions carrying 2 marks each – No choice   **20 Marks**

PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   **80 Marks**