Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M.Tech.) – Cyber Security
Course Code	:	1MCS05
Course Title	:	Data Structures and Algorithms Using Python
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	foundation in Python programming, mathematical concepts, programming logic, basic data structures, algorithmic complexity analysis
Course Objective	:	To understand the fundamentals of Data Structures.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Identify the appropriate data structures as per the specified problem definition.
	CO2	Demonstrate the operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
	CO3	Analyse the complexity of the given algorithms.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
2	0	2	3	70	30	30	20	150

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P** – Practical, **C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists ofAssignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Introduction:** **Data** **structure:** classification of data structure, operations on data structure, Development of Algorithms: Notations and analysis, recursion, Arrays: Definition, Types of arrays, operations on an array, and applicationsof arrays, sparse matrices.	12	20%	CO1

2	**Linked Lists:** Linear, circular, double, and priority link lists, operations on polynomials, dynamic storage management: garbage collection and compaction.	12	20%	CO1 CO2
3	**Stacks:** Stacks as ADT, Different implementation of the stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dequeue and Priority Queue, Queue simulation, Application of queues.	12	20%	CO1 CO2
4	Linear search, binary search; Sorting Techniques: selection, bubble, insertion, merge, heap, quick, and radix sort, Hashing: Hash Functions, separate chaining, open addressing, rehashing.	12	20%	CO2 CO3
5	**D Tree:** General tree, binary Tree, rooted tree, binary search tree, tree traversal, Expression manipulation, height-balanced trees, red-black trees. **Graph:** Definition, walks, paths, trails, connected graphs, regular and bipartite graphs, cycles and circuits, Spanning trees, Hamiltonian and Eulerian graphs, planar graphs, Graph traversal techniques, shortest path problems	12	20%	CO2 CO3

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	20	30	30	20	0	0

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

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.geeksforgeeks.org/python-data-structures/
2	https://www.edureka.co/blog/data-structures-in-python/
3	https://docs.python.org/3/tutorial/datastructures.html
4	https://www.tutorialspoint.com/python_data_structure/python_data_structure_introduction.htm

Reference Books

Sr. No.	Name of Reference Books
1	"Python Algorithms: Mastering Basic Algorithms in the Python Language" by Magnus Lie Hetland
2	"Problem Solving with Algorithms and Data Structures Using Python" by Bradley N. Miller and David L. Ranum
3	"Data Structures and Algorithms in Python" by Michael T. Goodrich, Roberto Tamassia, and Michael H.
4	"Python Data Structures and Algorithms" by Benjamin Baka