Tribhuvan University
Institute of Science and Technology
Department of Computer Science and Technology

Data Structure and Algorithms Micro-Syllabus

S.No.	Unit	Hours	Total Hours	Marks
1	**Concept and Definition of Data Structures** a. Information and its meaning b. Array in C c. The array as an ADT d. One dimensional array e. Two dimensional array f. Multi-dimensional array g. Structure h. Union i. Pointer	4	4	5
2	**Algorithm** a. Concept and Definition b. Design of algorithm c. Characteristic of algorithm d. Big O notation	2	2	3
3	**The Stack** a. Concept and Definition • Primitive Operations • Stack as an ADT • Implementing PUSH and POP operation • Testing for overflow and underflow conditions b. The Infix, Postfix and Prefix • Concept and Definition • Evaluating the postfix operation • Converting from infix to postfix c. Recursion • Concept and Definition • Implementation of: ➢ Multiplication of Natural Numbers ➢ Factorial ➢ Fibonacci Sequences ➢ The Tower of Hanoi	2 3 3	8	11
4	**Queues** a. Concept and Definition b. Queue as ADT c. Implementation of Insert and Delete operation of • Linear Queue • Circular Queue d. Concept of Priority Queue	1 2 1	4	5
5	**Linked List** a. Concept and Definition b. Inserting and deleting nodes c. Linked implementation of a stack (PUSH / POP) d. Linked implementation of a queue (Insert / Remove) e. Circular List • Stack as a circular list (PUSH / POP)	1 2 2	6	8

No	Topic	Hrs		
	• Queue as a circular list (Insert / Remove) f. Doubly Linked List (Insert / Remove)	1		

6	**Tree**
	a. Concept and Definition
	b. Binary Tree
	c. Introduction and application
	d. Operation
	e. Types of Binary Tree
	  • Complete
	  • Strictly
	  • Almost Complete
	f. Huffman algorithm
	g. Binary Search Tree
	  • Insertion
	  • Deletion
	  • Searching
	h. Tree traversal
	  • Pre-order traversal
	  • In-order traversal
	  • Post-order traversal
		1
		
		1
		
		1
		
		2
		
		2
			7	9

7	**Sorting** a. Introduction b. Bubble Sort c. Insertion d. Selection e. Quick f. Merge g. Comparison and Efficiency of sorting	2 2 1	5	7
8	**Searching** a. Introduction b. Sequential Searching c. Binary Search d. Comparison and Efficiency of Searching e. Hashing • Probing (Linear and Quadratic)	2 2 1	5	7

9	**Graph**
	a. Introduction
	b. Representation of Graph
	  • array
	  • linked list
	c. Traversal
	  • Depth First Search
	  • Breadth First Search
	d. Minimum spanning Tree
	  • Kruskal's algorithm
		1
		
		2
		
		1
			4	5

Text Book:
Data Structures using C and C++, Y. Langsam, M. J. Augenstein, A. M. Tenenbaum

Reference Book:
The Design and Analysis of Algorithm, Nitin Upadhyay, SK Kataria & Sons

Prerequisite: C

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