

Name of Programme : Diploma in Computer Engineering

Programme Code : 06

Name of Course : Data Structures Using ' C '

Course code No. : CM546

Time Allotted:

	Hours / Week	Total Hours
Theory	04	64
Term Work / Practical	02	32

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term-work
Duration	Three Class tests of 60 Min. duration	3 Hrs.	--	--	--
Marks	20	80	50	---	25

Course Aims: In the present era it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Data structure is such a tool, which aims in developing data organizing and programming skills.

Course Objectives: Students will be able to:

- Write programs in ' C ' using different types of data structures
- Understand concepts of arrays, pointers, link list, stacks, queues, trees, and graphs.
- Use proper data structures for particular problem.
- Develop efficient software using various data structures.

Course Contents:

Sr. No	Topic / Subtopic	Hours	Weightage	Practical
Section – I				
1.	Introduction to data structures: Basic terminology, data structure operations, complexity, and time space tradeoff. Arrays in C : Single dimensional , Multi dimensional ,strings ,Array operations: Insertion,deletion,traversing,searching:linear,binarysearch,sorting:Bubble sort, Sparse Matrices. Pointers in ' C ' : Pointers and Arrays, Pointers and Functions.	12	15	Programs based on: Array operations; insertion, deletion, linear search, binary search, bubble sort, programs on multidimensional arrays. Pointers, Pointers and arrays, pointers and functions. (All programs on various array operations + Minimum two programs on multidimensional arrays + Minimum three simple programs demonstrating use of pointers).

2.	<p>Link Lists: Structures in ' C ' , Dynamic memory Allocation, singly link list, Representation of link list, Link list operations: creating, traversing, inserting, deleting in sorted as well as unsorted link list. Header links list, Two-way list, Implementation of link list.</p>	16	15	<p>Programs for link list operations: Creating a link list, inserting at first node, inserting after given position, deleting of the node, counting number of nodes, creating a sorted link list, searching, reverting. All above link list operations to be practiced for two way (doubly) link list.</p>
3.	<p>Stacks, Queues & Recursion: Stacks: Concept, representing stacks in ' C ' . Polish Notations (Prefix, postfix), Infix, Applications of stacks, Quick sort. Recursion: Recursive definitions and processes, Recursion in ' C ' , writing recursive programs factorial, fibonacci, ackermann function, Tower of Hanoi, Implementation of recursive procedures by means of stack. Queues: The queue and its sequential representation, concept of queues, priority queues.</p>	10	10	<p>Programs for: Implementation of PUSH & POP operations, Tower of Hanoi, Evaluate postfix expressions, Infix to postfix conversions. Recursive programs: factorial, fibonacci, ackermann function, and tower of Hanoi. Programs for demonstrating queue operations. Implementation of tower of Hanoi in non-recursive ways. (Programs demonstrating: stack operations + queue operations +evaluating expression + at least two programs on recursion + one recursive program converted to non recursive ones.)</p>
Section - II				
4.	<p>Trees: Introduction, Binary trees, Binary tree representation, Traversing binary tree, Traversal algorithms using stacks, Header nodes, Threading concept, Binary search tree (BST), searching and inserting in BST, deleting from BST, Heap, Heapsort, pathlengths: Huffmann algorithm, General trees.</p>	10	14	<p>Programs for: Creating a binary tree, in order, preorder and post order traversal of binary tree, deleting a node from binary tree. (Minimum one tree traversal technique is must).</p>
5.	<p>Graphs and their applications: Introduction, Graph theory terminology, Sequential representation of graphs, Adjacency matrix, Path matrix, Warshalls algorithm, shortest path, linked representation of graph, Operations on graphs, traversing a graph and spanning forest, posets typological sorting.</p>	10	14	-----

6.	Sorting and searching: General background, Exchange sort, Selection sort and tree sorting, insertion sort, merge sort and radix sort. Searching: Basic search techniques, tree searching, hashing, general search trees. Storage management: General trees, automatic lists management, dynamic memory management.	06	12	Programs for implementing various sorting and searching techniques. (Minimum two sorting techniques and two searching techniques from topics mentioned in this chapter.)
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Text Books:

Author	Title	Publisher
Tanenbaum, Langsman, Augenstein	Data Structures in ' C '	PHI Publications
Lipschultz	Data Structures	Schaum Outline Series

Reference Books:

Author	Title	Publisher
Yashwant Kanetkar	Pointers in ' C '	BPB Publications
Tremblie and Sorrenson	Data Structures	TMH Publications

Learning Resources: OHP, LCD, Projector, and Transference, White board.

Specification Table:

Sr. No.	Topic	Knowledge	Comprehension	Application	Total
1.	Introduction to Data Structures	10	02	03	15
2.	Link Lists	03	02	10	15
3.	Stacks, Queues & Recursion	03	02	05	10
4.	Trees	04	03	07	14
5.	Graphs and their applications	04	03	07	14
6.	Sorting and Searching	03	03	06	12
	Total	27	15	38	80

Prepared by
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