COURSE HANDOUT

DATA STRUCTURES USING C (BCAMJ-201)

BCA-2nd SEMESTER

ACADEMIC YEAR (2025-26)

Ms. Amita Khanna

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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BCAMJ-201	Data Structures Using C	Major	4	4	0	0	20	60	100

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Understand the basics of data types and data structures.
CO2	Compare different data structures in context of their properties.
CO3	Identify the use of different data structures to solve a given problem
CO4	Apply different data structures to solve different sorting and searching problems
CO5	Appreciate applicability of advanced data structures to model and solve real world problems

Unit-I

Introduction to data structures: -: Introduction to data structures: Binary and Decimal Integers, Real Numbers, Character Strings, Abstract Data Types, Sequences as Value Definitions, Data Types in C, Pointers in C, Data Structures and C, Representation of Arrays, Structure in C.

(3 Hours)

Unit-II

Stacks and Queues-: Concept of Stacks, Operation on Stacks, Representing Stacks in C, Implementing the pop Operation, testing for Exceptional Conditions, Implementing the Push Operation, Multiple stacks, Application of stacks in Infix, Postfix, and Prefix, Recursion, Concept of Queues, Operation on Queues, Multiple Queues, Priority Queues, Circular Queues

(10 Hours)

Unit-III

Linked Lists: - Insertion, Deletion and traversal on Linear Linked Lists, Doubly Linked List, circular Linked List, Linked List as data structure, Header nodes, Stacks & Queues using linked list, Dynamic memory management, Garbage Collection. (10 Hours)

Unit- lV

Trees: - Binary trees and it's representation using Linked list, Operations on Binary Trees, Traversal Algorithms, Applications, Threaded Binary Trees and its traversal algorithms, Heterogeneous binary trees, List representation using binary trees, Optimum search trees, AVL trees.

Graphs Representation of Graphs, traversal methods, Applications undirected graphs, Directed Graph & their traversal, Depth first, Breadth First, Shortest path algorithms, Minimum Cost Spanning tree.

(18 Hours)

Unit-V

Searching & Sorting: Exchange Sort (Bubble, Quicksort), Selection & Tree Sorting. Insertion sort, Shell Sort, Address Calculation Sort, Merge & Radix Sort. Sequential Searching, Searching an Ordered Table, Index sequential search, Binary search, Interpolation search, Tree searching (5 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Data Structure using C	Tenenbaum, Langsam, Augenstein	Pearson/Addison Wesley	2nd (2007)
2.	Fundamentals of data structures	Horowiz E. and Sahni S	Cambridge University Press	2nd (2004)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Data structures and Program Design	Robert L Kruse	Prentice Hall	1st (1972)

COURSE PLAN		
Unit-I Introduction to Data Structures		
S.No	**Topics**	**Resource/Link**
1	Concepts of data, number system and algorithms	https://nptel.ac.in/courses/106105085/1
2	Data Structure & Abstract Data types	https://nptel.ac.in/courses/106105085/2
3	Data Structures and C	https://nptel.ac.in/courses/106105085/5
4	Pointers in C	https://www.tutorialspoint.com/cprogramming/c_pointers.htm
5	Structures in C	https://www.tutorialspoint.com/cprogramming/c_structures.htm
6	Representation of Arrays	https://www.tutorialspoint.com/cprogramming/c_arrays.htm
7	Sparse Matrices	https://www.geeksforgeeks.org/sparse-matrix-representation/
Unit-II Stacks and Queues		
8	Concepts of Stacks	https://www.tutorialspoint.com/data_structures_algorithms/stack_program_in_c.htm
9	Operations on Stacks	https://www.programiz.com/dsa/st

		ack
10	Multiple Stacks	https://www.etutorialspoint.com/index.php/data-structure/multiple-stack
11	Applications of Stacks in Infix, Prefix and Postfix	https://www.youtube.com/watch?v=TB7qzDgX-pI https://www.javatpoint.com/convert-infix-to-prefix-notation
12	Recursion	https://javascript.info/recursion
13	Concept Of Queues	https://www.tutorialspoint.com/data_structures_algorithms/dsa_queue.htm
14	Operation on Queues	https://www.geeksforgeeks.org/queue-data-structure/
15	Multiple Queues	https://www.geeksforgeeks.org/efficiently-implement-k-queues-single-array/
14	Priority Queues	https://www.programiz.com/dsa/priority-queue#:~:text=A%20priority%20queue%20is%20a,their%20order%20in%20the%20queue.
15	Circular Queues	https://www.geeksforgeeks.org/circular-queue-set-1-introduction-array-implementation/
	Unit-III Linked Lists	
16	Insertion, Deletion and Traversal on linear linked list	https://www.tutorialspoint.com/data_structures_algorithms/linked_list_program_in_c.htm
17	Doubly linked list	https://www.javatpoint.com/doubly-linked-list
18	Circular linked list	https://www.geeksforgeeks.org/circular-linked-list/
19	Linked list as data structure	https://www.simplilearn.com/tutorials/data-structure-tutorial/linked-list-in-data-structure

20	Stacks and Queues using linked list	https://www.scaler.com/topics/c/stack-using-linked-list-in-c/ https://www.geeksforgeeks.org/queue-linked-list-implementation/
	Unit-IV Trees and graphs	
22	Binary tress and its representation using linked list,	https://www.slideshare.net/rajendranjrf/binary-tree-49873757
23	Operation on binary trees	https://www.geeksforgeeks.org/threaded-binary-tree/
24	Threaded Binary trees and its traversal algorithm	https://www.geeksforgeeks.org/avl-tree-set-1-insertion/
25	Representation of graphs Traversal methods, applications	https://www.programiz.com/dsa/graph
26	Undirected graphs Directed graphs and their traversal	https://www.geeksforgeeks.org/difference-between-bfs-and-dfs/
	Unit-V Searching and Sorting	
29	Exchange sort (Bubble sort, Quick sort) Selection & Tree Sorting	https://www.geeksforgeeks.org/sorting-algorithms/ https://nptel.ac.in /courses/106105 085/26
30	Insertion sort, Shell Sort	https://www.geeksforgeeks.org/insertion-sort/
31	Address Calculation Sort	https://www.geeksforgeeks.org/address-calculation-sort-using-hashing/
32	Merge & Radix Sort.	https://www.youtube.com/watch?v=8BI2MNnwrKI
33	Sequential Searching	https://bradfieldcs.com/algos/searching/the-sequential-search/
34	Searching an Ordered Table	https://www.pdas.com/binsrch.html, http://www.foo.be/docs-free/Numerical_Recipe_In_C/c3-4.pdf

35	Index sequential search	https://www.geeksforgeeks.org/indexed-sequential-search/
36	Binary search,	https://www.programiz.com/dsa/binary-search
37	Interpolation search,	https://www.geeksforgeeks.org/interpolation-search/
38	Tree searching	https://en.wikipedia.org/wiki/Search_tree

ADDITIONAL WEB RESOURCES

1.	VLAB: http://cse01iiith.vlabs.ac.in/exp2/Simulation.html?domain=Computer%20Science&lab=Data%20Structures# This is a Vlab on DS which gives a hands-on experience to the students.
2.	**NPTEL LINK:** https://nptel.ac.in/courses/106105085/This site contains video lectures on various topics of Data Structures including the transcripts of the videos which will help the students from exam point of view also.

GRADING AND ASSESSMENT

- **Sessional Test**: 10 marks
- **Assignment**: 10 marks
- **Attendance**: 10 marks
- **Final Examination**: 100 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday (12:05 PM - 12:55 PM)
  Friday (12:05 PM - 12:55 PM)
- **Contact Information**
  amita.bca@mietjammu.in

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