

DATA STRUCTURES
(BCA-302)

UNIT PLAN
BCA-3rd Semester (July 2017-Dec 2017)
DATA STRUCTURES

Total Marks-100

Ext-90, Int-10

INTRODUCTION: Data Structure is a concept based subject which deals with the way of collecting and organising data in such a way that we can perform operations on these data in an effective way. Data Structures is all about the rendering of data elements in terms of some relationship, for better organization and storage. This chapter includes linked list, trees and searching techniques etc.

UNIT- I

(Time: 10-15 lectures)

Entry Behaviour:-

- This chapter starts with the Data structure basics, its notations and complexity.
- The students will learn about Big-O notation.
- Then students will learn about the Data structure operations and applications.
- The students will learn about the concept of Basic data structures like Array, its types, memory representation, applications and operations.
- Students will also learn about the concept of Stacks and queue, memory representation, applications and operations.

Learning Outcomes:

- The students will be able to define the concept of Data structure with its functionalities in problem solving.
- Students will learn about Big-O notation.
- The students will get the concept of basic data structure Array and its different functionalities like location tracing, searching etc.
- Students will get the idea about how stacks and queues are used for data functioning in computer system memory.
- The learners will be able to understand the internal working of Data structure algorithms and their different functionalities.

Major objectives:

- To make students understand the idea of Data's structure and its internal functionalities.
- It will make learners understand the Big-O Notation.
- To give the understanding to learners the concept of Array.
- To present the types of array and its memory representation and its applications.
- To present the concept of Stack.
- To present the concept of Queue.
- To make students understand the concept of Stacks and Queue functionalities and its applications.

Details of Unit Plan for UNIT- I :

Topics	Teaching points	Specific Objectives	Methods, Approaches and techniques	Resources and links
a) Data structures b) Array, c) stacks and Queue.	Definition and scope of Data structure, Applications of	The students will be able to get the complete	Class lectures, Power Point Presentations, Online video	Data Structure, Schaum Outline Series, TMH, New Delhi,

	data structure, Array, Stack and queue.	knowledge of Data structure, Array, Stack and queue.	lectures.	Data Structure Using C, Pearson. Other Course books (recommended), e-books, e-articles.
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UNIT-II

(Time: 12 -15 lectures)

Entry Behaviour:-

- This chapter holds the concept of Linked List.
- The student will learn about the different Linked list operations.
- The students will learn the operations like Traversing and searching techniques.
- Learners will learn about the operations of insertion and deletion.
- Students will learn about Header Linked list operations.
- Students will learn about Circular Linked list operations.
- Students will learn about Doubly Linked list operations.
- The students will be learning about the memory representation and applications in linked list.
- Students will also learn about the concept of Polynomial manipulation.

Learning outcomes :-

- The students will be able to understand the concept of Linked List and its different operation.
- The learner will be able to perform the Traversing and searching operations with linked list.
- The learner will be able to insert or delete the element in linked list with the help of algorithm.
- The learner will be able to understand the operations of Header linked list, circular linked list and doubly linked list.
- Further the learners will be able to understand the concept of memory representation in linked list.
- The student will be able to solve the problems of linked list operations.

Major objectives:-

- To make students understand the concept of linked list and its different operations.
- To give the difference between linked list and Arrays.
- To make learners understand the searching technique in linked list.
- To make students understand the concepts like availability list, garbage collection, overflow and underflow.
- After completing this chapter, students will be able to perform insertion and deletion operations on linked list.

Details of Unit Plan for Unit-II:-

Topics	Teaching Points	Specific Objectives	Methods, Approaches and Techniques	Resources and links
a) Linked List, b) Memory representation	Linked list, Traversing, Searching, Insertion, Deletion, circular linked list, Doubly linked list, Header linked list, Memory	The students will be able to perform specific operations like Traversing, searching, insertion and deletion on linked list.	Class lectures, Power point Presentations, Online Video Lectures etc.	Data Structure, Schaum Outline Series, TMH, New Delhi, Data Structure Using C, Pearson. Other Course books (recommended),

	representation etc.			e-books, articles.	e-
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UNIT- III

(Time: 12-15 lectures)

Entry Behaviour:-

- This chapter is all about the concept of Tree in linked list.
- Students will get the Idea about representation in contiguous storage.
- Learners will learn the concept of Binary tree.
- The students will get to know about the operations like traversing and searching, insertion and deletion with Tree concept.
- The students will learn about the types of the Binary tree.
- The students will learn about the concept of Heap tree.
- The student will learn to write tree based algorithms which are used for problem solving in data structure.
- Learners will learn about the AVL trees.

Learning Outcomes:-

- The students will be able to understand the concept of Tree.
- The Students will be able to define and use binary tree for problem solving.
- The student will be able to understand binary tree traversal and searching algorithm.
- The student will be able to explain and use operations like insertion and deletion with tree concept.
- The students will be able to understand Binary search technique and its algorithm.
- Learners will be able to understand the AVL Tree concept.

Major Objectives:-

- To make students understand the concept of Tree.
- To make students understand that how to use Binary tree algorithm for Problem solving in data structures.
- To explain the operations like Insertion and deletion with algorithms in Trees to the students.
- To make learners understand the Binary tree concept.
- To explain the AVL Tree concept to learners with proper algorithm.

Details of Unit Plan for Unit-III:-

Topics	Teaching Points	Specific objectives	Methods, Approaches and techniques	Resources and links
a) Tree, b) Binary Tree, c) Binary tree operations, d) AVL Tree	Tree concept, Representation, Binary tree: Traversal, Searching, Insertion and deletion, AVL tree etc.	To make Students understand the Tree operations, Binary tree operations like searching, traversing, insertion and	Class lectures, Power point Presentations, Online Video Lectures etc.	Data Structure, Schaum Outline Series, TMH, New Delhi, Data Structure Using C, Pearson. Other Course books

		deletion etc.		(recommended), e-books, e- articles.
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UNIT- IV

(Time: 12-15 Lectures)

Entry Behaviour:

- This chapter contains the content regarding Searching and sorting techniques.
- The students will learn about Binary search technique and Linear search techniques.
- The students will be learning about the different type of Sorting techniques like, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, Quick sort, Shell sort, Heap sort etc.
- The learners will be understanding the algorithms of all above mentioned sorting techniques that are used for problem solving in Data structure.
- The students will learn to compare various searching and sorting algorithms.

Learning Outcomes:

- The students will be able to understand the binary search algorithm.
- The learners will be able to understand the Linear search algorithm.
- The students will be able to understand the different sorting techniques.
- Learners will be going well with sorting and searching algorithms .
- The students will be able to compare the searching and sorting algorithms.
- The students will be able to understand the complexity of the different searching and sorting algorithms.

Major Objectives:

- To describe the complete concept of Searching techniques with algorithms.
- To make students understand the concept of Binary search and Linear search with the help of algorithms.
- To describe and present the different sorting techniques like Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, Quick sort, Shell sort and Heap sort.
- To make students understand the complexities of these searching and sorting techniques.

Details of Unit Plan for Unit-IV :

Topics	Teaching Points	Specific Objectives	Methodology, approaches and techniques	Resources and Links
a) searching algorithms, b) sorting algorithms	Searching techniques, Binary search, linear search, Sorting, bubble, insertion, selection , Merge, radix, quick and Heap sort	To make students understand the searching and sorting techniques.	Class lectures, Power point Presentations, Online Video Lectures etc.	Data Structure, Schaum Outline Series, TMH, New Delhi, Data Structure Using C, Pearson. Other Course books (recommended), e-books, e-articles.

Curriculum Studies (Data Structure)

BCA 3rd Semester

Question Bank

Unit -I

Short Answer Type Questions:-

1. Explain the concept of file, record, field, data and data item.
2. What is data structure?
3. What are the characteristics of a well designed data structure?
4. Describe the concept of Array with example.
5. Write four advantages of array.
6. How will you define the concept of stack?
7. What is an algorithm? What are its characteristics?
8. What do you know about memory representation in data structure.
9. What do you mean by multi dimensional Array.
10. Define: Traversing, Searching etc.

Long Answer Type Questions:-

1. What is array? Describe it with proper C language program. Write its advantages and disadvantages.
 2. Differentiate between:
 - a. Linear and Non-linear data structures.
 - b. Homogeneous and heterogeneous data structure.
 - c. Static and dynamic data structure.
 3. Discuss the Big-O notation. Using the example, explain the steps involved in deriving the Big-O notation from time complexity function. Discuss the various properties of Big-O notation.
 4. a) Discuss the following in detail:
Big-Omega notation, Big-Theta notation.
b) what do you understand by Best, Average and worst case complexity of an algorithm.
 5. What are the different operations we perform on an Array. Describe each with the help of Algorithms. Discuss each point of its algorithm.
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Unit-II

Short Answer Type Questions:-

1. What is linked list?
2. Write two differences between linked list and array in the context of Data structure.
3. What is traversing? Give a simple algorithm explaining it.
4. What is searching algorithm in Linked list? Why do we use it?
5. Define the terms: Insertion, Deletion, sorting.
6. What are the different notations we use in linked list algorithms? Write about each.
7. What is memory allocation in Linked list?
8. Define the term Garbage collection.
9. What is the difference between Header linked list, Doubly linked list and circular linked list.
10. What is Node in linked list?

Long Answer Type Questions:-

1. Define linked list. Write about the different parts of the linked list. What are the different operations performed on linked list in data structure.
 2. Write down the algorithms of: Traversing, Searching, Insertion and deletion.
 3. What is sorted linked list? Write an algorithm for searching into a sorted linked list.
 4. What is doubly linked list? Describe its types. Write the operations that we can perform on doubly linked list?
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Unit-III

Short Answer Type Questions:-

1. Define Tree.
2. Define: Node, Edge or Link.
3. What is the difference in Parent node and Child node?
4. What are Degree, Height and Depth of Tree?
5. Differentiate full binary tree and complete binary tree.
6. What is In order Traversal?
7. Define post order traversal.
8. What is Binary tree? Write its operations.
9. What is insertion and deletion?
10. Differentiate Heap tree and AVL tree.

Long Answer Type Questions:-

1. Define Tree? What are Binary tree? Write the properties of Binary tree. What operations can we perform on Binary tree.
 2. Write a complete note on binary tree.
 3. What is heap tree? How will you represent Heap tree in an Array. What are the different operations that can be performed on Heap Tree? What are its applications?.
 4. What are AVL trees? What is AVL rotation? Explain its types.
 5. What is Huffman Algorithm? Write applications of Huffman Tree.
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Unit-IV

Short Answer Type Questions:-

1. What do you mean by Searching?
2. Differentiate Binary search and linear search.
3. What is Sorting technique? What is its use in data structure?
4. Define: Insertion, Selection.
5. What is merge sort?
6. What is Hash function, Hash Table?
7. Define Quick, Heap and shell Sort.
8. Discuss the complexity of merge sort.

Long Answer Type Questions:-

1. What is Sorting? Discuss in details with algorithms.
 2. Write a program in C language to sort n elements of an Array in ascending order using selection sort.
 3. What is Redix sort? Discuss the complexity of Redix sort.
 4. Using an example, explain how bubble sort is used for sorting data.
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