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NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

Freshmen Engineering Department

Class : I B.Tech – II-Sem **Academic Year : 2023- 2024**

Course Title : Data Structures **Course Code :**

MODULE - I				
INTRODUCTION				
Sno	**Questions**	**CO**	**BL**	**MARKS**
1	Define time complexity.	1	1	2
2	Define space complexity.	1	1	2
3	Define Data Structures.	1	1	2
4	Write different types of data structures.	1	2	2
5	List Different Types of liner data structures.	1	2	2
6	Define Abstract Data type.	1	1	2
7	What is the importance of linear data structures?	1	1	2
8	List out Abstract Data types.	1	2	2
9	List Different Types of non liner data structures.	1	2	2
10	What is an array? What is the syntax to declare an array?	1	1	2
11	List any four operations performed on array.	1	1	2
12	List any four types of asymptotic notations.	1	1	2
13	Write any two advantages of ADT.	1	1	2
14	Differentiate linear and nonlinear data structures.	1	2	2
16	What are the disadvantages of ADT?	1	1	2
17	List any four applications of linear data structures.	1	1	2

MODULE - I

INTRODUCTION

Sno	Questions	CO	BL	MARKS
1	Define Data Structures. Explain various types of data Structures.	1	2	10
2	a) Define ADT. Give an example for it. b)Compare and contrast linear and non linear data structures.	1	2	5+5
3	a) What are the advantages of Abstract data type? b) Explain Characteristics of ADTs.	1	2	5+5
4	a) Briefly discuss various asymptotic notations with an examples. (b) Write an algorithm for determining transpose of a matrix using multi dimensional array.	1	1	5+5
5	Explain in brief about multi-dimensional array with an example.	1	2	10
6	Describe the significance of time and space complexity with an example.	1	1	10
7	Implement the following operations of an array. a) Insertion at end b) Insertion at middle c) deletion at beginning d) deletion at end	1	3	10
8	Write a Program to reverse the elements of an array.	1	2	10
9	Explain various operations of arrays.	1	3	10

MODULE - II				
LINKED LISTS				
Sno	Questions	CO	BL	MARKS
1	Define Linked List.	2	1	2
2	List various types of Linked Lists.	2	2	2
3	Write the procedure to insert an element at middle of SLL.	2	1	2
4	Explain the deletion operation on singly linked list.	2	2	2
5	Explain the traversal operation on singly linked list.	2	2	2
6	Explain the insertion operation on doubly linked list.	2	2	2
7	Explain the deletion operation on doubly linked list.	2	2	2
8	Explain the traversal operation on doubly linked list.	2	2	2
9	Define circular linked list.	2	1	2
10	List various Operations of Circular Linked List.	2	2	2
11	Define circular double linked list.	2	1	2
12	List various Operations on Circular Double Linked List.	2	2	2
13	List any four applications of linked list.	2	2	2
14	Compare arrays and linked lists.	2	2	2
15	Define node, what are parts of nodes?	2	3	2
16	What does the head in the linked list refer to?	2	3	2

MODULE - II				
LINKED LISTS				
Sno	Questions	CO	BL	MARKS
1	List out at least ten differences between array and linked list w.r.t. storage, accessing, size etc.	2	2	10
2	Implement various single linked list operations in detail.	2	3	10
3	Differentiate Singly Linked List and Doubly Linked List.	2	2	10
4	Write a function that removes all duplicate elements from linear linked list.	2	1	10
5	Explain various operations of double linked list in detail.	2	2	10
6	Explain the following operations in a doubly linked list: (a) Create an empty list. (b) Insert the elements 10 and 20 at the front of the list. (c) Insert the elements 30 at the middle of the list. (d) Insert the elements 15, 45 at the end of the list. (e) Delete the middle element from the list.	2	2	10
7	a) What is circular linked list and illustrate it with appropriate example. b) Write procedures for insertion and deletion operations on circular linked list.	2	1	10
8		2	2	10

	Explain traversal operation of circular lined list with an example.			
9	Describe any two Applications of linked list with suiatable examples.	2	1	10

MODULE - III				
STACKS				
Sno	Questions	CO	BL	MARKS
1	Define stack.	3	1	2
2	Explain Push operation.	3	2	2
3	Explain Pop operation.	3	2	2
4	What is meant by stack overflow?	3	1	2
5	What is meant by stack underflow?	3	1	2
6	List various applications of stacks.	3	2	2
7	What are the various notations to represent an expression?	3	1	2
8	Convert the following expression from infix to prefix notation: (A+B)*C	3	1	2
9	Convert the following expression from infix to postfix notation: A+B-C	3	1	2
10	Evaluate the following expression: a+b if a=2 and b=3.	3	1	2
11	Define backtracking.	3	1	2
12	What is LIFO Principle?	3	1	2
13	What is is Empty operation?	3	1	2
14	What is is Full operation?	3	1	2

MODULE - III				
STACKS				
Sno	Questions	CO	BL	MARKS
1	a) Write advantages of stack over linked list. b) How to implement Linked list using a stack?	3	2	5 5
2	List and explain different operations on stacks using arrays.	3	2	10
3	Explain stack operations using linked list with an example.	3	2	10
4	a) Construct an empty stack and perform PUSH operation for any five elements. Also perform POP operation for two elements and show the value on the top of stack. (b) Write a program to determine whether the given string is palindrome or not.	3	2	5 5
5	Illustrate the procedure *Infix To Postfix* with the following arithmetic expression: (A + B) ^ C – (D * E) / F).	3	2	10
6	Write a procedure to evaluate an expression using stacks	3	1	10

	with an example.			
7	Explain recursion procedure for finding a factorial of a number.	3	2	10
8	Explain Back tracking algorithm with an example using stack.	3	2	10
9	How can we reverse a list using stack? Explain with an example.	3	2	10
10	Implement a program to check for balanced parentheses using a stack.	3	3	10

MODULE - IV				
QUEUES AND TREES				
Sno	Questions	CO	BL	MARKS
1	Define queue.	4	1	2
2	What is meant by queue overflow?	4	1	2
3	What is meant by queue underflow?	4	1	2
4	List various operations on queue.	4	2	2
5	Define circular queue.	4	1	2
6	List out various operations on circular queue.	4	2	2
7	What is meant by overflow condition of circular queue?	4	1	2
8	Define deque.	4	1	2
9	List out various operations on deque.	4	2	2
10	What is meant by overflow condition of deque?	4	1	2
11	List out any four applications of queue.	4	2	2
12	Define tree.	4	1	2
13	Define binary search tree.	4	1	2
14	What are the operations performed on binary tree?	4	1	2
15	What are the tree traversals techniques?	4	1	2
16	Differentiate binary tree and binary search tree.	4	2	2
17	What is the FIFO principle?	3	1	2
18	What is the height and depth of a tree?	3	1	2

MODULE - IV				
QUEUES AND TREES				
Sno	Questions	CO	BL	MARKS
1	Explain queue operations using arrays with an example.	4	2	10
2	Implement operations on queue using linked list with an example.	4	3	10
3	Write an algorithm to implement insert and delete operations on Queues with array implementation for the following elements 88, 25, 67, 15, 56 with diagrammatic representations.	4	1	10
4	Implement various deque operations with an examples.	4	3	10

4	Illustrate Topological Sorting with an example	5	2	10
5	a) Distinguish between static and dynamic hashing. b) How a graph is represented as a hash table.	5	2	5 5
6	Compare Chaining and Open Addressing with an example	5	2	10
7	Differentiate Linear Probing and Quadratic Probing with an example	5	2	10
8	Explain Rehashing and Extendible hashing with an example	5	2	10
9	a) What is open addressing and explain it with an example? b) Define bucket hashing and explain it with an example.	5	2	5 5
10	Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function h(x) = x(mod 10), show the resulting: (i) Open hash table using linear probing. (ii) Open hash table using quadratic probing. (iii) Open hash table using double hashing with second hash function h2(x) =7-(x mod 7).	5	3	10

5	Explain various operations of circular queue with an examples.	4	2	10
6	Implement binary tree operations with an example.	4	3	10
7	Write about tree traversal techniques with suitable examples.	4	1	10
8	What is a binary Search Tree? What is the average depth of a binary search tree? How is it different from binary tree? Justify your answer.	4	1	10
9	Describe operations of binary search tree with an examples.	4	2	10
10	Explain Breadth fist search algorithm with an example.	4	2	10

MODULE - V				
GRAPHS AND HASHING				
Sno	**Questions**	**CO**	**BL**	**MARKS**
1	Define Graph	5	1	2
2	List representation of graph	5	2	2
3	List various graph operations	5	2	2
6	Define hashing	5	1	2
7	Define collision	5	1	2
8	What is collision resolution?	5	1	2
9	List Types of collision Resolutions	5	2	2
10	Define Chaining	5	1	2
11	Define open addressing	5	1	2
12	Define double hashing	5	1	2
13	Define bucket hashing	5	1	2
14	Define rehashing	5	1	2
15	Define extendible hashing	5	1	2
16	What is a directed graph?	5	1	2
17	What is an undirected graph?	5	1	2
18	what depth-first search (DFS)	5	1	2
19	What breadth-first search (BFS)	5	1	2
20	What is a spanning tree?	5	1	2

MODULE - V				
GRAPHS AND HASHING				
Sno	**Questions**	**CO**	**BL**	**MARKS**
1	Explain terminologies of graph	5	2	10
2	Explain the various representation of graph with example in detail.	5	2	10
3	Explain Dijkstra's Algorithm with an example	5	2	10