KADI SARVA VISHWAVIDHYALAYA
B.E. Semester III Examination
(Dec– 2023)

Data Structures and Algorithms

Branch : CE/IT/CSE **Subject Code : CT 303 N**
DATE:16/12/2023 **TIME:12:00 PM to 3:00 PM** **TOTAL MARKS: 70**

Instructions:

1. Answer each section in separate answer sheet.
2. All questions are **Compulsory.**
3. Indicate **clearly,** the options you attempt along with its respective question number.
4. Use the last page of main supplementary for **rough work.**

SECTION –I

Q-1	A	Define and explain Primitive and Non Primitive Data Types.	5
	B	How does Array differ from Linked List.	5
	C	Convert ((A+B^C^D)*(E+F/G)) infix expression into postfix format showing stack status after every step	5
		OR	
	C	What are the advantages of postfix & prefix expression? Evaluate the following postfix expression: 546+*493/+*	5
Q-2	A	Consider a circular queue of size 4. Initialize Front and Rear=0. Perform following operations: [Insert A, Insert B, Insert C, Delete, Insert D, Insert E, Delete, Insert F, Delete]. State the contents of queue after each operation.	5
	B	Write the algorithm for inserting a new node at the end of the Singly Linked List	5
		OR	
	A	Write the algorithm for inserting a new node before the address X in Doubly Linked List	5
	B	Write the Algorithm for Insertion and Deletion in a Simple Queue.	5
Q-3	A	Which data structure is used for finding the traversal of Breadth First Search? Explain BFS with its algorithm.	5
	B	Explain the data structures required to represent the graph.	5
		OR	
	A	Which data structure is used for finding the traversal of Depth First Search? Explain DFS with its algorithm.	5
	B	What is the advantage of using AVL tree over simple Binary Search Tree? State the application of Tree data structure.	5

SECTION – II

Q-4 A Define the following terms. 1) Graph 2) Tree 3) Adjacency Matrix 4) Complete Binary tree 5) Minimum Spanning Tree — 5

B What is a binary search tree? Create a binary search tree for inserting the following data. Keys: 50, 45, 100, 25, 49, 120, 105, 46, 90, 95 — 5

C Construct a binary tree from the traversals given below: — 5
Inorder: BIDACGEHF
Postorder: IDBGCHFEA

OR

C List out different traversal ways of tree and demonstrate any two with example. — 5

Q-5 A Write the algorithm of bubble sort and apply Bubble sort on following array to sort it in ascending order : — 5
10,5,3,20,15,25,17,60.

B Which data structure is used during the implementation of recursion? State any 1 applications of recursion and Explain it in detail. — 5

OR

A Write the algorithm of Merge Sort and apply it on following array to sort it in ascending order: 30,40,20,10,60,70. — 5

B Explain Linear Search algorithm with an example. — 5

Q-6A Explain file in terms of fields, records and database. — 5

B Explain the problem of Collision in Hashing. Discuss any 1 collision resolution technique in detail with an example. — 5

OR

A Explain Indexed and Relative/Random File Organization — 5

B Define Hashing. Insert following keys into the hash table with Chaining as collision resolution technique — 5
Keys : 10,5,26,43,92,41,20,63
H(k)=k mod 10
Size of Hash Table =7

BEST OF LUCK

Enrollment No.

KADI SARVA VISHWAVIDYALAYA

LDRP INSTITUTE OF TECHNOLOGY & RESEARCH, GANDHINAGAR

B.E. MID-SEMESTER EXAMINATION NOVEMBER 2023

Date : 2/11/2023 | Branch : CE/IT

Subject Name & Code: Data Structures & Algorithms (CT 303-N) | Semester : 3

Time : 09:15 AM To 10:45 AM | Max. Marks : 30

Instructions:
1) All questions are compulsory
2) Figures to the right indicate full marks
3) Indicate clearly the options you attempt along with its respective question number
4) Use the last page of main supplementary for rough work

			Marks
Q.1	(A)	Explain Tower of Hanoi with 3 disks.	[5]

	(B)	1) Consider 2 stacks, S1 and S2 each of size 20 and a FIFO Queue q1 with size 50. Following operations are performed in the sequence as they are given.
		push(s1, 5); push(s2, 10); push(s1, 12); push(s2, 13); push(s1, 18);
		enqueue(q1, 48); enqueue(q1, pop(s2)); enqueue(q1, pop(s1));
		push(s1, dequeue(q1));
		Write the content of each of s1, s2 and q1 after those operations are done.
			[3]

		2) State the Primitive and Non Primitive data types. Define Traversal.	[2]
Q.2	(A)	For the given keys, which hash function is better, H1(k) or H2(k)? Justify your answer. Size of Hash Table : 10 Keys : 10, 19,29,6,26,24 H1(k): k mod 10 H2(k): K mod 6	[5]
	(B)	Write the algorithm for inserting a new element before the node with address X in Doubly Linked List.	[5]
		OR	
Q.2	(A)	Define Hashing. State the types of techniques of Hashing. Explain the situation of Collision and its resolution Techniques.	[5]
	(B)	a) State the difference between Array and Singly Linked List. b) Convert the given infix expression to postfix expression: ((x+y^z^d)*(a+b/c))	[5]
Q.3	(A)	Suppose, there is a scenario where 10 million keys are to be sorted. Which algorithm for sorting would you prefer? Merge Sort or Bubble Sort? Justify the reason.	[5]
	(B)	Demonstrate the application of recursion in Merge Sort while sorting below array: 10 | 15 | 4 | 18 | 25 | 88 | 60 | 77 | 70 | 55	[5]
		OR	
Q.3	(A)	Write the algorithm and strategy used for Binary search and apply the search on the following array with target =26. 2 | 10 | 15 | 18 | 21 | 25 | 26 | 46 | 76 | 90	[5]
	(B)	Which Sorting algorithm is better to sort below list of keys? Insertion Sort or Quick Sort? Justify your answer. Sort the below keys using Quick Sort. 5 | 23 | 8 | 11 | 6 | 20 | 40 | 46 | 76 | 9	[5]

Seat No. 223285

KADI SARVA VISHWAVIDYALAYA

BE SEMESTER-III(New) Regular Examination December-2022

Subject Name: Data Structures and Algorithms **Subject Code: CT303-N**

Date:14/12/2022 **Time: 10:00 am to 1:00 pm** **Total Marks: 70**

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. Indicate clearly, the option you attempt along with its respective question number.

Section-I

Q-1 **(A)** Explain significance of Data structures. Compare primitive and non-primitive data structures. [5]

(B) Convert the following infix expressions into postfix expression [5]

a. (A+B) *D+E/ (F+A*D) +C
b. A/B^O+D*E–A*C (^ stands for exponentiation)

(C) Explain the problem of tower of Hanoi and trace the algorithm for number of disks=3 [5]

OR

(C) Explain recursive algorithm to find out factorial of given number and trace the algorithm for n=4. [5]

Q-2 **(A)** Explain insertion and deletion algorithms for circular queue. [5]

(B) Define single linked list and explain algorithm for deleting a node from a single linked list. [5]

OR

(A) Explain insertion and deletion algorithms for simple queue. [5]

(B) Define doubly linked list and explain algorithm for inserting a node in a doubly linked list. [5]

Q-3 **(A)** Write an algorithm for Heap sort & sort the following data using heap sort. [5]
20, 65, 43, 53, 78, 10, 78, 40, 39, 29

(B) The values given below are to be inserted in a hash table with 5 locations using chaining to resolve collisions. Construct hash table and use simple hash function. [5]
1,2,3,4,5,10,21,22,33,34,15,32,31,48,49,50

OR

(A) What is hashing? Explain external and internal hashing in detail. [5]

(B) Write an algorithm for quick sort & sort the following data using quick sort. [5]
10, 23, 64, 21, 74, 95, 2, 59, 44, 87, 55

Section-II

Q-4 **(A)** Define the following terms: [5]

a. Depth of a tree
b. Graph
c. Minimum Spanning tree
d. Weighted Graph
e. Complete Binary tree

(B) Explain algorithm for Binary Search. Compare Binary search and Linear Search. [5]

(C) Write a short note on sequential file organization. [5]

OR

(C) Explain structure of index sequential file. [5]

Q-5 **(A)** Construct Binary search tree for the following data [5]

10,3,15,22,6,45,65,23,78,34,5

(B) Explain DFS algorithm with example. [5]

OR

(A) Construct binary tree for the given preorder and inorder traversals. [5]

Preorder: GBQACKFPDERH

Inorder: QBKCFAGPEDHR

(B) Explain adjacency matrix and adjacency list representation for a graph with example. [5]

Q-6 **(A)** Explain Threaded Binary tree. [5]

(B) Explain Dijkstra's algorithm with example. [5]

OR

(A) Create AVL tree for the following data [5]

28,73,89,75,74,13,10

(B) Explain Prim's Algorithm with example. [5]

----------All the Best----------

Enroll.	2	1	B	E	C	E	3	0	3	0	2		

KADI SARVA VISHWAVIDYALAYA
LDRP INSTITUTE OF TECHNOLOGY & RESEARCH, GANDHINAGAR

B.E. MID-SEMESTER EXAMINATION– NOVEMBER2022

Date:4/11/2022	**Branch: CE / IT**
Subject Name &Code: Data Structures And algorithms (CT 303–N)	**Semester:3**
Time:1:30PM to 3:00PM	**Max. Marks: 30**

Instructions:
1) All questions are **compulsory**.
2) Figures to the **right** indicate full marks.
3) Use of scientific calculator is permitted.
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Q.1 **(A)** Explain Data Structure. Distinguish between linear and Non-linear Data Structure with example. [5

(B) Convert the following infix expression into postfix expression. [

I. A+(((B-C) *(D-E) +F)/G) ^(H-J)

II. (A*B/C/D) *(E-F+G)

Q.2 **(A)** Explain algorithm for Tower of Hanoi and perform tracing of it for number of discs=3. [5

(B) Explain single linked list and write an algorithm for inserting a nodefrom end in single linked list. [5

OR

(A) Explain Factorial algorithm and trace it for number 4. [5

(B) Explain algorithms for insertion and deletion in circular queue. [5

Q.3 **(A)** What is Hashing? Explain varioushashing functions. [5

(B) Explain Merge sort algorithm and trace it using following data sequence (11,60,100,20,30,50,80,75,65,55,23,32) [5

OR

Q.3 **(A)** Discuss problem of collision in Hashing. The integers given below are to be inserted in a hash table with 5 locations using chaining to resolve collisions. Construct hash table and use key%10 as a hashing function. [5
1,2,3,4,5,10,21,22,33,34,15,48,49,50

(B) Explain Quick sort algorithm and trace it using following data sequence [5
(10,23,64,21,74,95,2,59,44,87,55)

ALL THE BEST