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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Regular and Supplementary Examination December 2023 (2019 Scheme)

Course Code: RAT 401

Course Name: ALGORITHMS AND DATA STRUCTURES

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Differentiate between linear and non-linear data structures.	(3)
2		Define Big Oh, Big omega and Big theta notations.	(3)
3		Describe the applications of stack.	(3)
4		Illustrate with examples various operations on a queue.	(3)
5		Differentiate between full binary tree and complete binary tree.	(3)
6		List out the applications of priority queue.	(3)
7		Identify the number of comparisons required to find the key element 5 in the given array: 2, 3, 5, 10, 15, 20.	(3)
8		Consider a hash table of size 7 and hash function h(k) =k mod 7. Build the hash table after inserting elements in the order: 19, 26,13,48,17.	(3)
9		Illustrate with example dynamic programming approach.	(3)
10		Describe the concept of NP complete problems.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain the asymptotic notations that are commonly used to represent the running time of algorithms.	(10)
	b)	Differentiate between primitive and non-primitive data structures.	(4)

OR

12	a)	Illustrate with examples various data structure operations.	(6)
	b)	With necessary examples, explain different types of recursive algorithms.	(8)

Module II

13	a)	Design algorithms to perform following operations on a doubly linked list i) Insert a node at the beginning of the list ii) Delete a node from end.	(7)

b) Design algorithm to perform following operation on a singly linked list. (7)

i) Insert a node with value y after a node with value x.

ii) Delete a node with value a.

OR

14 a) Apply infix to postfix algorithm to get the equivalent postfix expression for the given expression: **(P-Q)/R+S*(T-U/V)+W** (6)

b) Illustrate with examples different types of queue. (8)

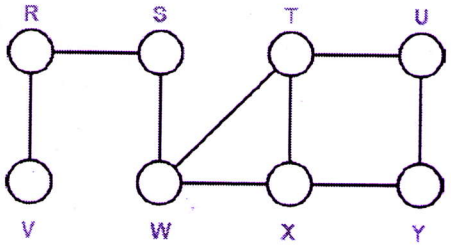
Module III

15 a) Construct the binary search tree after adding each of the following values in the order:34,52,23,17,88,99,100,45,90,1,5,78 (5)

b) Illustrate with necessary examples the various ways of representing a graph bringing out the advantages and disadvantages of each representation. (9)

OR

16 a) Apply BFS and DFS traversal algorithms on the given graph. (8)



b) Explain various tree traversal algorithms with examples. (6)

Module IV

17 a) Write an algorithm to sort the given array in ascending order using quick sort: (7)
92,14,34,78,45,67,1,9,54

b) Write an algorithm to search for 15 in the given array using binary search: (7)
2, 3, 15,10,25,20,5

OR

18 a) Write an algorithm to sort the given array in ascending order using insertion sort: (6)
43,25,67,12,22,45,88,92,100

b) Illustrate with example Dijikstra's algorithm to find the shortest path from a given vertex to all other vertices in the graph. (8)

Module V

19 a) Illustrate with example the concept of backtracking. (7)

b) Describe greedy approach with suitable example. (7)

OR

20 a) Explain briefly various approaches for solving computational problems. (10)

b) Differentiate between divide and conquer approach and dynamic programming approach for solving problems. (4)

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