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Minor CERTIFICATION EXAMINATION, NOVEMBER 2023

First Semester

18CSC001J - DATA STRUCTURES AND ALGORITHMS

(For the candidates admitted during the academic year (2020-2021 & 2021-20222))

Note:

i. Part - A should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

	rt - B and Part - C should be answered in a	answer booklet.				
Time: 3 Hours			Max. Marks: 100			
	PART - A (20 × 1 = Answer all Qu		Mark	s BL	ĆÓ	
1,	To represent hierarchical relationship be suitable? (A) Dequeue (C) Tree	etween elements, which data structure is (B) Priority (D) Graph	1	1	1	
2.	Abstract data types are (A) Mathematical abstractions (C) Set operations	(B) Set of values(D) Mathematical functions	1	1	1	
3.	What is the best case and worst case comp (A) O(nlogn), O(logn) (C) O(n), O(1)	olexity of linear search? (B) O(logn), O(nlogn) (D) O(1), O(n)	1	3	1 .	
4.	What will be the output for the following void main() { int a[] = {1,2,3,4,5}, *p; p = a; ++*p; printf("%d", *p); p += 2; printf("%d", *p); }		1	3	1	
	(A) 2 4 (C) 2 2	(B) 3 4 (D) 2 3				
5.	How to create linked list using cursor imp (A) Successive elements are connected by pointers (C) Using Adjacency list representation	(B) Using sparse matrices (D) Global Arrays of structures	1	1	2	
6.	In a Circular linked list, insertion of a reco (A) No pointer (C) 2 pointer	ord involves the modification of (B) 1 pointer (D) 3 pointer	1	2	2	
7.	What differentiates a circular linked list fr (A) You cannot have the 'next' pointer point to null in a circular linked list (C) You may or may not have the 'next' pointer point to null in a circular linked list	rom a normal linked list? (B) It is faster to traverse the circular linked list (D) Head node is known in circular linked list	1	2	2	
8.	In Linked List implementation, a node car (A) Data (C) Data and Link	rries information regarding (B) Link (D) Node	1	1	2	

9.	In linked list implementation of a queue, for of these pointers will change during an inset (A) Only front pointer (C) Both front and rear pointer	ront and rear pointers are tracked. Which rtion into a NONEMPTY queue? (B) Only rear pointer (D) No pointer will be changed	1	1	3
10.	What happens when you try to pop an element (A) It returns null (C) It causes an underflow	ent from an empty Stack? (B) It returns the top element (D) It causes an overflow	1	1	3
11.	Which of the following applications may not (A) Recursion (C) Browser history	ot use a Stack? (B) Parsing (D) Tatkal Ticket Booking in IRCTC	1	1	3
12.	If the elements "A", "B", "C" and "D" are time, in what order will they be removed? (A) ABCD (C) DCAB	placed in a queue and are deleted one at a (B) DCBA (D) AAAA	1	4	3
13.	Binary tree with only left child node is calle (A) Left-skewed binary tree (C) Right-skewed binary tree	ed as (B) Right binary tree (D) Left binary tree	1	1	4
14.	Select the correct definition for balancing fa (A) Difference between left subtree and right subtree (C) Difference between root and degree of a tree	(B) Difference between leaf node and non-leaf node (D) Difference between height and depth of a tree	1	1	4
15.	The following numbers are inserted into a order: 10, 1, 3, 5, 15, 12, 16. What is the he (A) 2 (C) 4		ĺ	3	4
16.	In Binary tree traversing visiting the root retree is called(A) Inorder (C) Postorder	(B) Preorder (D) Levelorder	1	1	4
17.	What can be the value of m in the division (A) Any prime number (C) $2^p - 1$	method? (B) Any even number (D) 2 ^p	1	1	5
18.	Using division method, in a given hash ta placed at position (A) 19 (C) 15	(B) 72 (D) 17	1	3	5
19.	A person wants to visit some places. He st every vertex till it finishes from one vertex from same vertex. What algorithm he shoul (A) Depth First Search (C) Prim's algorithm	, backtracks and then explore other vertex	1	3	5
20.	Dijkstra algorithm is also called the(A) multiple source (C) single destination	_ shortest path problem. (B) single source (D) multiple destination	1	1	⁶ 5
	PART - B $(5 \times 4 = 20 \text{ Marks})$			BL	СО
٠	Answer any 5 Questions				
21.	Narrate how binary search works for search		4	4	1

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22.	Find the upper bound of running time of quadratic function $f(n) = 3n^2 + 2n + 4$; $g(n)=O(n^2)$.	4	5	1
23.	What is Circular Linked List? How it it differs from singly linked list?			2
24.	. What kind of linked list can apply to solve Joseph Problem? Give example.		2	2
25.	Outline the procedure for towers of Hanoi using stack data structure.	4	?	3 =
26.	Underline the term AVL trees? Describe the different rotations defined on AVL tree.		2	4
27.	Give algorithm/pseudocode for DFS. Demonstrate DFS using suitable example.	4	3	5
PART - C (5 × 12 = 60 Marks) Answer all Questions			s BL	CO
28.	 (a) Show all the passes using insertion sort for the following list 54,26,93,17,77,31,44,55,20 (DR) (b) Write C program/algorithm to perform linear search. Find the time complexity for best, worst and average case for a linear search in an array of n elements. 	12	1	1
29.	(a) Interpret the procedure on how to delete a node from a linked list with an example and relevant diagrams. (OR)	12	1	2
	(b) State the term array and analyze the various ADT operations on array.			
30.	the prescribed algorithm:(300+23)*(43-21)/(84+7). Do the evaluation of resultant postfix expression.	12	1	3
	(OR) (b) Explain the operations and the implementation of Queue ADT using Array			
31.		12	1	4
	(OR)			
	(b) Apply the binary search tree property and write the algorithm to search a binary tree with an example.			
32.	(a) Elaborate the steps in the Dijkstra's shortest path algorithm with an example. (OR)	12	1.	5
S S	 (b) Consider a hash table of size 7 and hash function h(k)= k mod 7. Draw the table that results after inserting in the given order, the following values. 19,26,13,48,17 for each of the three scenarios. a) When collisions are handled by separate chaining. b) When collisions are handled by linear probing. c) When collisions are handled by double hashing using second hash function h'=5-(5 mod k). 			

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