Reg. No.															

B.Tech. DEGREE EXAMINATION, DECEMBER 2023

Fourth Semester

18CSC201J – DATA STRUCTURES AND ALGORITHMS

(For the candidates admitted from the academic year 2020-2021 & 2021-2022)

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.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours | Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
1. From the following which is not the operation of data structure? (A) Operations that manipulate data (B) Operations that perform computation (C) Operation that check for syntax errors (D) Operations that monitor an object for the occurrence of controlling an event	1	1	1	1
2. What is the disadvantage of an array data structure? (A) The amount of memory to be allocated should be known beforehand (B) Elements of an array can be accessed in constant time (C) Elements stored in continuous memory (D) Multiple other data structures can be implemented using arrays	1	1	1	1
3. What is the time complexity of the binary search algorithm? (A) O (n) (B) O (1) (C) O ($\log_2$ n) (D) O (n^2)	1	3	1	2
4. What is the best case time complexity of linear search algorithm? (A) O (1) (B) O (n) (C) O ($\log_2$ n) (D) O (n^2)	1	3	1	2
5. Assuming an int of size 4 bytes, what is the size of int arr [15]? (A) 15 (B) 19 (C) 11 (D) 60	1	3	2	2
6. In linked lists there are no NULL links in (A) Single linked list (B) Doubly linked list (C) Circularly linked list (D) Cursor implementation of linked list	1	1	2	1
7. Write the output of the following program int $a[\,] = \{1,2,3\}^* P;$ (A) 3 (B) Junk value (C) Run time error (D) Address of the third element	1	3	2	2

8. Linked list are not suitable for the implementation? 1 1 2 1

(A) Insertion sort (B) Radix sort
(C) Polynomial manipulation (D) Binary search

9. Which data structure allows deleting data elements from an inserting at rear? 1 1 3 1

(A) Stacks (B) Queues
(C) Dequeues (D) Binary search tree

10. Identify the data structure which allows deletions at both ends of the list but insertion at only one end. 1 1 3 1

(A) Stack (B) Priority queues
(C) Output restricted dequeue (D) Input restributed dequeue

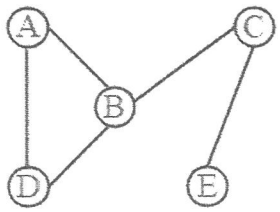
11. The value of REAR is increased by 1 when 1 2 3 2

(A) An element is merged in a queue (B) An element is added in a queue
(C) An element is traversed in a queue (D) An element is deleted in a queue

12. The data structure required to check whether an expression contains balanced parenthesis is 1 1 3 2

(A) Stack (B) Queue
(C) Tree (D) Array

13. Identity the cut vertices. 1 2 4 2



(A) B and E (B) C and D
(C) A and E (D) C and B

14. What is the number of edges present in a complete graph having n vertices? 1 2 4 2

(A) $(n*(n+1))/2$ (B) $(n*(n-1))/2$
(C) n (D) $n/2$

15. A graph with all vertices having equal degree is known as a _____. 1 1 4 1

(A) Multi graph (B) Regular graph
(C) Simple graph (D) Complete graph

16. If every item of the list maps to an unique index in the hash table, the hash function is called _____. 1 1 4 1

(A) Hash free table (B) Collision table
(C) Collision free table (D) Perfect hash table

17. The number of edges from root to the node is called _____ of the tree. 1 1 5 1

(A) Height (B) Depth
(C) Length (D) Width

18.	What is the average case time complexity for finding the height of the binary tree?	1	2	5	2

(A) $h = O(\log \log n)$ (B) $h = O(n \log n)$

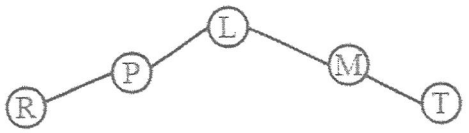
(C) $h = O(n)$ (D) $h = O(\log n)$

19.	What will be the height of a balanced full binary tree with 8 leaves?	1	2	5	2

(A) 8 (B) 5

(C) 6 (D) 4

20.	Figure below is a balanced binary tree. If a node is inserted as child of node R, how many nodes will becomes unbalanced?	1	3	5	2



(A) 2 (B) 1

(C) 3 (D) 0

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Differentiate linear and non-linear data structures.	4	1	1	1
22.	Explain how singly linked list and double linked list are represented.	4	2	2	1
23.	Write a routine to perform insertion operation in a singly linked list at the end.	4	3	2	2
24.	What are the applications of queue?	4	2	3	2
25.	Give the pre and postfix form of the expression $\left(a + ((b^*(c-e)/f\right)$.	4	3	4	2
26.	Classify tree traversal algorithms with the help of visual diagram.	4	2	4	1
27.	What are the basic operations that can be performed on graph?	4	2	5	1

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Let A = {7, 2, 4, 3, 1, 6, 21} be the given unsorted array. Perform sorting operation on the array so that at $N^{th}/2$ iteration the array is partially sorted.	12	4	1	3

(OR)

b.	Assume that the given array is	12	3	1	3

21	34	43	57	66	78

Perform binary search operation to determine the position of element 78.

29. a.	Explain insertion operation in a linked list of all types.	12	3	2	3
	(OR)				
b.i.	Write the procedure to delete a last node from circularly linked list.	6	3	2	3
ii.	Explain cursor based implementation of a linked list.	6	3	3	3
30. a.	Write an algorithm for PUSH and POP operation on stack with an example.	12	4	3	3
	(OR)				
b.i.	Write the procedure to convert infix to post fix expression. Also evaluate the given postfix expression 9 3 4* 8 + 4 / −.	8	4	3	3
ii.	Convert the expression $A-(B/C+(D\%E^{*}F)/G)^{*}H$ to postfix expression.	4	4	3	3
31. a.	What are expression trees? Write the procedure for constructing an expression tree.	12	3	4	2
	(OR)				
b.	Explain with example with algorithm for insertion into AVL trees.	12	3	4	2
32. a.	Explain Krushal's algorithm with an example.	12	3	5	2
	(OR)				
b.	Explain prims algorithm with an example and state its applications.	12	3	5	2

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