No. of Printed Pages : **8**

Sl. No.

B2.1-R4 : DATA STRUCTURE THROUGH C++

DURATION : 03 Hours **MAXIMUM MARKS : 100**

OMR Sheet No. :					

Roll No. : | | | | | | |

Answer Sheet No. : | | | | | | |

Name of Candidate : _____ **; Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English language only.
- There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
- **PART ONE** is Objective type and carries **40** Marks. **PART TWO** is Subjective type and carries **60** Marks.
- **PART ONE** is to be answered in the **OMR ANSWER SHEET** only, supplied with the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
- Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the Answer Sheet for **PART ONE** is returned. However, Candidates who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the Answer Sheet for **PART ONE** to the Invigilator.
- **Candidate cannot leave the examination hall/room without signing on the attendance sheet and handing over his/her Answer Sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART ONE

(Answer ALL questions; each question carries ONE mark)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "OMR" answer sheet supplied with the question paper, following instructions therein. **(1x10)**

1.1 Which of the following is/are the levels of implementation of data structure ?

(A) Abstract level

(B) application level

(C) implementation level

(D) all of the above

1.2 Stack is also called as :

(A) last in first out

(B) first in last out

(C) last in last out

(D) first in first out

1.3 Which is very useful in situation when data have to be stored and then retrieved in reverse order ?

(A) stack

(B) queue

(C) list

(D) link list

1.4 Which data structure allows deleting data elements from and inserting at rear ?

(A) stacks

(B) queues

(C) dequeues

(D) binary search tree

1.5 A circular queue is also known as :

(A) Ring Buffer

(B) Square Buffer

(C) Rectangle Buffer

(D) Curve Buffer

1.6 Which one is not the operation that can be performed on queue ?

(A) insertion

(B) deletion

(C) retrieval

(D) traversal

1.7 There is an extra element at the head of the list called a :

(A) antinel

(B) sentinel

(C) list header

(D) list head

1.8 Which of the following is not the type of queue ?

(A) ordinary queue

(B) single ended queue

(C) circular queue

(D) priority queue

1.9 Any node in the path from the root to the node is called :

(A) successor node

(B) ancestor node

(C) internal node

(D) none of the above

1.10 The Average case occur in linear search algorithm :

(A) when item is somewhere in the middle of the array

(B) when item is not in the array at all

(C) when item is the last element in the array

(D) when item is the last element in the array or is not there at all

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

2.1 Time and space are two main parameters to measure the efficiency of an algorithm.

2.2 A directed graph is strongly connected. If there is a path from each vertex to every other vertex in the digraph.

2.3 In the depth first traversal we process all of a vertex's descendants before we move to an adjacent vertex.

2.4 The number of comparisons done by sequential search is $(n/2)+1$.

2.5 Arrays are best data structures for the size of the structure and the data in the structure are constantly changing.

2.6 A matrix in which non-zero entries can only occur on the diagonal or on elements immediately above or below the diagonal, is called sparse matrix.

2.7 The time complexity of quick sort is o(n).

2.8 Indexed search is a search for data that uses an index to locate the item.

2.9 The Shell sort algorithm is called diminishing increment sort.

2.10 The average case complexity of Insertion Sort is o(n3).

3. Match words and phrases in column X with the closest related meaning / word(s) / phrase(s) in column Y. Enter your selection in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

	X		Y
3.1	If string 1 = Ram and string 2 = Leela are merged, the process is called as	**A.**	empty
3.2	Linked list is generally considered as an example of type of memory allocation _____	**B.**	O(n log n)
3.3	If a list contains no elements then it is said to be	**C.**	O(n * k)
3.4	Space Complexity of Bubble Sort is	**D.**	previous node and Next node
3.5	Time Complexity of Selection Sort is	**E.**	rear
3.6	Space Complexity of Radix sort is	**F.**	front
3.7	Time Complexity of Merge Sort is	**G.**	O(n2)
3.8	A double linked list contains reference to	**H.**	concatenation
3.9	When we insert an element in Queue, which pointer is increased by one ?	**I.**	Only Previous node
3.10	Time Complexity of Radix sort is	**J.**	O(n + k)
		K.	O(1)
		L.	dynamic
		M.	O(n*n*n4)

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Choose the most appropriate option, enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

A.	Dn = log2n+1	**B.**	n-1	**C.**	o(n)	**D.**	(log2n-1)* (log2n-3)
E.	0 and -1	**F.**	vertices, edges	**G.**	AVL tree	**H.**	null
I.	Input-restricted deque	**J.**	linear search	**K.**	n	**L.**	Dn = (n-1)*(n-3)*(n-5)
M.	Depth first						

4.1 In _____ search start at the beginning of the list and check every element in the list.

4.2 In a queue, the initial values of front pointer f , rare pointer r, should be _____ and _____ respectively.

4.3 A graph is a collection of nodes, called _____ And line segments called arcs or _____ that connect pair of nodes.

4.4 _____ data structure allows deletions at both ends of the list but insertion at only one end.

4.5 The depth of a complete binary tree is given by _____.

4.6 In selection sort of n elements, _____ times is the swap function called in the complete execution of the algorithm.

4.7 _____ would be the asymptotic time complexity to find an element in the linked list.

4.8 In worst case, the number of comparison need to search a singly linked list of length n for a given element is _____.

4.9 In the _____ traversal we process all of a vertex's descendants before we move to an adjacent vertex.

4.10 A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called _____.

PART TWO

(Answer any FOUR questions)

5. (a) Discuss the top-down and bottom-up approaches to algorithm design with advantage and disadvantage of each of the approach.

(b) What do you mean by Structured Programming Approach ? Explain the merit and demerit of it.

(c) Explain Classes, Encapsulation, Abstraction, Inheritance, Polymorphism with respect to Object Oriented Programming.

(5+5+5)

6. (a) What is Queue ? Explain the FIFO principal of Queue. Which are the basic operations that can perform on simple queue ?

(b) What is Linked List ? Difference between a Singly Linked List and a Doubly Linked List.

(c) What is a Circular Queue ? List and explain the operation which can perform on Circular Queue.

(5+5+5)

7. (a) What is Binary search tree ? Write an algorithm for DELETE operation in a Binary search tree.

(b) Discuss algorithm of Breadth First Search (BFS) traversal for a Graph. Explain with an example.

(7+8)

8. (a) Explain merge sort algorithm with its time and space complexity.

(b) Write an algorithm for quick sort and explain with an example.

(7+8)

9. (a) Discuss the height balanced binary tree.

(b) What is a Minimum Spanning Tree ? Explain the working of prim's and kruskal's algorithm.

(7+8)

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SPACE FOR ROUGH WORK

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