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S.Y. B.Tech. (Computer Science and Engineering) (Part-II)**(Semester - III) (CBCS) Examination, January - 2023****DATA STRUCTURE****Sub. Code : 73278****Day and Date : Wednesday, 25 - 01 - 2023****Total Marks : 70****Time : 10.30 a.m. to 1.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
 - 2) Assume suitable data wherever necessary.
 - 3) Figures to the right indicate full marks.

Q1) Solve MCQs. (1 marks each)**[14×1=14]**

- a) Which of the following is a linear data structure?
- i) Array
 - ii) AVL Trees
 - iii) Binary Trees
 - iv) Graphs
- b) Consider the following stack implemented using stack.

```
# define SIZE 11
```

```
struct STACK
```

```
{
```

```
int arr[SIZE];
```

```
int top=-1;
```

```
}
```

What would be the maximum value of the top that does not cause the overflow of the stack?

- i) 8
 - ii) 9
 - iii) 11
 - iv) 10
- c) The time complexity of quicksort is_____
- i) $O(n)$
 - ii) $O(\log n)$
 - iii) $O(n^2)$
 - iv) $O(n \log n)$
- d) _____ sorting is good to use when alphabetizing a large list of names.
- i) Merge
 - ii) Heap
 - iii) Radix
 - iv) Bubble

P.T.O.

- e) Identify the data structure which allows deletions at both ends of the list but insertion at only one end.
- i) Input restricted dequeue ii) Output restricted queue
 - iii) Priority queues iv) All of the above
- f) Which of the following statement is false?
- i) Arrays are dense lists and static data structure.
 - ii) Data elements in linked list need not be stored in adjacent space in memory.
 - iii) Pointers store the next data element of a list.
 - iv) Linked lists are collection of the nodes that contain information part and next pointer.
- g) What data structure would you mostly likely see in a non-recursive implementation of a recursive algorithm?
- i) Stack ii) Linked list
 - iii) Queue iv) Trees
- h) An adjacency matrix representation of a graph cannot contain information of
- i) nodes ii) edges
 - iii) direction of edges iv) parallel edges
- i) Which of the following data structures is indexed structure?
- i) Array
 - ii) Structure
 - iii) Stack
 - iv) Queue
- j) A B-tree of minimum degree t can maximum _____ pointers in a node.
- i) $t-1$ ii) $2t-1$
 - iii) $2t$ iv) t
- k) An adjacency matrix representation of a graph cannot contain information of
- i) nodes ii) edges
 - iii) direction of edges iv) parallel edges
- l) The postfix form of the expression $(A+B)*(C*D-E)*F/G$ is?__
- i) $AB+CD*E-FG/**$ ii) $AB+CD*E-F**G/$
 - iii) $AB+CD*E-*F*G/$ iv) $AB+CDE*-*F*G/$

- m) Which data structure is used in breadth first search of a graph to hold nodes?
- | | |
|-----------|-----------|
| i) Stack | ii) Queue |
| iii) Tree | iv) Array |
- n) Which of the following is not an in-place sorting algorithm?
- | | |
|-------------------|----------------|
| i) Selection sort | ii) Heap sort |
| iii) Quick sort | iv) Merge sort |

Q2) Solve any 2 of the following (7 Marks Each) [14]

- a) Give the Definition of Data structure? Explain with suitable examples following terms
- | |
|-------------------------|
| i) Array |
| ii) Functions |
| iii) Control Structures |
- b) Explain working of the Bubble Sort Algorithm. Comment on Complexity of Sorting Algorithm.
- c) Sort the following given numbers using Radix Sort Technique.
6,5,3,1,8,7,2,4

Q3) Solve any 2 of the following. (7 Marks Each) [14]

- a) Define Stack. Explain stack operations with example
- b) Explain Binary search with example
- c) Explain circular queue with example

Q4) Solve any 2 of the following. (7 Marks Each) [14]

- a) Write algorithm for finding minimum and maximum values from Binary Search Tree.
- b) What is complete binary tree? Calculate size of an array to store complete Binary tree of depth 4?
- c) What is B-tree? Explain with suitable example, insertion of a node in B-Tree?

Q5) Solve any 2 of the following (7 Marks Each) [14]

- a) Describe data structures used for storing a graph.
- b) Explain graph traversal techniques with Example-BFS
- c) What is AVL tree? Explain insert node operation of AVL tree.

