

## Annual Examination, 2022

**B.Sc. Part III**

## INFORMATION TECHNOLOGY

**Paper II**

(Fundamental Data Structure)

Time : 3 Hours ]

[ MAXIMUM MARKS : 50

**Note :** Section 'A' is Objective type and is compulsory. It should be written on the **first page** of Answer-book. Section 'B' is Short answer type and Section 'C' is Long answer type.

**Section 'A'****(Multiple Choice Questions)**

Choose the correct answer from the following :

**1×10=10**

- (i) Elements in linked list, elements are accessed ..... .  
 (a) exponentially (b) randomly  
 (c) logarithmically (d) sequentially
- (ii) Entries in a stack are "ordered". What is the meaning of this statement ?  
 (a) There is a sequential entry that is one by one

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- (b) A collection of stacks is sortable  
 (c) The entries are stored in a linked list  
 (d) Stack entries may be compared with the '<' operation.

(iii) What is a memory efficient double linked list ?

- (a) The list has breakpoints for faster traversal.  
 (b) A doubly linked list that uses bitwise AND operator of storing address.  
 (c) An auxiliary singly linked list acts as a helper list to traverse through the doubly linked list.  
 (d) Each node has only one pointer to traverse the list back and forth.

(iv) Which of the following is false about a circular linked list ?

- (a) Every node has a successor  
 (b) We can traverse the whole circular linked list by starting from any point.

- (c) Time complexity for deleting the last node in  $O(n)$
- (d) Time complexity of inserting a new node at the head of the list is  $O(1)$ .
- (v) Level order traversal of a tree is formed with the help of :
  - (a) Prime algorithm
  - (b) Dijkstra's algorithm
  - (c) Breadth first search
  - (d) Depth first search
- (vi) Which of the following pair's traversals on a binary tree can build the tree uniquely ?
  - (a) level-order and pre-order
  - (b) post-order and in-order
  - (c) post-order and pre-order
  - (d) post-order and level order
- (vii) What is the advantages of selection sort over other sorting techniques ?
  - (a) It is faster than any other sorting technique
  - (b) It requires no additional storage space

- (c) It works best for inputs which are already sorted
- (d) It is scalable.
- (viii) The given array is  $arr = \{1, 2, 4, 3\}$ . Bubble sort is used to sort the array elements. How many iteration will be done to sort the array?
  - (a) 4
  - (b) 1
  - (c) 2
  - (d) 3
- (ix) Which of the following is true ?
  - (a) A graph may contain many edges and no vertices
  - (b) A graph may contain no edges and many vertices
  - (c) A graph may contain no vertices and many edges
  - (d) A graph may contain no edges and no vertices.
- (x) A graph having on edge from each vertex to every other vertex is called a ..... .
  - (a) Loosely connected
  - (b) Strongly connected
  - (c) Tightly connected
  - (d) Weakly connected.

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**Section 'B'**

**(Short Answer Type Questions) 3×5=15**

**Note :** All the five questions are compulsory.

1. What is Recursion ?

Or

Write application of stack.

2. List advantages of linked list over arrays.

Or

Explain the need of header node.

3. Explain array representation of tree.

Or

What is B\* tree ?

4. Explain the complexity of linear search ?

Or

Explain the technique of Binary search.

5. Differentiate graphs and trees.

Or

Explain spanning tree.

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**Section 'C'**

**(Long Answer Type Questions) 5×5=25**

**Note :** All the five questions are compulsory.

1. Write an algorithm to insert an item into queue.

Or

Describe the types of deque.

2. Discuss circular linked list.

Or

Write an algorithm to insert an item into double linked list and delete an item from double linked list.

3. Write an algorithm for preorder traversal of tree.

Or

Write notes on :

(a) Height balanced tree

(b) manipulating 2-3 tree.

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4. Write an algorithm for Insertion sort.

Or

Explain Quick sort with suitable example.

5. Explain the types of graph.

Or

Discuss graph traversal techniques.

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