2/11 **2504E138** Candidate's Seat No :_____

Integ. MSc DS Semester-2 Examination

CC 113

Algorithams & Data Structures

Time : 2-30 Hours] **April-2024** **[Max. Marks : 70**

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

Q.1. (A) **Answer the following questions. (Any TWO)** **(14)**

(1) Write an algorithm to implement Binary Search algorithm.

(2) Show the tracing of a bubble sort algorithm on the given data:
25, 17, 31, 13, 2

(3) Write an algorithm / program to implement selection sort.

(B) **State the following statements are TRUE or FALSE. (Any FOUR)** **(04)**

(1) An array is a finite set of order collection of homogeneous data.

(2) Pointer is a special variable, which is used to store the address of another variable.

(3) In insertion sort algorithm, divide and conquer method is used.

(4) Best case complexity of a Quick sort algorithm is O(n).

(5) Worst case complexity is of a linear search algorithm is $O(n^2)$.

(6) Binary search algorithm can be applied only on sorted array.

Q.2. (A) **Answer the following questions. (Any TWO)** **(14)**

(1) What is data structure? List and explain different types of it.

(2) What is Link-List? How it differs from an array? Explain different types of it.

(3) Write an algorithm / program to display a singly Link-List.

(B) **State the following statements are TRUE or FALSE. (Any FOUR)** **(04)**

(1) Tree and Graph are examples of non-Linear data-structure.

(2) In a link list, nodes may store non – contiguously in the memory.

(3) Graph is an example of linear data-structure.

(4) In a circular link list, next part of a last node has an address of the first node.

(5) To create a matric if 3 *3, we need a 2-dimantional array.

(6) In circular link list node has two pointer variables which stores the address of next as we previous nodes.

Q.3. (A) **Answer the following questions. (Any TWO)** **(14)**

(1) What is stack? Write an algorithm/program to implement stack using array.

(2) List and explain applications of stack.

(3) Write an algorithm / program to implement simple queue.

(B) **Fill in the blanks. (Any THREE)** **(03)**

(1) _____ is an application of queue data-structure.

(2) _____ data structure is used, to convert any prefix expression to postfix.

(3) stack data-structure can be act as good replacement of _____.

(4) If Infix Expression:9 + 4 * 5 – 8 % 3, is converted into the postfix then we will get _____ postfix expression.

(5) _____ data structure is used in the process scheduling of CPU.

P.T.O

Q.4. (A) **Answer the following questions. (Any TWO)** **(14)**

(1) Draw a BST from the given insertion data:
55, 35, 75, 85, 65, 87, 63, 67, 25, 40, 28, 11

(2) What is AVL-Tree? Discuss different cases where different types of rotations are required.

(3) What is graph? Explain traversal methods of graph

(B) **Answer in short. (Any THREE)** **(03)**

(1) What is directed graph?

(2) What is B-tree?

(3) Define: Leaf node

(4) Write the name of the algorithms used to construct MST from the graph.

(5) What is the use of Dijkstra algorithm?

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