Enrollment No.....................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2017

CS2CO01 Data Structure

Programme: Diploma   Branch/Specialisation: CS

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   Which of the following data structures are indexed structures?   **1**
(a) Linear arrays   (b) Linked lists
(c) Both (a) & (b)   (d) None of these

   ii.   Which of the following shows the correct order of algorithms in increasing order of best case time complexity?   **1**
(a) Insertion Sort, Selection Sort, Merge Sort.
(b) Bubble Sort, Selection Sort, Quick Sort.
(c) Quick Sort, Insertion Sort, Selection Sort.
(d) Insertion Sort, Quick Sort, Selection Sort.

   iii.   A linear list in which each node has point to the predecessor and successors nodes is called **1**
(a) Singly linked list   (b) Circular linked list
(c) Doubly linked list   (d) Linear linked list

   iv.   The postfix form of the expression (A+ B)*(C*D- E)*F / G is?   **1**
(a) AB+ CD*E – FG /**   (b) AB + CD* E – F **G /
(c) AB + CD* E – *F *G /   (d) AB + CDE * – * F *G /

   v.   A full binary tree with n leaves contains   **1**
(a) n nodes   (b) log2n nodes
(c) 2n - 1 nodes   (d) 2n+1 nodes

   vi.   A binary search tree is also known as: **1**
(a) B-tree   (b) Binary sorted tree
(c) Binary ordered tree   (d) B+ tree

vii. Dijkstra algorithm is also called the .... shortest path problem. **1**
(a) Multiple source   (b) Single source
(c) Single destination   (d) Multiple destination

viii. A minimal spanning tree of a graph G is….? **1**
(a) A spanning sub Graph   (b) A tree
(c) Minimum weights   (d) All of these

ix. A graph with no cycle is called as: **1**
(a) Directed Graph   (b) Acyclic graph
(c) Sub graph   (d) None of these

x. Tree structure diagram in which pointers of data are stored at leaf nodes of diagram is classified as: **1**
(a) B tree   (b) B^+ tree   (c) B^2 tree   (d) B^* tree

Q.2 i. What is an algorithm? What are its characteristics? **2**

ii. Write a function for linear search. Write its time complexity. **3**

iii. What is an array? Differentiate between one dimensional and two dimensional arrays. **5**

OR iv. Explain selection sort and insertion sort briefly. **5**

Q.3 i. How do declare a structure of a linked list? **2**

ii. What is doubly linked list? Explain inset operation in doubly linked list. **8**

OR iii. Translate the following arithmetic expression into its equivalent infix expression showing each step of conversion: **8**
12 7 3 - / 2 1 5 + * +

Q.4 i. What are the average number of comparison in Binary search tree? **2**

ii. What is Binary Search Tree (BST)? Explain the following operation in BST: **8**
(a) Searching a Value in BST (b) Inserting a new value in BST

OR iii. A binary tree T has 9 nodes. The in order and pre-order traversal of T yield of the following sequence of nodes: **8**
Inorder: E A C K F H D B G
Preorder: F A E K C D H G B
Draw the tree.

Q.5 i. Define Minimum Spanning Tree. List the technique to compute minimum spanning tree. **4**

ii. Write Depth First Search algorithm to traverse a graph. **6**

OR iii. Explain Dijkstra's algorithm with suitable example. **6**

Q.6 i. Give an algorithm for quick sort and write its time complexity. **4**

ii. Define B+ tree. In an empty B+ tree, insert the following data: **6**
65 70 75 80 85 60 55 50 45.

OR iii. Define the term Graph. With the help of suitable example give adjacency matrix representation and adjacency list representation of the graph. **6**

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CS2CO01 Data Structure
Marking Scheme

Q.1 i.   (a) Linear arrays   **1**
     ii.   (d) Insertion Sort, Quick Sort, Selection Sort.   **1**
     iii.   (c) Doubly linked list   **1**
     iv.   (a) AB+ CD*E – FG /**   **1**
     v.   (c) 2n - 1 nodes   **1**
     vi.   (b) Binary sorted tree   **1**
     vii.   (b) Single source   **1**
     viii. (d) All of these   **1**
     ix.   (b) Acyclic graph   **1**
     x.   (b) B$^+$ tree   **1**

Q.2 i.   Algorithm – 1 mark   **2**
            Characteristics – 1 mark
     ii.   Function for linear search – 2 marks   **3**
            Time complexity – 1 mark
     iii.   Array – 1 mark   **5**
            Difference – 4 marks (minimum 4 differences)
OR   iv.   Selection sort - 2.5 marks   **5**
            Insertion sort – 2.5 marks

Q.3 i.   Structure of a linked list   **2**
     ii.   Doubly linked list – 2 marks   **8**
            Inset operation in doubly linked list- 6 marks
OR   iii.   Translate the following arithmetic expression into its equivalent   **8**
            infix expression showing each step of conversion:
            12 7 3 - / 2 1 5 + * +

Q.4 i.   Binary search tree   **2**
     ii.   Binary Search Tree- 2 marks   **8**
            (a) Searching a Value in BST - 3 marks
            (b) Inserting a new value in BST – 3 marks
OR   iii.   Inorder – 4 marks   **8**
            Preorder – 4 marks

Q.5 i.   Minimum Spanning Tree – 2 marks   **4**
            Technique- 2 marks
     ii.   Depth First Search algorithm to traverse a graph.   **6**
OR   iii.   Dijkstra's algorithm Overview – 1 marks   **6**
            Suitable example with proper steps – 5 marks

Q.6 i.   Write Algorithm for quick sort and write its time complexity.   **4**
     ii.   Define B+ tree – 1 marks   **6**
            inserting data: 65 70 75 80 85 60 55 50 45 – 5 marks
OR   iii.   Graph – 2 marks   **6**
            Adjacency matrix representation – 2 marks
            Adjacency list representation – 2 marks

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