B.TECH DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Third Semester

INFORMATION TECHNOLOGY

U13ITT301: Data Structures and Algorithms

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Identify the data structure which allows deletions at both ends of the list but insertion at only one end.

    a) Input-restricted dequeue   b) Output-restricted dequeue

    c) Priority Queue   d) Circular queue

2. …………….. pointers are used to traverse a doubly linked list.

3. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called

    a) Leaf   b) Branch

    c) Path   d) Thread

4. In a heap data structure, the largest element is placed in the ……………..

5. Consider AVL trees whose nodes are integers, and heaps of integers i.e. complete binary trees whose nodes are integers and meet the heap-order property. Which one of the following statement is correct?

    a) Every non-empty AVL tree of integers   b) Every non-empty heap of integers is an AVL
        is a heap of integers, but not vice versa.   tree of integers, but not vice versa.

    c) Every non-empty AVL tree of integers   d) Every non-empty heap of integers is an AVL
        is a heap of integers, and vice versa.   tree of integers, and vice versa.

6. If the next empty location is found in a squared number sequence, then it is called…………

7.   If every node u in G is adjacent to every other node v in G, A graph is said to be

    a) Isolated   b) Finite

    c) Complete   d) Strongly connected

8. In …………….. algorithm, a sorted array of edges is required in order to construct a minimal spanning tree.

9. The worst case occur in linear search algorithm when

   a) Item is somewhere in the middle of the array
   b) Item is not in the array at all

   c) Item is the last element in the array
   d) Item is the last element in the array or is not there at all

10. The complexity of bubble sort algorithm is ……………..

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. What is ADT?
12. How pointer implementation of linked list differs from cursor implementation?
13. Mention the purpose of threaded binary tree.
14. Draw tree structure for Zig-Zag in splaying.
15. How do hash tables deal with collisions?
16. Differentiate binary tree and B-tree.
17. What is meant by topological sorting?
18. When a graph is said to be biconnected?
19. What is the difference between internal sorting and external sorting?
20. What is meant by binary search?

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. Given two binary trees, write the routine in c that finds whether

    (i) the two binary trees are similar

    (ii) the two binary trees are mirror images of each other

    (iii) the number of nodes at each level on both of the binary trees are equal

    (iv) the height of the binary trees are equal

22. a) (i) Write the function to insert and delete an element in a singly linked list.   (7)

       (ii) Provide an algorithm to add two polynomials A and B using linked list.   (7)

(OR)

b) How recursion is implemented using stack? Explain the implementation of recursive procedure call for factorial function using stack and provide its disadvantages.

23. a) (i) What is the need for an AVL tree? What are the steps need to be followed to insert a node into an AVL tree? (4)

   (ii) Generate an AVL Tree by inserting the following nodes: (10)
   3, 2, 1, 4, 5, 6, 7, 16, 15 and 14

   Classify how each insertion causes imbalance and correct the same using necessary rotations.

(OR)

b) (i) Define B-tree and write the rules to construct a B-tree. (4)

   (ii) Start with an empty B-tree of order 5 and insert the keys which arrives in the following order: (10)
   1 12 8 2 25 5 14 28 17 7 52 16 48 68 3 26 29 53 55 45

24. a) How Dijkstra's algorithm is used to find the shortest path from source to destination? Find the shortest path from A to all other vertices for the following graph.
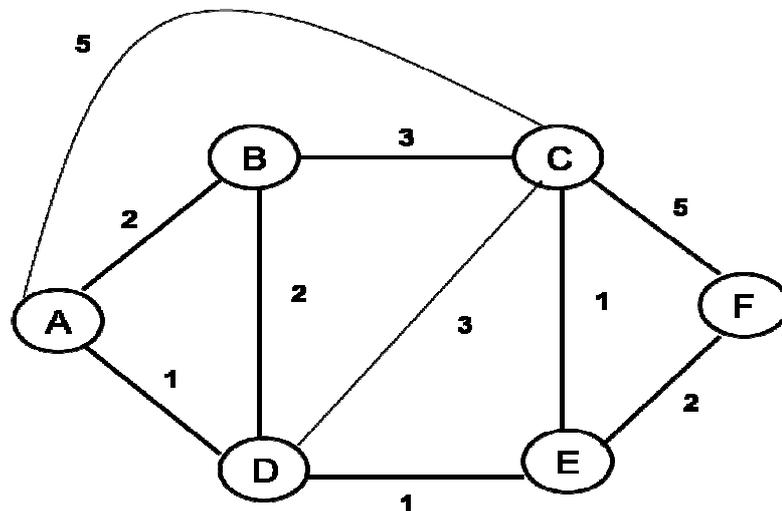
(OR)

b) Find out a minimum spanning tree for the following connected weighted undirected graph using Prim's algorithm.
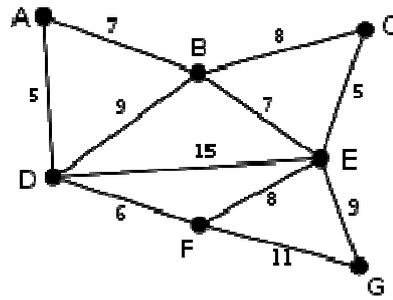
25. a) (i) What is sorting? Write the procedure for quick sort. (10)

   (ii) Sort the following sequence of numbers using quick sort. (4)

   38 81 22 48 13 69 93 14 45 58 79 72

(OR)

b) (i) Compare insertion sort and selection sort. (7)

   (ii) Write the iterative algorithm for binary search. Provide numerical example. (7)

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