KUMARAGURU
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Register Number:…….

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2013)

Third Semester

COMPUTER SCIENCE AND ENGINEERING

U13CST301:Data Structures and Algorithms

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?
   a) Deleting a node whose location in given
   b) Searching of an unsorted list for a given item
   c) Inverting a node after the node with given location
   d) Traversing a list to process each node
2. The postfix form of the expression (A+B) * (C*D-E)*F/G is _____
3. Which one of the following array represents a binary max-heap?
   (A) 25,12,16,13,10,8,14 (B) 25,14,13,16,10,8,12
   (C) 25,14,16,13,10,8,12 (D) 25,14,12,13,10,8,16
   a) A
   b) B
   c) C
   d) D
4. A full binary tree with' n' leaves contains _____ nodes
5. The searching technique that takes O (1) time to find a data is
   a) Linear Search
   b) Binary Search
   c) Hashing
   d) Tree Search
6. The height of the AVL tree is _____
7. The maximum degree of any vertex in a simple graph with n vertices is
   a) n–1
   b) n+1
   c) 2n–1
   d) n
8. The data structure required for breadth first traversal on a graph is _____

9. Which of the following sorting algorithms does not have a worst case running time of $O(n^2)$?

   a) Insertion sort b) Merge sort

   c) Quick sort d) Bubble sort

10. Assume a list L consisting of a sorted list followed by a few "random" elements. Which sorting method would be especially suitable for such a task _____.

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. Compare array and linked list.
12. List any four applications of stack.
13. Make a BST for the following sequence of numbers. And perform in-order traversal.

    45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48.
14. Construct a heap for the following list

    1,8,6,5,3,7,4

    H,E,A,P,S,O,R,T
15. What do you mean by hashing? List any two hash functions.
16. Construct an AVL tree by inserting the following elements successively starting with the empty tree.

    1,2,3,4,5,6

    6 ,5,4,3,2,1
17. Represent the given graph using any two methods.

18. What are the applications of depth first search?
19. How many interchanges required to sort 5, 1, 6, 2, 4 in ascending order using insertion sort.
20. Illustrate the best, average and worst case time complexity of linear search using example?

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. a) Two linked lists contain information of the same type in ascending order. Write a module to merge them to a single linked list that is sorted.

22. a) Develop functions to implement the following

- To insert an element in the binary search tree.
- To delete an element from the binary search tree.
- To search an element in the binary search tree.

(OR)

b) (i) Write short notes on threaded binary trees. (7)

(ii) Develop algorithms to implement tree traversal techniques. (7)

23. a) (i) What is a height balanced tree? Explain how the height is balanced after Addition / deletion of nodes in it? (7)

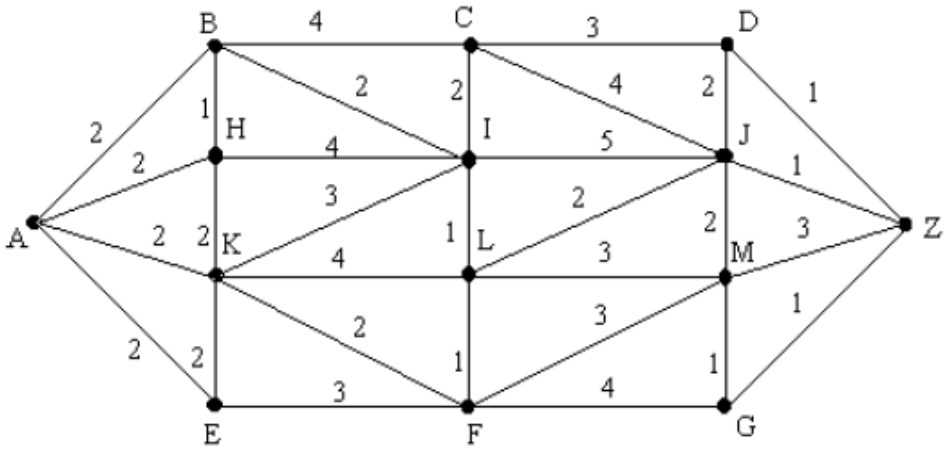
(ii) Develop functions to implement insert and delete operations in AVL tree (7)

(OR)

b) (i) What are B-trees? Construct a B-Tree of order 3 for the following set of Input data: 69, 19, 43, 16, 25, 40, 132, 100, 145, 7, 15, 18 (7)

(ii) What are Splay trees? Explain in detail with necessary diagrams: (7)

24. a) Find the shortest path from A to Z using Dijkstra's Algorithm.



(OR)

b) What is minimum spanning tree? Write and explain Prim's algorithm to find the minimum spanning tree with an example graph

25. a) (i) What are the two phases in heap sort algorithm? Sort the following data using heap sort and show all the intermediate steps. (7)

88, 12, 91, 23, 10, 36, 45, 55, 15, 39, 81

(ii) Write binary search algorithm and trace to search element 91 in following list with all the intermediate steps: 13 30 62 73 81 88 91. What are the limitations of Binary Search? (7)

(OR)

b) Illustrate the operation of merge sort on the array A={3,41,52,26,38,57,9,49} and analyze its time complexity. Also write an algorithm for merge sort.

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