Reg. No. :

Question Paper Code: 41322

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Third Semester

Computer Science and Engineering

14UCS302 - DATA STRUCTURES

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL 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 data structure required to check whether an expression contains balanced parenthesis is

    (a) stack   (b) queue   (c) tree   (d) array

3. The prefix form of an infix expression $a + b - c * d$ is

    (a) $+ ab - *cd$ (b) $- +abc * d$ (c) $- +ab * cd$ (d) $- + * abcd$

4. In order to get the information stored in a binary search tree in the descending order, one should traverse it in which of the following order?

    (a) left, root, right   (b) root, left, right
    (c) right, root, left   (d) right, left, root

5. Which amongst the following cannot be a balance factor of any node of an AVL tree?

   (a) 1   (b) 2   (c) 0   (d) -1

6. The process of accessing data stored in a serial access memory is similar to manipulating data on a

   (a) heap   (b) queue   (c) stack   (d) binary tree

7. If h is any hashing function and is used to hash n keys in to a table of size m, where $n<=m$, the expected number of collisions involving a particular key x is

   (a) less than 1 (b) less than n (c) less than m (d) less than n/2

8. If unions are done by size, if a node is initially at depth 0, the depth of any node is never more than

   (a) n-1   (b) log n   (c) n   (d) n/2

9. In breadth first search of graph, which of the following data structure is used?

   (a) stack   (b) queue   (c) linked List   (d) none of the above

10. The spanning tree of connected graph with 10 vertices contains

    (a) 9 vertices   (b) 11 edges   (c) 10 edges   (d) 9 edges

PART - B (5 x 2 = 10 Marks)

11. State ADT for push operation.

12. Define a threaded binary tree.

13. Express the percolate up strategy in Heap tree ADT?

14. Define disjoint set.

15. Define articulation point.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Define double linked list? State the advantages of using doubly linked list. Write an algorithm to add and delete an element from the doubly linked list.   (8)

    (ii) Define circularly linked list with neat diagram. Write an algorithm to add an element at the end of circular linked list.   (8)

(b) Explain the Linked implementation of stack and queue. How will you represent a Polynomial using an array? (16)

17. (a) (i) A binary tree *T* has 10 nodes. The in-order and preorder traversals of *T* yield the following sequence of nodes:

Inorder	D	B	H	E	A	I	F	J	C	G
Preorder	A	B	D	E	H	C	F	I	J	G

Draw the tree *T*. (8)

(ii) Define a threaded binary tree. Write an algorithm for in-order traversal of a threaded binary tree. (8)

Or

(b) (i) What are expression trees? Represent the following expression using a tree. Comment on the result that you get when this tree is traversed in Preorder, Inorder and Postorder. *(a-b) / ((c*d)+e).* (8)

(ii) What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers. 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48. (8)

18. (a) (i) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, and 7 into an initially empty AVL tree. (8)

(ii) Define Splay trees. Explain the rotations in Splay trees. (8)

Or

(b) (i) Draw a B-tree of order 3 for the following sequence of keys 2, 4, 9, 8, 7, 6, 3, 1, 5, 10. (8)

(ii) How will you represent a max-heap sequentially? Explain with an example. Write an algorithm to insert an element to a max-heap that is represented sequentially. (8)

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19. (a) Given the following keys {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(X) = X \pmod{10}$, construct.

    (i) separate chaining table

    (ii) an Open addressing hash table using linear probing

    (iii) an Open addressing hash table using quadratic probing

    (iv) an Open addressing hash table with second hash function

$h2(X) = 7-(X \bmod 7)$. (16)

Or

(b) (i) Illustrate the smart union algorithm with suitable example. (8)

    (ii) Discuss about the dynamic equivalence problem with example. (8)

20. (a) (i) Describe the Dijkstra's algorithm for finding a shortest path in a given graph. (6)

    (ii) What is a Spanning tree of a graph? What is minimum spanning tree? Execute Prim's algorithm to find the minimum spanning tree of the following graph. (10)
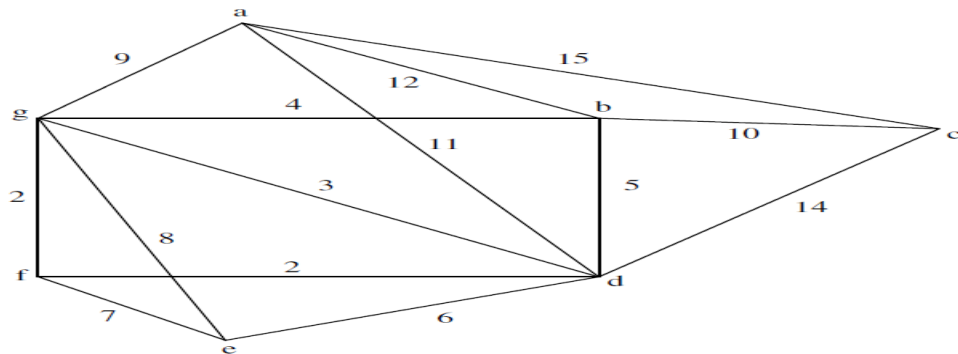
Or

(b) (i) Write an algorithm to implement Depth-first search? How is Depth-first search differing from Breadth-first search? (10)

    (ii) Discuss about Euler circuit with suitable example. (6)

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