BRAINWARE UNIVERSITY

Term End Examination 2019 - 20

Programme – Master of Technology in Computer Science & Engineering

Course Name – Advanced Data Structures

Course Code – PCC-MCS101

(Semester – 1)

Time allotted : 2 Hours 30 Minutes Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question) 20 x 1 = 20

1. *Choose the correct alternative from the following* (Answer any Twenty)

(i) When it would be optimal to prefer Red-black trees over AVL trees?

a. when there are more insertions or deletions
b. when more search is needed
c. when tree must be balanced
d. when log(nodes) time complexity is needed

(ii) Which of the following algorithms formed the basis for the Quick search algorithm?

a. Boyer-Moore's algorithm
b. Parallel string matching algorithm
c. Binary Search algorithm
d. Linear Search algorithm

(iii) The goal of hashing is to produce a search that takes

a. O(1) time
b. $O(n^2)$time
c. O(log n) time
d. O(n log n) time

(iv) What is the method to avoid collision?

a. Make the hash function appear random
b. Use uniform hashing
c. Use the chaining method
d. All of the mentioned

(v) Which of the following is the fastest way to store and retrieve data?

a. Sorting
b. Hashing
c. Indexing
d. Both A and B

(vi) What is the speciality about the inorder traversal of a binary search tree?

a. It traverses in a non increasing order
b. It traverses in an increasing order
c. It traverses in a random fashion
d. It traverses based on priority of the node

(vii) What is a skip list?

a. a linkedlist with size value in nodes
b. a linkedlist that allows faster search within an ordered sequence
c. a linkedlist that allows slower search within an ordered sequence
d. a tree which is in the form of linked list

(viii) In a hash table of size 10, where is element 7 placed using division method (indexing start at 1)?

a. 6
b. 7
c. 17
d. 16

(ix) Which of the following is identical to that of a separate chaining hash node?

a. Linked list
b. Array
c. Stack
d. Queue

(x) What is the hash function used in the division method?

a. h(k) = k/m
b. h(k) = k mod m
c. h(k) = m/k
d. h(k) = m mod k

(xi) Which of the following is true?

a. larger the order of B-tree, less frequently the split occurs
b. larger the order of B-tree, more frequently the split occurs
c. smaller the order of B-tree, more frequently the split occurs
d. smaller the order of B-tree, less frequently the split occurs

(xii) AVL Tree is

a. a tree which is balanced and is a height balanced tree
b. a tree which is unbalanced and is a height balanced tree
c. a tree with three children
d. a tree with atmost 3 children

(xiii) If the sequence of operations – push (1), push (2), pop, push (1), push (2), pop, pop, pop, push (2), pop are performed on a stack, the sequence of popped out values

a. 2,2,1,1,2
b. 2,2,1,2,2
c. 2,1,2,2,1
d. 2,1,2,2,2

(xiv) A variant of linked list in which last node of the list points to the first node of the list is?

a. Singly linked list
b. Doubly linked list
c. Circular linked list
d. Multiply linked list

(xv) In doubly linked lists, traversal can be performed?

a. Only in forward direction
b. Only in reverse direction
c. In both directions
d. None of the above

(xvi) Which type of traversal of binary search tree outputs the value in sorted order?

a. Pre-order
b. In-order
c. Post-order
d. None

(xvii) If the given input array is sorted or nearly sorted, which of the following algorithm gives the best performance?

a. Insertion sort
b. Selection sort
c. Quick sort
d. Merge sort

(xviii) Direct or random access of elements is not possible in .....

a. Linked list
b. Array
c. String
d. None of these

(xix) If in a linked list address of first node is 1020 then what will be the address of node at 5th position?

a. 1036
b. 1028
c. 1038
d. Cannot determined

(xx) Is a skip list like balanced tree?

a. true
b. false
c. May be
d. Can't say

(xxi) Which of the following is the correct function definition for quadratic probing?

a. $F(i)=i^2$
b. $F(i)=i$
c. $F(i)=i+1$
d. $F(i)=i^2+1$

(xxii) Which balance factor is stored in the new field introduced by an AVL tree for the representation of a node?

a. Length
b. Height
c. Width
d. Information

(xxiii) To represent hierarchical relationship between elements, Which data structure is suitable?

a. Dequeue
b. Priority
c. Tree
d. Graph

(xxiv) Which is/are the application(s) of stack

a. Function calls
b. Infix to positfix conversion
c. Evaluation of arithmetic expressions
d. All of the above

(xxv) In a priority queue, insertion and deletion takes place at ……

a. front, rear end
b. only at rear end
c. only at front end
d. any position

Group – B

(Short Answer Type Questions) 4 x 5 = 20

Answer any *four* from the following

2. Explain Brute-force pattern matching algorithm. 5
3. Briefly explain quad tree. 5
4. Explain String matching Algorithm with example. 5
5. Circular queue is needed to overcome the problem of linear queue – Justify. 5
6. Briefly explain Rehashing in data structure. 5
7. Write the difference between Strictly Binary tree and Complete Binary Tree. 5

Group – C

(Long Answer Type Questions) 2 x 10 = 20

Answer any *two* from the following

8. Suppose the following eight numbers are inserted in order into an empty AVL treeT: 77, 11, 99, 55, 22, 33, 44, 88. Draw the AVL tree T by describing each step of insertion. 10
9. Give the input values = {4371, 1423, 6273, 9149, 3494, 8679, 1989} and the hash function H(K)=K MOD 10. Hash table size=10.Find out the result using linear probing and chaining. 10
10. (a) Briefly explain the collision resolution technique in Hashing. 7
    (b) What is the difference between linear probing and quadratic probing? 3
11. (a) What is 2-3 tree? Construct the 2-3 tree for the following data: 45,23,12,29,37,11,89,38,48 7
    (b) What is B-tree? 3
