BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – Master of Technology in Computer Science & Engineering

Course Name – Advanced Data Structures

Course Code – MCSE010401

(Semester – 1)

Time allotted: 3 Hours **Full Marks: 70**

[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 Questions) 10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) What is the best case time complexity of insertion sort?

a. O(1) b. O(n)

c. O(n log n) d. O(n^2)

(ii) What is the equivalent postfix expression for *d / (e + f) + b * c*?

a. defbc/++* b. def+/bc+*

c. def+/bc*+ d. None of these

(iii) What is the time complexity of binary search?

a. O (n^2) b. O (n)

c. O (log n) d. O (n log n).

(iv) What is the actual string corresponding the postfix form of a string ABC + – D*?

a. (A – (B + C)) * D b. ((A – B) + C) * D

c. ((A + B) – C) * D d. (A + (B – C) * D)

(v) The values in a Binary Search Tree can be sorted in ascending order by using which of the following traversals?

a. Pre-order b. In-order

c. Post-order d. Level-order

(vi) In what tree, for every node the heights of its left sub-tree and right sub-tree differ at least by one?

a. Binary search tree b. AVL tree

c. Complete tree d. Threaded binary tree

(vii) Fibonacci function *fib (n) = fib (n –1) + fib (n – 2)* is an example of

a. Linear Recursion b. Binary Recursion

c. Non-linear Recursion d. Mutual Recursion

(viii) What is the fastest sorting algorithm for an almost already sorted array?

a. Quick sort b. Merge sort

c. Selection sort d. Insertion sort

(ix) A linear list that allows elements to be added or removed at either end but not in the middle is called

a. Stack b. Queue

c. Priority queue d. None of these

(x) A complete binary tree with n leaves contains

a. n nodes b. $\log_2$ n nodes

c. 2n – 1 nodes d. 2^n nodes

Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following

2. What is the difference between Static and Dynamic Data Structure? Explain with an example. 5

3. Write an algorithm or a function in C Programming Language to reverse a Singly-linked list physically. The error conditions are to be handled properly. 5

4. Define and explain Hashing. 5

5. Write down the Formation algorithm of Binary Search Tree. 5

6. (a) What is Open Addressing? 1

 (b) Where it is used? 2

 (c) Explain with an example. 2

Group – C

(Long Answer Type Questions) 3 x 15 = 45

Answer any *three* from the following

7. (a) Define the ADT for stack. 2

(b) Show the implementation of the stack data structure using linked list. 6

(c) What is Circular queue? 2

(d) Write *Q*-insert algorithm for the circular queue. 5

8. (a) Show the steps in creation of a height balanced binary AVL TREE using insertion of items in the following order (show all the balancing steps)

(March, May, November, August, April, January, December, July, February, June, October, September) 10

(b) What do you mean by a *B*-Tree and what are the uses of such a tree in data structures? 5

9. (a) Define Bruce Force Pattern Matching. 5

(b) Explain briefly QuadTrees 5

(c) Explain ReHashing with Examples 5

10. (a) What are the applications where you will prefer hash tables to other data structures? 4

(b) What do you mean by collision? How is it handled? 7

(c) Write the recursive function for the problem of Tower of Hanoi problem. 4

11. Write a short note of any three of the following. 3x5

(a) Radix sort.

(b) Asymptotic Notation.

(c) Tail recursion.

(d) Threaded binary tree.

(e) BFS *vs* DFS.
