



## BRAINWARE UNIVERSITY

### Term End Examination 2018 - 19

Programme – Master of Computer Applications

Course Name – Data Structure with Python

Course Code - MCA202

(Semester – 2)

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 Question)

10 x 1 = 10

1. *Choose the correct alternative from the following*
  - (i) The time complexity of the following program code is-  
while ( n!=1 ):  
  n=n/2
 

a. O(n)	b. O(logn)
c. O(nlogn)	d. O(n <sup>2</sup> )
  - (ii) A vertex that has no child is called
 

a. NULL vertex	b. None Vertex
c. pendant vertex	d. none of these
  - (iii) Best case time complexity of insertion sort is
 

a. O(1)	b. O(n)
c. O(nlogn)	d. O(n <sup>2</sup> )
  - (iv) We can implement a queue data structure using stack data structure. In that case we need at least
 

a. one stack	b. two stack
c. three stack	d. cannot be implemented
  - (v) The time complexity of  $T(n) = T(n/2) + 1$ 

a. O(logn)	b. O(n)
c. O(1)	d. O(nlogn)



**Group – C**

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

- |     |   |     |
|-----|---|-----|
| 7.  | (a) Show how the merge sort algorithm will sort the following list of elements in ascending order: 100,90,80,70,60,50,40,30,20  | 4   |
|     | (b) Why does it run faster than bubble sort in most of the cases?   | 1   |
|     | (c) Write an algorithm to implement merge sort algorithm. Analyse the time complexity of your algorithm.  | 5+5 |
| 8.  | (a) What are the advantages and disadvantages of linked list over array?  | 3   |
|     | (b) Write python functions to implement the following on a singly linked list:  | 5+5 |
|     | (i) Insert an element at the end of the list  |     |
|     | (ii) Delete a particular element.   |     |
|     | (c) What are the advantages and disadvantages of linked list over array?  | 3   |
| 9.  | (a) Define hashing  | 2   |
|     | (b) Explain three hashing methods with a suitable example.  | 6   |
|     | (c) Explain with a suitable example the collision resolution scheme using linear probing with open addressing   | 5   |
|     | (d) What is quadratic probing?  | 2   |
| 10. | (a) Construct an AVL tree with the following list of elements<br>Jan, Sun, Feb, Mon, Mar, Tue, Apr, Wed, May, Thu Jun, Fri<br>Clearly mention different rotations and balance factor of each node | 6   |
|     | (b) Sort the following list of elements using radix sort algorithm<br>345, 123,234,354,456,543,654,356,378,389,300,30,450,100   | 5   |
|     | (c) Write a python function to reverse a singly linked list (i.e., the first node becomes the last node)  | 4   |
| 11. | Write short notes on any three of the following   | 3x5 |
|     | (a) Collision resolution techniques in chaining   |     |
|     | (b) Tail recursion  |     |
|     | (c) Sequential representation of binary tree  |     |
|     | (d) Asymptotic Notation   |     |
|     | (e) Doubly linked list  |     |

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