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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, December - 2019
DATA STRUCTURES AND ALGORITHMS
Time: 3 Hours
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A
$5 \times 4$ marks $=20$
1.a) Define a single linked list, Write the structure of the linked list with neat sketch. [4]
b) Explain the representations of graphs. [4]
c) Write a program to sort an array of integers using selection sort. [4]
d) Insert $02,36,09,06,14,27,28$ into BST.
e) What is dynamic programming? When to apply it.

## PART - B

$5 \times 8$ marks $=40$
2. Explain the Operations on Doubly Linked Lists.

## OR

3.a) List and explain the applications of stack ADT.
b) Write an algorithm to find the sum of n-numbers and also analyze its time complexity.
4. Differentiate between BFS and DFS traversals. Take an example graph and implement the BFS traversal.

## OR

5.a) Define tree and what are the properties of trees?
b) Explain the different types tree traversals.
6.a) Explain the worst-case time complexity in the quick sort.
b) Explain the different types of Hash functions are used in hashing.

## OR

7. Perform heap sort algorithm for (10 15622518162204 4).
8. Define AVL trees. Explain the rotations involved in balancing an unbalanced AVL tree.

OR
9.a) Write the insertion algorithm of red-black tree. Also analyze its time complexity [8]
b) What are properties of B-Tree.
10. Compare the Standard Tries and Compressed Tries with an example.

OR
11. State and explain the Knuth-Morris-Pratt algorithm with an example.

