F–14361

Register No. | | | | | | | | |

BE Degree Examination November 2016

Third Semester

Computer Science and Engineering

14CST31 – DATA STRUCTURES

(Regulations 2014)

Time: Three hours Maximum: 100 marks

Answer all Questions

Part – A (10 × 2 = 20 marks)

1. Identify the advantages of Linked list over Arrays.
2. Write a routine to display the elements of singly linked list.
3. List any two applications of stack and queue.
4. What is Priority Queue?
5. Differentiate between binary tree and binary search tree.
6. What is full and complete binary tree?
7. Consider a hash table with 100 slots. Collisions are resolved using chaining. Assuming simple uniform hashing, what is the probability that the first 3 slots are unfilled after the first 3 insertions?
8. What is the worst case time complexity of insertion sort where position of the data to be inserted is calculated using binary search?
9. Let G be connected undirected graph of 100 vertices and 300 edges. The weight of a minimum spanning tree of G is 500. When the weight of each edge of G is increased by five, then what is the weight of a minimum spanning tree?
10. Define topological sort.

Part – B (5 × 13 = 65 marks)

11. a. With an algorithm explain how insertion and deletion are implemented in doubly linked list. (13)

(OR)

b. i) Write a function to reverse a singly linked list. (5)

ii) What are the time complexities of finding 8^{th} element from beginning and 8^{th} element from end in a singly linked list? Let n be the number of nodes in linked list, you may assume that n >= 8 . (4)

iii) Write a routine for deletion operation of singly linked list. (4)

12. a. Illustrate the array and linked list implementation of stack. (13)

(OR)

b. i) Implement Queue ADT with the operations insertion, deletion and display elements. (6)

ii) Demonstrate how stack is applied for evaluating postfix expression with an example. (7)

13. a. Write a recursive and non recursive function for pre-order and post-order tree traversal. Give an example. (13)

(OR)

b. i) Elaborate various rotations of AVL tree. (6)

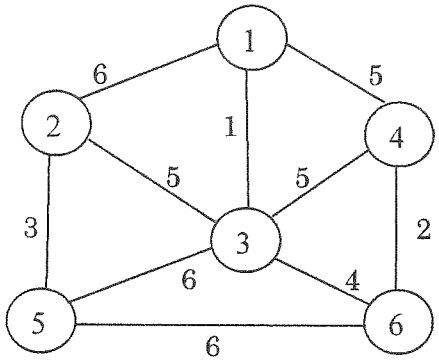
ii) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7 into an initially empty AVL tree. (7)

14. a. Illustrate merge sort algorithm with an example and analyze its efficiency. (13)

(OR)

b. Write an algorithm for heap sort and apply this algorithm to show how the heap sort process the following input 31, 41, 59, 26, 53, 58, 97. (13)

15. a. Write and explain psecdocode for Kruskal's algorithm. Apply this algorithm to find the minimum spanning tree for the following graph: (13)

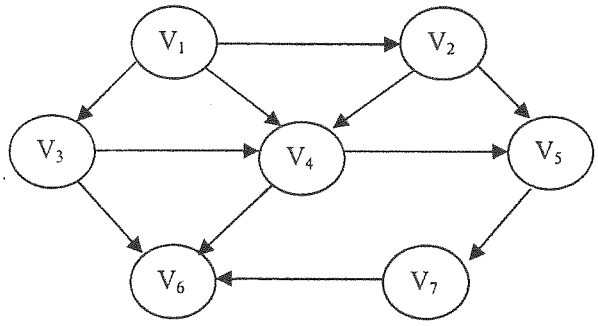


(OR)

b. Which graph algorithm can be used to determine the presence of a cycle in a given graph? Explain the algorithm with suitable example. (13)

Part – C (1 × 15 = 15 marks)

16. a. Write a pseudocode to perform topological sort and show the result of applying this sort to the following graph: (15)



(OR)

b. Apply Bubble sort, insertion sort and quick sort algorithm on the following elements of the array. (15)

25, 57, 48, 37, 12, 92, 86, 33.

Analyse the running time of above sorting methods in worst case and best case.