Hall Ticket Number:

Code No.: 21112 S

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. II Year (C.S.E.) I-Semester Supplementary Examinations, May/June-2017

Data Structures

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 X 2=20 Marks)

1. Define Space and Time complexity of an algorithm.
2. Write pseudo code to count the number of nodes in a singly linked list.
3. Evaluate the postfix expression: 3 2 * 9 + 8 4 / - 6 4 * + using stack.
4. What is the need for hashing?
5. Write pseudo code for finding the minimum element in a binary search tree.
6. What is the advantage of an AVL tree over binary search tree?
7. What is the minimum number of connected components in a simple, undirected and disconnected graph?
8. Let G be a connected, undirected graph with 50 vertices and 200 edges. The cost (weight) of a minimum spanning tree of G is 275. Determine the cost of a minimum spanning tree of G, if the weight of each edge of G is increased by three.
9. Which of the following arrays is efficiently sorted in descending order by Insertion sort?

   A: (10,20,30,40,50,60,70,80)

   B: (80,70,60,50,40,30,20,10)

   Justify your answer.
10. What is the height of a heap with 54 elements?

Part-B (5 × 10 = 50 Marks)

11. a) Formally define asymptotic notations with suitable examples. [5]

    b) Write a function to insert the element 'x' after the k^{th} position in a singly linked list. [5]

12. a) With pseudo code explain *push* and *pop* operations of stack when implemented using arrays. [5]

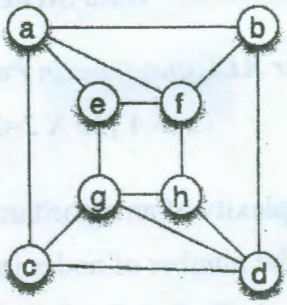
    b) What is a collision in hashing? Explain hashing with chaining with a suitable example. [5]

13. a) Define a binary tree. Determine the minimum and the maximum number of nodes in a binary tree of height h. [5]

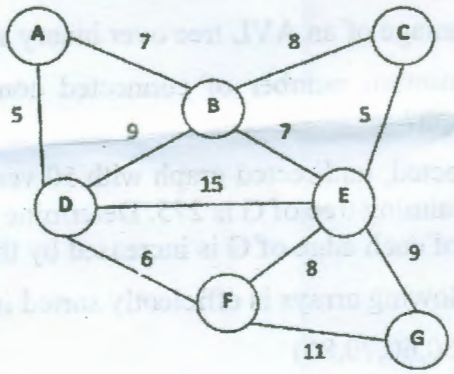
    b) Construct a Binary Search Tree (BST) for the sequence of elements: 10, 20, 15, 42, 12, 18, 16, 6, 4, 8 and 9. Delete node with key 15 from the constructed BST. [5]

Contd...2

14. a) Define a connected graph. Apply DFS algorithm to the following graph and find four different DFS orderings by considering the vertex *b* as the source. [5]



b) Define a Minimum Spanning Tree (MST). Determine a MST of the following graph by applying Kruskal's algorithm. [5]



15. a) Show the content of an array after the each iteration of merge sort algorithm. Initial content of an array is 29, 38, 27, 43, 3, 9, 82, 10, 18. [5]

b) Write the pseudo code for Heap sort algorithm. [5]

16. a) Explain with a suitable example an advantage of doubly linked list over singly linked list. [4]

b) Write a program to implement the circular queue. [6]

17. Write short notes on any *two* of the following:

a) Deletion operation in Binary Search Tree [5]

b) Dijkstra's Algorithm [5]

c) Quick Sort [5]

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