Reg. No.										

B. Tech. DEGREE EXAMINATION, DECEMBER 2018
Fourth Semester

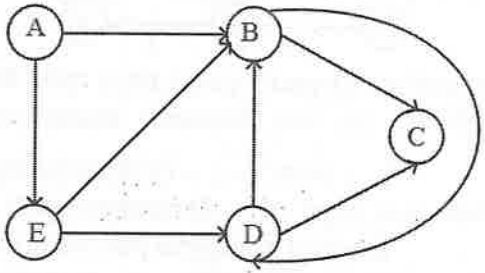
IT0208 – DATA STRUCTURES AND ALGORITHMS
(For the candidates admitted from the academic year 2007-2008 to 2012-2013)

Time: Three Hours Max. Marks: 100

Answer **ALL** Questions

PART – A (10 × 2 = 20 Marks)

1. Define: Data structures. List its applications.
2. Construct orderly linked list for the following data (Ascending order). 50, 30, 10, 60, 45.
3. Differentiate full and complete binary tree.
4. Show that maximum number of nodes in a binary tree of height is $2^{h+1} - 1$.
5. Perform insertion sort on the following data.
   51, 32, 48, 26, 10.
6. What do you mean by heap order property?
7. Represent the following graph using "Adjacency matrix"



8. What is spanning tree? Can a graph can have more

spanning tree. Justify.

9. Specify any two examples for greedy algorithms.
10. Define backtracking.

PART – B (5 × 16 = 80 Marks)

11. a.i. Explain the ADT operation with algorithm for linked list implementation of queue. (10 Marks)

ii. State the various asymptotic notation used for denoting time complexity. (6 Marks)

(OR)

b. Write an algorithm to insert a node at the beginning, at given position and at the end of the linked list. Give a pictorial representation of singly linked list before and after insertion. Provide time complexity for deleting a node.

12. a. Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7, 0 into an initially empty AVL tree. Explain all four rotations.

(OR)

b. Show the result of inserting 3, 1, 4, 6, 9, 2, 5, 7 into an initially empty binary search tree. Also perform all three traversal techniques and list their outcomes.

13. a.i. Suppose the merge sort is called on the arrays 4, 8, 2, 1 and 9, 5, 7, 3 what arrays are input to the 1st four recursive call of the algorithm (not including the initial call) (10 Marks)

ii. Write an algorithm to perform binary search. (6 Marks)

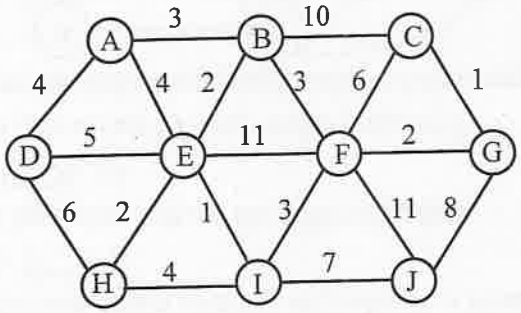
(OR)

b. Given input {1437, 1323, 6173, 4199, 4344, 9696, 1986} and a hash function h(x) = X mod 10. Show the resulting

(i) Open addressing hash table using linear probing and quadratic probing

(ii) Open addressing hash table with second hash function $h_2(x) = 7 - X \bmod 7$.

14. a. Find the minimum spanning tree for the graph given below using both Prim's and Kruskal's algorithms



(OR)

b.i. Describe the implementation of Dijkstra's algorithm with example. (12 Marks)

ii. Write short notes on NP-completeness. (4 Marks)

15. a. Show the operation of all of the bin-packing strategies on the input 0.42, 0.25, 0.27, 0.07, 0.72, 0.86, 0.09, 0.44, 0.50, 0.68, 0.73, 0.31.

(OR)

b. A file contains only colons, spaces, newlines, commas and digits in the following frequency: Colon (100), Space (605), newline (100), comma (705), 0(431), 9(242), 2(176), 3(59), 4(185), 5(250), 6(174), 7(199), 8(205), 9(217). Construct the Huffman code.

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