FACULTY OF ENGINEERING

B.E. 2/4 (CSE) I-Semester (Main) Examination, November/December, 2009

Subject : DATA STRUCTURES

Time : 3 Hours]

[Max. Marks : 75

Note : *Answer all questions from Part A. Answer any five questions from Part B.*

PART - A

(25 Marks)

1. How many non–zero elements are there in a tridiagonal matrix of size 100×100 ?

2. Suppose the time compulsion of two different algorithms for a given problem are $T_1(n) = 400\,n$ and $T_2(n) = n^2$. For what values of n Algorithm with height time complexity is preferred ?

3. Convert the following infix expression to postfix form $A + B*(C - D)/(F - G)$.

4. Suppose a queue is represented by a circular array of size N, F and R are used to denote front and rear positions. If F points a location before front element of queue and R points to last element of queue, how many elements are there in the queue ?

5. Write a function to count the number of elements in a binary tree.

6. Draw all possible AVL trees of height 3.

7. Define a heap.

8. What is the worst case time complexity of Quick Sort ? For what type of input it occurs ?

9. How do you test whether a given directed graph is strongly connected or not ?

10. What is minimum spanning tree ?

PART - B

11. (a) Write a function to find n[th] element from last position in a singly linked list in one pass.

    (b) Write a function to concotenate two circular linked lists.

12. Declare two stacks of varying length in a single array. Write functions to push and pop elements from these stacks.

13. (a) Write a function Successor (X) to return successor of x in a binary search tree, if x is present.

    (b) Write a function to find an element in AVL tree.

14. (a) Write a function for insertion sort.

    (b) Sort the following numbers using quick sort.

    45, 89, 30, 15, 10, 35, 55, 40.

15. Draw five different spanning trees for the following graph.
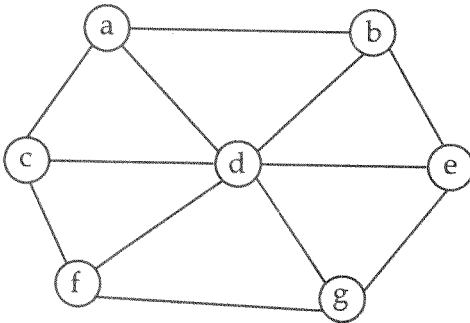
16. (a) Write a function double hash to resolve collisions using double hashing.

    (b) What is the time complexity of insertion sort when all keys are equal ?

17. Write short notes on :

    (a) Recursive Colls Implementation.

    (b) Representation of graphs

    (c) Time–Space trade off.

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