Code No. : 5232/O

FACULTY OF ENGINEERING
B.E. 2/4 (CSE) I Semester (Old) Examination, Dec. 2011
DATA STRUCTURES

Time: 3 Hours]

[Max. Marks: 75

Note : 1) Answer **all** questions from Part **A**.

2) Answer **any five** questions from Part **B**.

PART – A
(25 Marks)

1. Suppose you have an algorithm that takes about 1 hour to solve a problem of size N. You buy a new computer that is twice as fast and has twice as much memory. About how long will it take you to solve a problem of size 2N ? Assume the running time of your program is $8N^2 + 13 N^{4/3} + 12N + 3$ nanoseconds.

    a) $\frac{1}{2}$ hour   b) 1 hour   c) 2 hours   d) 4 hours

2. How many non-zero elements are there in a tridiagonal matrix of size $n \times n$?

3. Selection sort program always performs $n - 1$ passes. Is it possible to reduce the number of passes by including a test to end the program when no more exchanges are required ?

4. Which Graph traversal algorithm is used
    i) for finding shortest Path ?
    ii) topological sorting ?

5. How many number of comparisons are required to sort N equal keys using quick sort ?
    a) N   b) 2 N   c) N log N   d) N^2

6. Maximum number of equality tests to insert N keys into an empty linear probing hash talk of size 2N is _____

7. Write a function to find height of a Binary tree.

8. Of in order, pre order, post order and level order traversals which is best for deleting all nodes and which is best for all nodes to a file so that the tree is reconstructed ?

9. Suppose on an empty stack following operations are preformed. In what order will the elements be popped ?
    push A ; push B ' push C ; pop ; pop ' push D; pop; pop;

10. Which of the representations of graph, adjacency list or adjacency matrix, are space efficient ? Why ?

PART – B
(5×10=50 Marks)

11. a) What lettrs are interrogated by Binary search if applied to the following list :
    L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
    When searching for U, and when searching for B ?
    b) Write a function to find n^{th} element from last element of a linked list in one pass.
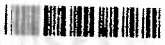
12. a) Simulate queue insert and delete operations using stack.

   b) Write a function to evaluate a postfix expression using stack operatins

13. a) Show different passes of sorting the following elements using quick sort.
   N O P A R T I G B U S

   b) Write a function for bubble sort.

14. a) Write a function that converts a sorted array in to a binary search tree. The constructed tree should be nearly balanced.

   b) Write a function for non-recursive post order traversal of a binary tree.

15. a) Write a functions to delete duplicate elements from a sorted list.

   b) A queue Q contains the items a_1, a_2 ... a_n in that order with a_1 at the front and a_n at the back. It is required to transfer these items into a stack S so that a_1 is at top of the stack and order of all other items is preserved using operations of queues and stack, outline the algorithm to accomplish this task.

16. Use Kruskals algorithm to find minimum spanning tree of the following graph.
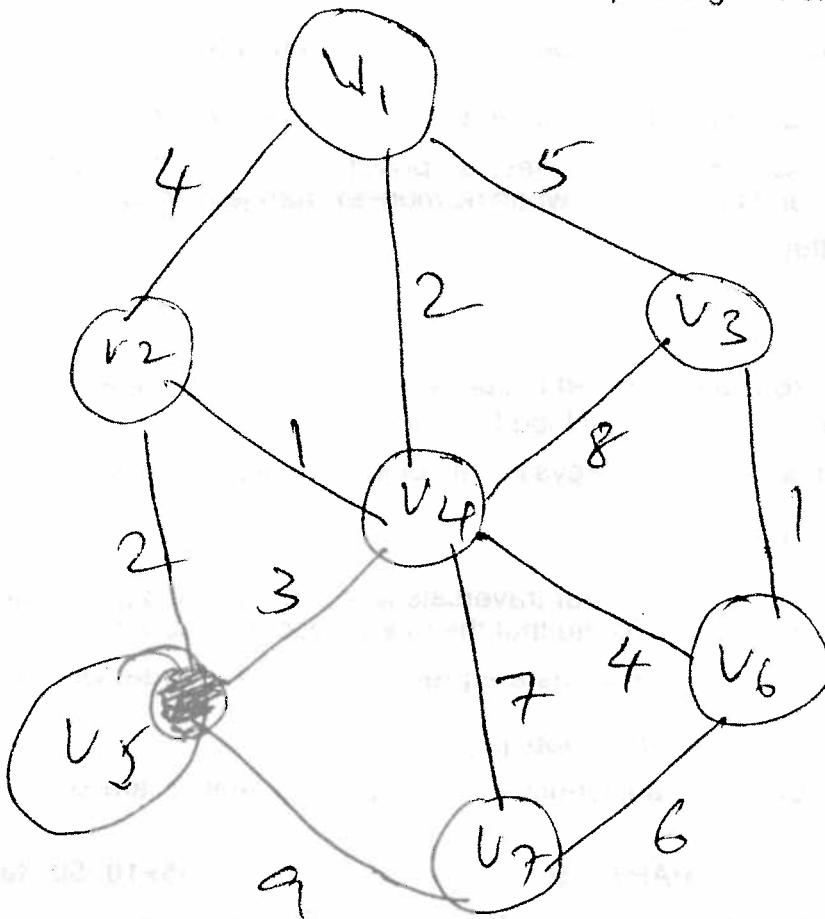
17. Write short notes on :

   a) Indirect representations

   b) B – Trees.