ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2008

DATA STRUCTURE WITH C

SEMESTER - 2

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Given two sorted list of size '*m*' and '*n*' respectively. The number of comparisons needed in the worst case by the merge sort algorithm will be

a) $m*n$ b) maximum of m, n

c) minimum of m, n d) $m + n - 1$. ☐

ii) The depth of a complete binary tree with n nodes is

a) $\log (n + 1) - 1$ b) $\log n$

c) $\log (n - 1) + 1$ d) $\log (n) + 1$. ☐

iii) The running time of an algorithm $T (n)$, where n is the input size is given by

$T (n) = 8\ T (n/2) + qn$, if $n > 1$

$= p$, if $n = 1$.

where p and q are constants. The order of this algorithm is

a) n^2 b) n^n

c) n^3 d) n. ☐

iv) A sorting technique that guarantees, that records with the same primary key occurs in the same order in the sorted list as in the original unsorted list is said to be

a) stable b) consistent

c) external d) linear. ☐

v) A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately

a) 50.2 sec b) 6.7 sec

c) 72.7 sec d) 11.2 sec.

vi) The postfix equivalent of the prefix * + ab – cd is

a) ab + cd –* b) abcd + – *

c) ab + cd* – d) ab + – cd*.

vii) The order complexity of Bubble sort in the worst case is

a) O (n) b) O (n^2)

c) O ($n \log n$) d) O ($\log n$).

viii) Which one out of the following works on "Divide & Conquer" policy ?

a) Selection sort b) Heap sort

c) Quick sort d) Shell sort.

ix) Which is the time complexity for selection sort to sort an array of n elements ?

a) O ($\log n$) b) O ($n \log n$)

c) O (n) d) O (n^2).

x) If we are sorting an array of eight integers using quick sort and we have just finished the first partitioning with the array looking like this

2 5 1 7 9 12 11 10

Which statement is correct ?

a) The pivot could be either 7 or 9

b) The pivot could be 7 but not 9

c) The pivot is not 7 but could be 9

d) None of these.

xi) If T is a connected graph without any cycle and also it is a finite with 15 nodes, then T will have ..... edges.

a) 15 b) 16

c) 14 d) 120.

xii) Which of the following statements are true in case of Depth-First-Traversal ?

i) DFS is used to determine connected components of an undirected graph.

ii) DFS is used to determine acyclic nature of a graph.

a) only (i) is true b) only (ii) is true

c) both (i) & (ii) are true d) all are false.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) How the polynomial $3x^2 - 11x^2 + 9$ can be represented using a linked list ?

b) What are the relative advantages and disadvantages of a linear linked list over an array. 2 + 3

3. a) Define O, θ and Ω notations.

b) $T(n) = 4n^2 + 3\, n \log n$. Express $T(n)$ in order notation. 3 + 2

4. What is Hashing ? What is Linear Probing ? 3 + 2

5. Write a function to create a node of the double linked list. What are the difference between array and linked list.

6. Construct a Binary Search Tree with the help of following inorder and postorder traversal :

Postorder : B, C, A, P, N, T, L, K, G, F, P

Inorder : A, B, C, D, F, G, K, L, N, P, T.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

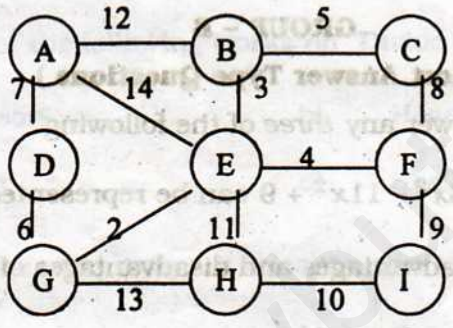
7. Define AVL tree and give examples of AVL and non-AVL trees. Insert the following keys in that sequence into an AVL tree, clearly indicating the various rotations used.

   6, 3, 1, 2, 4, 5, 9, 7, 8, 11, 10, 12. (3 + 2) + 10

8. a) Write a C program to reverse a linked list traversing the list exactly once.

   b) Write a C program to insert a node into a doubly linked list at *n*th position where '*n*' is asked from the user. 7 + 8

9. a) What is a graph ? Find out the shortest path between all pairs of nodes in the given graph by Kruskal's algorithm. 1 + 7



   b) Analyze selection sort algorithm with example. 4 + 3

10. Write an algorithm of Quick sort. Derive complexity algorithm.

11. Write short notes on any *three* of the following : 3 × 5

    a) Threaded binary tree

    b) Dijkstra's algorithm for finding shortest path

    c) Towers of Hanoi problem and solution

    d) B-tree

    e) Priority Queue.

END