ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2007

DATA STRUCTURE WITH C

SEMESTER - 2

Time : 3 Hours] [Full Marks : 70

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct choice for the following : $10 \times 1 = 10$

i) Structure in C is an

a) user defined data type

b) ADT

c) both (a) and (b)

d) none of these. ☐

ii) What is the balancing condition of an AVL tree ?

a) Height factor between + 2 and - 2

b) Height factor between + 1 and - 1

c) Height factor between 0 and - 1

d) None of these. ☐

iii) What is suitable efficient data structure to construct a tree ?

a) Linked list

b) Stack

c) Queue

d) None of these. ☐

iv) How many different trees are possible with 3 nodes ?

a) 3 b) 4

c) 5 d) 8. ☐

v) Let $T(n)$ be the function defined by

$$T(1) = 1, \text{ if } n = 1$$

$$= 2T(\lfloor n/2 \rfloor) + \sqrt{n}, \text{ for } n \geq 2$$

Which of the following statement is true ?

a) $T(n) = O(\sqrt{n})$ b) $T(n) = O(n)$

c) $T(n) = O(\log n)$ d) None of these.

vi) The initial configuration of a queue is a, b, c, d (a is in the front end). To get the configuration d, c, b, a one needs a minimum of

a) 2 deletions and 3 additions

b) 3 deletions and 2 additions

c) 3 deletions and 3 additions

d) 3 deletions and 4 additions.

vii) Which of the following is a hash function ?

a) Quadratic probing b) Chaining

c) Open addressing d) Folding.

viii) Which sort does not use divide and conquer methodology ?

a) Merge Sort b) Quick Sort

c) Bubble Sort d) None of these.

ix) Worst case time complexity of the heap sort algorithm is

a) $O(N \log_2 N)$ b) $O(N \text{ in } N)$

c) $O(N^2)$ d) $O(N^3)$.

x) A full binary tree with n leaves contains

a) n nodes b) $\log_2 n$ nodes

c) $2n - 1$ nodes d) 2^n nodes.

GROUP – B

(Short Answer Type Questions)

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

2. Define circular queue. What are the advantages of circular queue over linear queue ? Define priority queue. 1 + 2 + 2

3. What is tail recursion ? How is it different from ordinary recursion ? What are the difference between iteration and recursion ? 1 + 2 + 2

4. What is collision ? Discuss linear probing method to resolve collision. 2 + 3

5. Distinguish between linear and non-linear data structure with suitable example. 5

6. Write a C-function to add a node at the end of the single linked list. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. $3 \times 15 = 45$

7. Define a *B*-Tree. Insert the following keys into a *B*-Tree of order 3. (*i.e.* the *B*-tree is a 3-way tree)

   A F B K H M E S R C L N U P. 5 + 10

8. What is Binary Search Tree (BST) ? Write the algorithm for deletion of an element from a BST. Explain the principal operation of Heap Sort. The preorder and inorder traversal sequence of nodes in a binary tree are :

   Inorder : E A C K F H D B G

   Preorder : F A E K C D H G B

   Construct the binary tree. 2 + 4 + 4 + 5

9. a) Represent the following polynomial by a linked list

   $5x^5 + 4x^2 - 25x + 10$.

   Write a program to print the above polynomial. 2 + 5

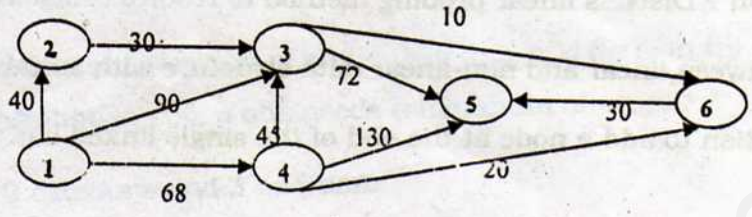
   b) Write an algo. of quick sort. 4

   c) Find the worst case analysis of merge sort. 4

10. a) Prove that the maximum number of edges possible in a simple graph of a n nodes is $n(n-1)/2$. 4

b) Write down the BFS algorithm. What are the differences between BFS & DFS ? 6

c) Obtain shortest paths to all destinations from vertex 1 using Dijkstra's algorithm. (Figure on each link represents the distance between nodes i and j). 5



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

a) AVL tree

b) Polish and Reverse polish notation

c) Compaction

d) Threaded binary tree

e) Array row / column major ordering.