Roll No. .....

MCSE/MSE(N)–102

M. E./M. Tech. (First Semester)
EXAMINATION, March, 2010

ADVANCED DATA STRUCTURES AND ALGORITHM

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks. Use of calculators is permitted.

1. (a) Consider the recurrence : 10

$$T(n) = 14\,T\left(\left\lfloor \frac{n}{2} \right\rfloor\right) + n^2$$

Find the asymptotic bound.

(b) Discuss different types of time complexities which can be analyzed for an algorithm with the help of an example. 10

2. (a) Write a 'C' function to find out whether there is an element 'a_{ij}' in an $m \times n$ matrix 'A' of numbers such that 'a_{ij}' is the smallest value in the ith row and largest value in the jth column. How many comparisons does your function make ? 10

(b) What is doubly linked list ? Write a function to delete the specified node from doubly linked list. 10

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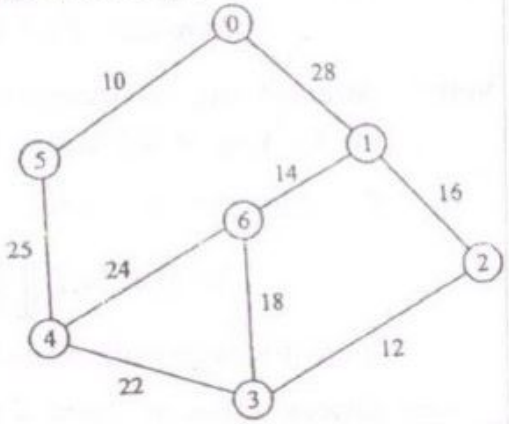
5. (a) Convert the expression (A + (B * C))/(C − (D * B)) into postfix expression and then evaluate it for A = 10, B = 20, C = 15, D = 5. Display the stack status after each operation. 10

(b) What is a B-tree ? Discuss the algorithm used for insertion of a node into a B-tree. 10

4. (a) Explain Prim's algorithm to generate minimum cost spanning tree. Also generate minimum cost spanning tree for the following graph using this algorithm. 10



(b) What are the differences between an AVL tree and binary tree ? In what way is an AVL tree better than a binary tree ? 10

5. (a) Write recursive C function to traverse a binary tree using postorder traversal strategy. 10

(b) Write depth first search algorithm for the traversal of any graph. Explain your algorithm's time complexity with the help of an example. 10

6. (a) Discuss various methods of selecting the free block to use when processing a request for storage. 10

(b) What is a buddy system ? How is it useful ? Implement a binary buddy system as a set of 'C' program.

7. (a) Prove that Quick Sort's best case running time is $\Omega(n \log n)$. 10

(b) Sort the array A = {15, 13, 9, 25, 7, 17, 20, 8, 4} using Heap sort algorithm. 10

8. Write short notes on any *four* of the following : 5 each

(i) AVL Tree

(ii) Storage Compaction

(iii) Backtracking

(iv) Gready Algorithm

(v) Binary Search