(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1062 Roll No. | | | | | | | | | | |

B.Tech.

THIRD SEMESTER EXAMINATION, 2006-07

DATA STRUCTURE AND ALGORITHMS

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt ALL questions.*

(ii) All questions carry equal marks.

(iii) In case of numerical problems assume data wherever not provided.

(iv) Be precise in your answer.

1. Attempt *any four* parts of the following : **(5x4=20)**

(a) Explain time space trade off in context of algorithm complexity.

(b) What do you understand by the term Data Structure ? Differentiate between primitive and non primitive data structure by taking suitable example.

(c) Show the solution of

$$T(n) = 2T\left(\left\lfloor \frac{n}{2} \right\rfloor\right) + n \text{ is } O(n \lg n).$$

(d) Explain Master method for solving recurrences. Use the method to solve following recurrence $T(n) = 4\,T(n/2) + n^3$.

(e) How two dimensional arrays are represented in memory ? Obtain the formula for calculating the address of any element stored in the array in column major order (Make suitable assumptions).

(f) What is the significance of Sparse Matrix ? Explain by giving an example.

2. Attempt *any four* parts of the following : (5x4=20)

(a) Write a program in C to implement a stack.

(b) Define the term Recursion. Write a recursive program in C to calculate the product of two integers.

(c) Write an algorithm for converting infix notation of any mathematical expression into its equivalent post fix notation. Show the working of your algorithm by taking an example.

(d) Explain queue data structure. Also discuss the practical implementation of different types of queues.

(e) Write function in C to create insert and delete nodes in single linked list.

(f) State the merits and demerits of static and dynamic memory allocation techniques.

3. Attempt *any two* parts of the following : (10x2=20)

(a) Explain Binary Tree. How it is represented in computer memory ? Write algorithm to find a given element in binary tree. Analyze running time of your algorithm also.

(b) (i) Write an algorithm to perform deletion operation on Binary Search Tree. Analyze its running time.

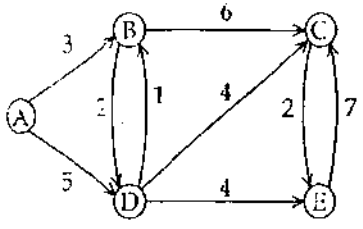
(ii) Discuss the different transversal techniques used in Binary Search Tree.

(c) Write a program in C to implement a Heap Data Structure.

4. Attempt *any two* parts of the following : **(10x2=20)**

(a) Explain Graph Data Structure in detail. How are they represented in computer memory ? Discuss the different searching techniques used in graph.

(b) Find the minimum distance of each station from A. Give the algorithm used. Show all the steps and also analyze the algorithm to give its run-time.



(c) Write short notes on any three :

(i) Kruskal's Algorithm

(ii) Topological Sort

(iii) Activity Network

(iv) Critical Paths

5. Attempt *any two* parts of the following : **(10x2=20)**

(a) (i) Write a program in C to implement bubble sort. Give its running time.

(ii) Explain the difference between internal and external sorting by giving suitable example.

(b) (i) Show the result of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B in order into an empty B-tree with order 5.

(ii) Discuss the running time of quick sort.

(c) Write short notes on any two of the following :

(i) Index sequential file

(ii) Direct file

(iii) Two way merge sort

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(i) Index sequential file

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(iii) Two way merge sort

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