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

PAPER ID : 2125 Roll No. | | | | | | | | | | |

B.Tech

(SEMESTER-V) THEORY EXAMINATION, 2012-13

DATA STRUCTURE AND ALGORITHM

Time : 3 Hours] *[Total Marks : 100*

Section – A

1. Attempt **all** question parts : **10 × 2 = 20**

(a) List out and define the performance measures of an algorithm.

(b) What is a recurrence equation ?

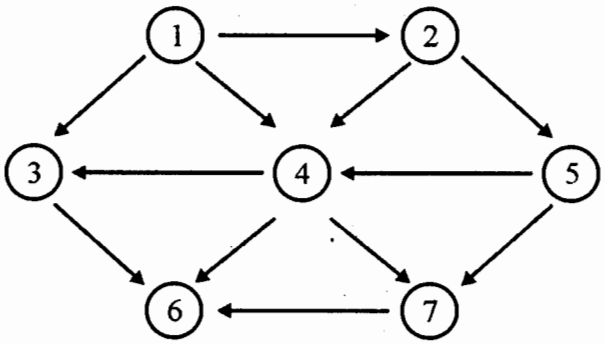
(c) How do you push and pop elements in a linked stack ?

(d) Why is linked list used for polynomial arithmetic ?

(e) How do declare a Binary tree node ?

(f) Give the steps to achieve the Inorder traversal of threaded binary tree.

(g) Write down the adjacency matrix of the graph.



(h) What is meant by BFS traversal ?

(i) Explain in twenty words or less how insertion sort works.

(j) Explain different phases of Heapsort.

Section – B

2. Attempt any **three** question parts : **10 × 3 = 30**

(a) Define Recurrence equations. How will you derive and solve the recurrence equations ?

(b) With an example, briefly explain about the structure declaration of singly, doubly and circular linked list.

(c) Perform the routines to insert and remove a node from a binary search tree.

(d) Give the algorithms for Depth-First and Breadth-First in Topological Sorting.

(e) Design a function that will delete the entry with the largest key (the root) from the top of the heap and restore the heap properties of the resulting, smaller list.

Section – C

Attempt **all** question : **10 × 5 = 50**

3. Attempt any **two** parts : **5 × 2 = 10**

(a) Write down the properties of Big oh notation and prove

$O(f(n)) + O(g(n)) = O(\max\{f(n), g(n)\})$

(b) Prove the following :

(i) $T(n) - 2T(n-1) = 3^n$ subject to $T(0) = 0$

(ii) $T(n) - 2T(n-1) = 1$ subject to $T(0) = 0$

(c) With an example, brief about the single and multidimensional array.

4. Attempt any **one** part : **10 × 1 = 10**

(a) A degree is a data structure consisting of a list of item, on which the following operation are possible :

Push (X, D) : Insert item X on the front end of degree D

Pop (D) : Remove the front item from degree D and return it

Inject (X, D) : Insert item X on the rear end of degree D

Eject (D) : Remove the rear item from degree D and return it

Write routines to support the degree that take O(1) time per operation.

(b) Using circularly linked list, write routines to implement addition of two polynomials.

5. Attempt any **one** part : **10 × 1 = 10**

(a) Draw expression trees for each of the following expressions and show the order of visiting the vertices in (1) preorder, (2) inorder and (3) postorder :

(i) $(a - b) - c$

(ii) $\log n!$

(iii) $(a < b)$ and $(b < c)$ and $(c < d)$

(b) (i) Define Heap and Heap Order Property.

(ii) With proper example, describe the operations performed with Heap.

6. Attempt any **one** part : **10 × 1 = 10**

(a) With an example, brief about the Graphs and Multigraphs.

(b) Describe Prims and Kruskal Algorithms.

7. Attempt any **two** parts : **5 × 2 = 10**

(a) List and explain the operations performed on B tree.

(b) What is external sorting ? Give the polyphase merging strategy with three tapes T_1, T_2 and T_3.

(c) Write down the quick sort algorithm and give its worst case, best case and average case analysis.
