Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CHE)/SEM-3/CS-312/2010-11

2010-11

DATA STRUCTURE AND DATABASE CONCEPTS

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) Which is related to stack ?

      a) Backtracking b) Push

      c) Traversal d) None of these.

   ii) Sparse matrices have

      a) many zero entries

      b) many non-numeric entries

      c) higher dimension

      d) none of these.

   iii) Stack is called as

      a) KOLP operation b) LIFO operation

      c) JKLO operation d) none of these.

iv) Which of following traversal techniques lists the nodes of a binary search tree in ascending order ?

a) Postorder b) Inorder

c) Preorder d) None of these.

v) Which of the following can not be performed recursively ?

a) Binary search b) Quick sort

c) Depth First search d) None of these.

vi) The prefix expression for the infix expression a*(b+c)/e – f is

a) /*a+bc – ef b) –/*+abcef

c) –/*a+bcef d) none of these.

vii) Which of the following is a hash function ?

a) Quadratic probing b) Chaining

c) Open addressing d) Folding.

viii) Number of nodes in a complete binary tree of depth k is

a) $2k$ b) 2^k

c) $2^k - 1$ d) none of these.

ix) The time complexity of bubble sort algorithm in the best case is

a) O(n) b) $O(n\log_2 n)$

c) $O(n^2)$ d) None of these.

x) Input restricted deque is such that

a) Insertion is restricted at one end

b) Insertion is restricted at either end

c) Deletion is restricted at one end

d) Deletion is restricted at either end.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is the difference between inorder, preorder and postorder traversals ? Write the algorithm of inorder traversal in tree. 3 + 2

3. What is queue ? Explain deque with diagram. 2 + 3

4. Briefly describe the insertion sort technique by taking an example.

5. Suppose a linear linked list is implemented of *N* size in memory. Write an algorithm to insert a new element at the *k*th position of the linked list.

6. Show that the number of vertices of odd degree in a finite graph is even.

GROUP – C

(Long Answer Type Questions)

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

7. a) What is a prefix expression ?

   b) Why is postfix of an expression used by the computers ?

   c) Write the algorithm for converting an infix expression into equivalent postfix expression.

   d) Using your algorithm convert the infix expression A +*(B + C) + E^Q + F into its equivalent postfix expression clearly showing the state of the stack.

   2 + 2 + (6 + 5)

8. a) What is the function of the Database Administrator (DBA) ? 7

   b) Explain the difference between client-server distributed database and collaborating distributed database with suitable example. 3

c) Draw an ER Diagram from the following functional dependency of an organisation : 5

i) emp_id, start_date-> job_title, end_date

ii) emp_id->emp_name, ph_no, office_no, proj_no, proj_name, dept_no

iii) ph_no-> office_no

iv) proj_no-> proj_name, proj_start_date, proj_end_date

v) dept_no-> dept_name, mgr_id

vi) mgr_id-> dept_no

9. a) What is the advantage of Linked list with respect to Queue ?

b) Write an algorithm to create a binary tree.

c) Write the algorithm of push and pop operation in stack.

3 + 6 + (3 + 3)

10. a) Give the definition of a binary.

b) Write the algorithm of insertion and deletion operations in queue.

c) Write short notes on circular queue and priority queue.

3 + (4 + 4) + (2 + 2)

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

a) Quick sort

b) AVL tree

c) Binary search

d) Depth First Search (DFS)

e) Breadth First Search (BFS).