



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 : $10 \times 1 = 10$

i) Which is related to stack ?

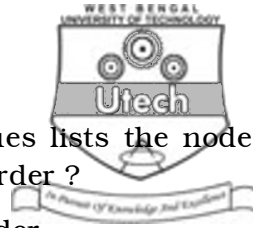
- | | |
|-----------------|-------------------|
| a) Backtracking | b) Push |
| c) Traversal | d) None of these. |

ii) Sparse matrices have

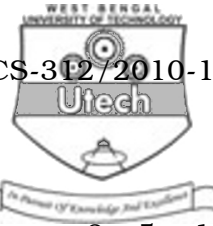
- a) many zero entries
- b) many non-numeric entries
- c) higher dimension
- d) none of these.

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. $3 \times 5 = 15$

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. $3 \times 15 = 45$

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) $\text{emp_id, start_date} \rightarrow \text{job_title, end_date}$
 - ii) $\text{emp_id} \rightarrow \text{emp_name, ph_no, office_no, proj_no, proj_name, dept_no}$
 - iii) $\text{ph_no} \rightarrow \text{office_no}$
 - iv) $\text{proj_no} \rightarrow \text{proj_name, proj_start_date, proj_end_date}$
 - v) $\text{dept_no} \rightarrow \text{dept_name, mgr_id}$
 - vi) $\text{mgr_id} \rightarrow \text{dept_no}$
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).
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