



Name :
Roll No. :
Invigilator's Signature :

CS/BCA/SEM-3/BCA-302/2011-12

2011

DATA STRUCTURE WITH C

Time Allotted : 3 Hours

Full Marks : 70

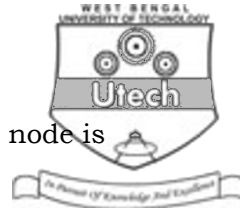
The figures in the margin indicate full marks.

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 any *ten* of the following : 10 × 1 = 10
- i) Let q be the queue of integers defined as follows :
- ```
#define MAX10
struct queue
{ int data [MAX];
 int rear, front;
} q;
```
- To insert an element into the queue, we may write operation
- a) ++q.data[q.rear]=x;
  - b) q.data[q.rear]++=x;
  - c) q.data[++q.rear]=x;
  - d) none of these.
- ii) The tree traversal technique in which the root is traversed after its children is known as
- a) post-order traversal
  - b) pre-order traversal
  - c) in-order traversal
  - d) none of these.



- iii) Number of possible binary tree with 4 node is
  - a) 14
  - b) 34
  - c) 24
  - d) none of these.
- iv) 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.
- v) The best case complexity of insertion sort is
  - a)  $O(n^2)$
  - b)  $O(\log n)$
  - c)  $O(n)$
  - d)  $O(n \log n)$ .
- vi) Graph is a
  - a) linear data structure
  - b) non-linear data structure
  - c) either (a) or (b) depending on situation
  - d) none of these.
- vii) Stack works on
  - a) LIFO
  - b) FIFO
  - c) both (a) and (b)
  - d) none of these.
- viii) A linked list follows
  - a) random access mechanism
  - b) sequential access mechanism
  - c) no access mechanism
  - d) none of these.
- ix) The best data structure to see whether an arithmetic expression has balanced parenthesis is a
  - a) stack
  - b) queue
  - c) tree
  - d) list.
- x) The total number of comparisons in bubble sort is
  - a)  $O(n \log 2^n)$
  - b)  $O(2n)$
  - c)  $O(n^2)$
  - d)  $O(2^n)$ .



- xi) The sparse matrix is a matrix whose
- most of the elements are non-zero
  - half of the elements are zero and half of the elements are non-zero
  - most of the elements are zero
  - none of these.
- xii) The prefix notation is also known as
- reverse notation
  - reverse polish notation
  - polish notation
  - none of these.

**GROUP – B**

**( Short Answer Type Questions )**

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

- What is Data structure ? What is ADT ? Explain with an example.
- What is circular queue ? How is it different from queue ? What advantage do we get from circular queue over ordinary queue ?
- Convert the following infix expression into postfix form by using stack :  

$$a + b * c - ( d - e * f ) / g$$
- What is Linked List ? What are its advantages over array ? What are its disadvantages over array ? 1 + 2 + 2
- Distinguish between DFS and BFS. Indicate their time complexities. 4 + 1

**GROUP – C**

**( Long Answer Type Questions )**

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

- What is binary search tree ? 2
  - Construct the binary search tree if the elements are in the order :  
 60, 75, 25, 66, 50, 55, 45, 40, 35, 57, 30 4



- c) Delete the following nodes in order and show each step :
  - i) Node with 55
  - ii) Node with 66
  - iii) Node with 50. 3 + 3 + 3
  
- 8. Write short notes on any *three* of the following : 3 × 5
  - a) De-queue
  - b) Non-linear data structure
  - c) Hashing
  - d) Priority queue.
  
- 9. a) Define General tree. Write an algorithm to convert a General tree into a binary tree. 7  
b) Define *B*-tree. Construct a *B*-tree of order 5 from the following key values :  
*a, g, f, b, k, d, h, m, j, e, s, i, r, x, c, l, n, t, u, p.*  
Also delete *h, r, p, d.* 8
  
- 10. Write the functions of the following :
  - a) Insert a node after a particular node in a Single Linked List. 5
  - b) Reverse display of the list elements in a Doubly Linked List. 5
  - c) Physically reverse the Single Linked List. 5
  
- 11. a) Write a *C* function for selection sort. 6  
b) How does binary search give benefit over sequential search ? 3  
c) Explain the divide and conquer rule with example. 6

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