



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(BME)/SEM-5/CS-502/2009-10  
2009**

**DATA STRUCTURE AND ALGORITHM**

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 :

$$10 \infty 1 = 10$$

i) Complexity of the Binary search algorithm is

- a)  $O(n)$
- b)  $O(2^n)$
- c)  $O(\log 2^n)$
- d)  $O(n^2)$ .

ii) Hashing is a method of

- a) sorting
- b) searching
- c) inserting
- d) deleting.

iii) No. of elements present in queue is

- a)  $Rear + Front - 1$
- b)  $Rear - Front - 1$
- c)  $Rear - Front + 1$
- d)  $Rear + Front$ .





**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. What do you mean by Data Structure ? Briefly explain the classification of Data structure. 2 + 3
3. What is time complexity ? Explain the significance of  $O$ ,  $\theta$ ,  $\Omega$  notations. 2 + 3
4. Write down the differences between Breadth-First Search ( BFS ) and Depth-First-Search ( DFS ) with a suitable example.
5. a) What is connected graph ? Describe the linked representation of graph. 1 + 2  
b) What are the advantages of linked list over array ? 2
6. What are the complexities ( best & worst case ) for the following ?
  - a) Quick sort
  - b) Binary search
  - c) Insertion sort.

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Define queue.  
b) Explain the limitation of linear queue insertion operation & explain the solution with insertion algorithm or c code.  
c) Define priority queue.  
d) Compare and contrast different hash functions.

$2 + 5 + 2 + 6$



8. a) Write the code to create and display the node of a linked list.
- b) Write an algorithm or c function to insert a node at beginning & end position of a circular linked list.
- c) Represent the following polynomial by linked list ( show the diagram only ) :
- $$10x^8 - 9x^5 + 3x^3 + 2x^2 - 8x - 5 .$$
- d) What is doubly linked list ? Write an algorithm or c function to insert a node after a particular node in a doubly linked list.
9. a) What is binary search tree ?
- b) Construct an expression tree for the expression :
- $$E = ( \partial x + y - z ) / ( 5a * 3b / 6c ) .$$
- c) Write down the algorithms or c functions for PUSH & POP operations on stack.
- d) The pre-order and in-order traversal sequences of nodes in a binary tree are given below :
- Pre-order — M A D H U S M I T A
- In-order — M A D H U S M I T A
- Construct the binary tree and state the logic to construct the tree.
10. Write short notes on any *three* of the following :
- a) Threaded Binary Tree
- b) Hashing Function
- c) B Tree
- d) Digraph
- e) Inverted file
- f) AVL Tree.