Roll No. ……

M.Sc. IT-10 (Master of Science in Information Technology)
Second Semester Examination 2012
MIT 2001
Data Structure & Algorithm

Time: 3 Hour **Max. Marks: 60**

Note: The Question paper has been divided in three Sections – A, B and C. Answers the Questions as per instructions given in each section.

Section 'A'
(Long Answer's Question)

Answer any two questions. Each question carries 15 marks. (2x15=30)

1. What is a data structure? What are the types of data structures? What are the notations of measurement of performance of an algorithm?

2. What is Bubble sort? Write an algorithm for sorting an array of N elements using bubble sort. Sort this array using bubble sort – 15, 18, 4, 5, 2

3. What are the types of linked list? Explain with diagram. Write an algorithm to delete element (node) from "pos" position in linked list.

4. Define the properties of complete binary tree. Create a tree from given orders of traversal
   pre-order = {11, 5, 3, 8, 16, 14, 18, 17, 20} in-order = {3, 5, 8, 11, 14, 16, 17, 18, 20}.

Section 'B'
(Short Answer's Question)

Answer any four questions. Each question carries 5 marks. **(4x5=20)**

1. What is an array? Write a program to count the elements of array.
2. Write short notes on following
   a. Structures
   b. Pointers
3. Convert this infix equation to postfix using stack – (A+B^D)/(E-F) +G
4. Write algorithms for PUSH and POP operations of stack using array.
5. What is the difference between sequential (linear) search and binary search? Show the steps of searching element '5' using binary search technique in this array – 2, 5, 8, 15, 20
6. What is Recursion? Write a program to generate Fibonacci series using recursion.
7. Explain malloc (), calloc (), realloc () and free () functions for dynamic memory allocation.
8. Explain megre sort using an example.

Section 'C'
(Objective Answer's Question)

Answer all questions. Each question carries 01 mark. **(10x1=10)**

Write true/false for -

1. Array is a non-linear data structure.
2. Structure is a user defined data type.
3. Big O notation is used to denote worse case complexity
4. In-order traversal of binary tree is always in sorted order.
5. A Complete binary tree with depth 2 can have 9 nodes.

Choose the correct answer –

6. Size of pointer is

   A) 1 byte B) 2 byte

   C) 4 byte D) depends on type of variable whose address it holds

7. Which of the following is not an abstract data type

   A) array B) stack

   C) queue D) pointer

8. Suppose A[10][20] is an integer array. Find out the address of A[10][2] if its stored in row major and column major fashion. Assume Base Address is 100.

   A) 464 B) 282

   C) 524 D) 312

9. Queue is based on the concept of

   A) LIFO B) FIFO

   C) FILO D) none

10. Binary search calculates the mid position to search element using formula where (lb means lower bound, ub means upper bound)

    A) mid = (lb + ub) / 2 B) mid = n / 2

    C) mid = array[n] / 2 D) mid = (arr[1] + arr[2] + arr[3]…. Arr[n]) / n