MASTER'S IN MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE
M.Sc. (MACS)
Term-End Examination
June, 2012

00040

MMT-001 : PROGRAMMING AND DATA STRUCTURES

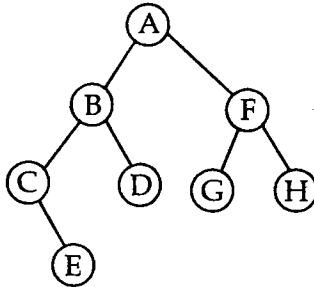*Time : 1½ hours*   *Maximum Marks : 25*

Note : *Question 1 is **compulsory**. Answer **any three** questions from question nos. 2 to 5. All programs should be written in 'C' language. Use of calculator is not allowed.*

1. Write the output of the following piece of 'd' code. Justify your answer with a short explanations.

   (a) int a, b;   **2x5=10**

   for (a = 5 ; a>0 ; a − −)

   {

   for (b = 1 ; b< = a ; b + +) printf ("%d", b) ;

   printf("\n") ;

   }

   (b) int n = 25, a [10], c = 1 ;

   while (n>0) { a [c] = n%2 ; C++; n/ = 2 ; }

   for (C − 1; C>0 ; C − −) printf ("%2d", a [c]);

   (c) long int a = 0, n = 987654321

   while (n>0) { a + = n%10 ; n/ = 10 ; }

   printf ("%d", a) ;

(d)   int $x = 10$; $y = 10$;
       int *p1 = &x ; *p2 = &y ;
       printf ("%d,%d", (*p1) + +, + + (*p2) − *p1);

(e)   'PRE ORDER' traversal of the below
       BINARY TREE.

2.   (a)   Explain with an example each, the working   2
             of bitwise OR and exclusive OR operators
             in 'C'.

      (b)   Write a 'C' programme using tarnery   3
             if-then-else operator to evaluate the
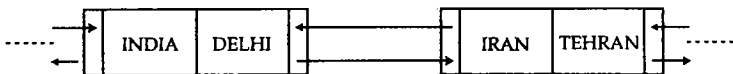   following function.

$$f(x) = \begin{cases} 1 \text{ if } x > 0 \\ 0 \text{ if } x = 0 \\ -1 \text{ if } x < 0 \end{cases}$$

3.   (a)   Find the errors in the following programme.   2
             # Include <stdio.h>
             int main ( )
             {
             printf ("C programming is fun") ;
             return ( ) ;
             }

(b) Declare a structure that stores a 3-dimensional vector. Also write a function that returns the norm of the vector stored in the structure you declared. **3**

4. (a) What is a macro ? Write the differences between macro and a function. Give an example of a macro. **2**

(b) Construct a binary search tree with keys 5, 7, 3, 10, 19, 4, 6. **2**

(c) Arrange the following operators in the ascending order of priority ( ), <, ||, && +, *. **1**

5. Assume that a doubly linked list stores the country names and their capitals, arranged in ascending order of country names for example. **5**

Declare a node for the list. Also, write a function that inserts a new node at the proper place.