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MMT-001

M. Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE) M. Sc. (MACS)

Term-End Examination

December, 2021

MMT-001 : PROGRAMMING AND DATA STRUCTURES

Time : $1\frac{1}{2}$ Hours *Maximum Marks : 25*

Weightage : 20%

Note : *Question* ***No. 1*** *is* ***compulsory****. Answer any* ***three*** *questions from Q. No. 2 to 5. All programs should be written in 'C' language only. Use of calculators is* ***not*** *permitted.*

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1. Write the output of the following segments of code. Justify your answers with short explanations : 10

(a)
```
main( )
{
    unsigned int i;
    for (i = –10; i < = –1; i– –)
        printf ("%d", i);
}
```

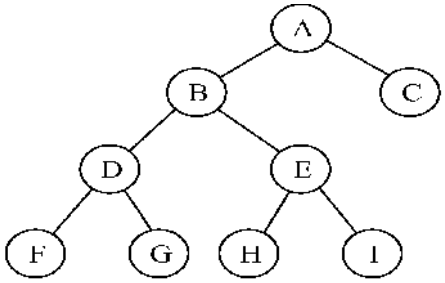
(b)
```
main( )
{
    struct point
    {   float x;
        float y;
    };
    struct point P = {3, 2};
    struct point Q = {7, 5};
    float d = sqrt ((P.x – Q.x) * (P.x – Q.x)
                + (P.y – Q.y) * (P.y – Q.y);
    printf("%f", d);
}
```

(c)
```
main( )
  { struct
        { int i;
        } xyz;
  (&xyz)→ i = 10;
  printf (%d", xyz i);
}
```

(d)
```
main( )
{
    int x = 12;
    (x/5 = = 2.4) ? printf ("True") : printf
                                    ("False");
}
```

(e)
```
main( )
{ char * p;
  p = "Hello";
  printf("%d", p[0]);
}
```

2. (a) Write postorder and inorder traversal of the binary tree given below : 2



(b) Differentiate between a macro and a function. Give an example for each. 3

3. (a) Write a function in 'C' language which takes a 5×5 matrix of real entries and returns its trace. 2

(b) Write a "C" function that implements the strcmp( ) function of C library. 3

4. (a) Give any ***two*** advantages of circular queue over the linear queue. 2

(b) Declare a node for a doubly linked list of integers using pointer implementation. Also, write a function that prints the nth node of this list. 3

5. (a) Write a C program to check how many terms of the series given below, must be summed before the total exceeds 3000 : 2

$$1^2 + 2^2 + 3^2 + \ldots\ldots + n^2$$

(b) Write a 'C' function that takes an array of integers, and a number; and returns the frequency of the number in the array. 3