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MMT-001

M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)
M.Sc. (MACS)
Term-End Examination
December, 2018

00523

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 questions no. **2** to **5**. All programs should be written in 'C' language only. Use of calculators is **not** permitted.*

1. Write the output of the following statements of code. Justify your answers with short explanations. *5×2=10*

(a)
```
void main()
{   int const *p = 5;
    printf("%d", ++ (*p));
}
```

(b)
```
main()
{   char s[ ] = "man"; int i;
    for (i = 0; s[i]; i++)
      {printf("\n%c%c%c", s[i], *(s + i), *(i + s));}
}
```

(c)
```
main()
{   static int var = 5;
    printf("%d", var--);
    if (var)
        {main();}
}
```

(d)
```
main()
{  int x = 0;
   for ( ;  ; ){
       if (x ++ == 4)
         break;
       continue;
   }
   printf("%d", x);
}
```

(e)
```
main()
{ int i = – 1, j = – 1, k = 0, l = 2, m;
  m = ++ i && j ++ && k ++ | | l ++;
  printf("%d%d%d%d%d", i, j, k, l, m);
}
```

2. (a) The value of the nodes of binary search tree for in-order and pre-order transversal, respectively, are given below :

5, 6, 8, 11, 10, 12, 13

11, 6, 5, 8, 12, 10, 13.

Construct the binary search tree. *2*

(b) Write an iterative program to generate the Fibonacci series of n numbers. *3*

3. (a) Write a recursive function to find the sum of first n positive integers. Show all the recursive calls for n = 5. *3*

(b) Explain the switch-care-default statement with a small example. *2*

4. (a) What are preprocessor statements ? Write a preprocessor statement using #define preprocessor to evaluate function $f(x) = 2x + 3$. *2*

(b) Write functions to perform following tasks on a singly-linked list data structure : *3*

(i) Insert a node at the beginning

(ii) Insert a node at the end

(iii) Insert a node in the middle

5. (a) Write a 'C' program to evaluate the following function : *3*

$$f(x) = \begin{cases} 2x + 1 & \text{if } x < 5 \\ 3x - 4 & \text{if } 5 \le x \le 15 \\ 0 & \text{otherwise} \end{cases}$$

(b) Differentiate between call-by-value and call-by-reference. *2*