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

Term-End Examination

December, 2022

MMT-001 : PROGRAMMING AND DATA STRUCTURES

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

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

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

   (i) Void main( )

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

   (ii) int main( )

   ```
   {   int i = 0;
       for (; * ("I am a pointer." + i)! = '\0'; i++)
           putchar (*("I am a pointer." + i));
       return 0;
   }
   ```

   (iii) int main( )

   ```
   { int n = 123, x = 0;
     while (n > 0)
       { x + = n % 10;
         n / = 10;
       }
     printf ("%d", x);
   }
   ```

(iv) int main( )

    {int x = 1, y = 2;

     printf("%d", ++x+y++);

     return 0;

    }

(v) int main( )

    {   int i;

      for (i = 1; i < 6, i++)

        { if (i = = 3)

            continue;

          printf("%d", i);

        }

      return 0;

    }

2. (a) Write a function in 'C' to check whether the input string consists of at least one vowel in lowercase.   3

(b) What is the difference between a binary tree and a binary search tree ? Construct a binary search tree with keys :   2

      15, 20, 25, 13, 12, 8, 17

3. (a) Write a program in 'C' that takes two 2-D matrices as input from the user and performs matrix addition.　　　3

   (b) Evaluate the postfix expression, given below :　　　2

   $$6, 5, 7, +, 1, 3, *, /, -$$

4. (a) Write a function to perform insertion sort.　　　2

   (b) How does stack differ from queue ? Write the function to perform Push and Pop operations in stack.　　　3

5. (a) Explain the difference, with example, between the malloc( ) and calloc( ) functions.　　　3

   (b) Explain the call-by-value and call-by-reference, with an example for each.　　　2

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