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MMT-001

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

Term-End Examination

December, 2025

**MMT-001 : PROGRAMMING AND DATA
STRUCTURES**

Time : 1½ 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 allowed.*

A-407/MMT-001

P. T. O.

1. Write the output of the following segments of codes. Justify your answers with short explanations : 2×5=10

(a) `int main()`

```
{  int a = 1, b = 0, c;  
    c = (a -- || ++ b) & & b;  
    printf ("%d,%d, %d", a, b, c);  
    return 0;  
}
```

(b) `int main()`

```
{  int a = 4603, b = 0;  
    while (a)  
    {  b = b + a%10;  
        a = a/10;  
    }  
    printf ("%d", b);  
    return 0;  
}
```

```
(c)  int some_fun (int n)
      {  if (n > 0)
          if (n%2 == 0)
              return (n + some_fun (n - 2));
          else
              return (n - 1 + some_fun (n - 2));
          else
              return 0;
      }

void main()
{
    printf("%d", some_fun(10)_some_fun (9));
}

(d)  main()
      {  char a;
          for (a = 'A'; a <= 'Z'; ++ a)
              printf ("%d, ", a);
      }
```

(e) `main()`

```
{    int a = 5, b = 7;

    int *p, *q;

    p = &a;

    q = &b;

    a = a + b;

    b = a - b;

    a = a - b;

    printf ("%d, %d", *p, *q);

}
```

2. (a) In what ways does the control string in the `printf( )` function differ by the control string in the `scanf( )` function ?
- Explain. 2

- (b) Write a C function that implements the following function : 3

$$f(x) = \begin{cases} x & , \quad 0 \leq x < 1 \\ x^2 - 1, & 1 \leq x < 2 \\ \frac{1}{x} & , \quad 2 \leq x \leq 4 \end{cases}$$

3. (a) Write a C function that takes two array arguments x and w as input, x contains a list of integers and w contains the corresponding weights ranging from 0 to 1. The function returns the weighted average of the list of integers. The function must flag an error message if any of the weights does not lie in the range $[0, 1]$, or if the sum of all the weights exceeds 1. 3

- (b) Give syntax for declaring one-dimensional and two-dimensional array. Write function for traversing one-dimensional array. 2
4. (a) Describe the use of any *two* functions from the library *string.h*. 3
- (b) Give the structure of a singly linked list. Write function for traversal of a singly linked list. 2
5. (a) What is meant by dynamic memory allocation ? Explain the relevant functions used with examples. 3
- (b) Differentiate between Stack and Queue. 2

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