MMT-001

ASSIGNMENT BOOKLET

PROGRAMMING AND DATA STRUCTURES

(1st January, 2026 to 31st December, 2026)

- It is compulsory to submit the Assignment before filling in the Term-End Examination form.
- It is mandatory to register for a course before appearing in the Term-End Examination of the course. Otherwise, your result will not be declared.

School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068
(2026)

Dear Student,
Please read the section on assignments in the Programme Guide for elective Courses that we sent you after your enrolment. A weightage of 20%, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is in this booklet.

Instructions for Formatting Your Assignments

Before attempting the assignment please read the following instructions carefully.

1. On top of the first page of your answer sheet, please write the details exactly in the following format:

ROLL NO. : .....
NAME : .....
ADDRESS : .....
.....
.....
COURSE CODE : ....
COURSE TITLE : .....
STUDY CENTRE : ..... **DATE** .....

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

2. Use only foolscap size writing paper (but not of very thin variety) for writing your answers.

3. Leave a 4 cm margin on the left, top and bottom of your answer sheet.

4. Your answers should be precise.

5. While solving problems, clearly indicate which part of which question is being solved.

6. This assignment is to be submitted to the Study Centre as per the schedule made by the study centre. **Answer sheets received after the due date shall not be accepted.**

7. This assignment is valid only up to 31st December, 2026. If you fail in this assignment or fail to submit it by the due date, then you need to get the assignment for the year 2027 and submit it as per the instructions given in the Programme Guide.

8. **You cannot fill the Exam form for this course** till you have submitted this assignment. So solve it and **submit it to your study centre at the earliest.**

9. **We strongly suggest that you retain a copy of your answer sheets.**

We wish you good luck.

Assignment

(To be done after reading the course material)

Course Code: MMT-001
Assignment Code: MMT-001/TMA/2025
Maximum Marks: 100

1. Write the output of the following C codes, with proper justification for each. (10)

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

ii)
```
int f(int n)
{
  if (n < 1)
    return n;
  else
    return n*n + f(n-1);
}
main()
{
  printf("%d", f(5));
}
```

iii)
```
void show();
int main()
{show();
  printf("BREAD");
  return 0;
}
void show()
{
  printf("Butter");
}
```

iv)
```
struct book
{
  char#author;
  char#title;
  int pages; }mybook = {"ANSI C", "Kernighan &
Ritchie", 288};
int main()
{
  printf("Book Info \n");
  printf("Title :  %s \n", mybook.title);
  printf("Author :  %s \n", mybook.author);
  printf("Pages :  %d \n", mybook.pages);
  return 0;
}
```

v)
```
void texas(int*, int*);
int main()
{
  int a = 11, b = 22;
  printf("Before = %d %d",a,b);
  texas(&a, &b)
  printf("After = %d %d",a,b);
  return 0;
} void texas(int#i, int#j)
{
  *i = 55,*j = 65;
}
```

2. (a) Write a C program that compute the simple interest (SI) on principle of (P) Rupees deposited for a period of (T) years at a rate percent of (R) percent. The values of P, T and R are taken as input from the keyboard. (5)

   (b) (i) Write the definition of the following function in C: (3)

$$f(x) = \begin{cases} \frac{\sin x}{x}, & \text{if } x \neq 0 \\ 1, & \text{if } x = 0. \end{cases}$$

   (ii) Explain the use of enum data type, with an example. (2)

   (c) Write a program that determines whether a given year is a leap year or not. (5)

3. (a) Verify that nearly 1300 iterations are required to find one root of the equation (6)

$$x^2 - 0.6x + 8.99999 = 0$$

   using fixed point iteration correct upto six places of decimals.
   Note: The initial guess must be entered by the user and programme should display a warning message if the initial guess is too far from the exact root.

   (b) What does happen in each of the following situations? (4)

   (i) a function returns a value but it is not assigned to anything.

   (ii) a function is assigned to an object but that function returns no value.

4. (a) Write a function that accepts a string and determines the number of times a given character appears in it. (4)

   (b) Write a C program to multiply two matices using pointers. The dimensions of the matrices must be given by the user from keyboard. The program must return an error message if the matrices are not compatible for product. (5)

   (c) Explain, with an example, the difference between call by value and call by reference. (3)

   (d) Write a function to determine if a two - dimensional array passed to it is **symmetric** or not. (3)

5. (a) Differentiate between a static variable and an automatic variable. (2)

   (b) How are the arguments of scanf() different from an ordinary function? Explain. (3)

   (c) What do you understand by a macro? Write a macro to compute the volume of a cylinder. (3)

   (d) Give any three different situations where the keyword **typedef** is used. (3)

(e) Write a C program to create an array to record and print data about students enrolled in the various courses at a University. (4)

6. (a) Write C functions for carrying Push and Pop operations. Also, write a function that prints the contents of the stack. Write a small C function that (5)

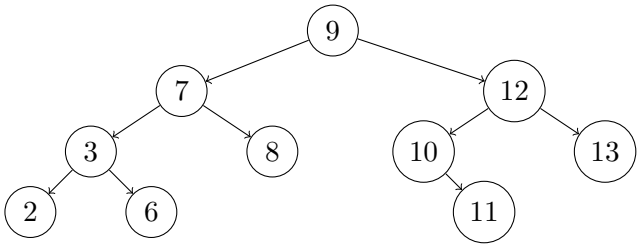
   (i) Pushes 4, 5 and 7 into the stack.

   (ii) Prints the contents of the stack.

   (iii) Pops the stack.

   (iv) Prints the contents of the stack again.

   (b) Write the inorder, preorder and postorder traversals of the following binary search tree. (4)

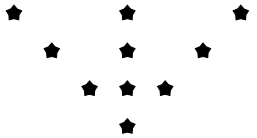


   (c) Write the syntax for defining a node of a doubly linked list containing floating point data. Also write a function create-node() which creates a new node and returns the pointer to it. (3)

   (d) Explain with an example for each the difference between the **logical AND (&&)** and the **bitwise AND (&)** operators. (3)

7. (a) Explain the meaning of the terms garbage collection, fragmentation, relocation and compaction. (5)

   (b) Write a program that prints the following shape made of stars. (5)



8. (a) Write a C function to implement the strcpy() function of C library. (2)

   (b) Explain the difference between the following with an example for each (4)

   (i) global and local variable.

   (ii) L-values and R-values.

   (c) What do you understand by file organisation? Explain the methods of file organisation. (4)