

ASSIGNMENT BOOKLET

PROGRAMMING AND DATA STRUCTURES

(1st January, 2025 to 31st December, 2025)

- 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
(2025)

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 30%, 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, 2025. 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 2026 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) main()
{
    int x = 2, y = 2, z = 2;
    x = y == z;
    y = z == x;
    z = x == y;
    printf("%d", z);
}

ii) main()
{
    int x = -1, y;
    x++;
    y = x ? 2+x : 3-x;
    printf("%d", y);
}

iii) main()
{
    int i, j, a = 0;
    for(i = 1, j = 1; i <= 5; j++)
    {
        a = a + i*j++;
        i = j;
    }
    printf("%d ", a);
}

iv) main()
{
    int x = 5, y = 12;
    int *p = &x, *q = &y, *r;
    r = p;
    p = q;
    q = r;
    printf("%d, %d", x, y);
}

v) func(int x)
{
    static int a = 0;
    a += x;
    return(a);
}
main()
{
    int p;
```

```

    for(p = 1; p <= 5; ++p)
        printf("%d", fun(p));
}

```

2. (a) Write a C program that takes a list of floating point numbers as input from the keyboard, and prints their mean and standard deviation. (5)
- (b) Parenthesise the following C statement for its proper evaluation.

$$x += a \% b + c * d / e ! = f + + - g$$

Further, if all the variables from a to g are initialised by 2, then what will be the value of x ? (5)

- (c) Write a loop that examines each character in a character type array called `text`, and determines how many of the characters are letters, how many are digits, how many are whitespace characters, and how many are other characters. (5)
3. (a) Explain the arguments of the functions `scanf()` and `printf()`, and how they work with an example for each. (5)
 - (b) Suppose you wish to solve the equation $x^5 + 3x^2 - 10 = 0$ for x . Rearrange this equation to get an appropriate fixed point iteration method. Then write a program to get an approximate value of the root of the equation. The initial guess must be entered by the user. Your programme must be able to flag a warning message if the initial guess is too far from the exact root. In that case, your program must be able to suggest an initial guess to the user. Terminate the program and print the current value of the root as soon as the difference between two successive approximations becomes smaller than 0.005. (6)
 - (c) Explain the use of the string library functions `strncpy()` and `strncat()`, with the help of an example for each. (4)
4. (a) Write a C program to check whether a given string is a palindrome or not. (3)
 - (b) Explain, with an example, the difference between passing by value and passing by reference. (3)
 - (c) How would you differentiate between the terms **pointer to an array** and **array of pointers**? Give proper examples. (4)
5. (a) Explain how will you allocate memory dynamically for a two dimensional array of floating point numbers. (4)
 - (b) You might recall that the Euler number e can be represented by the following series:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots$$

Write a program that approximates e with desired number of terms as entered by the user. (5)

- (c) What do you understand by a *nested structure*? Explain with an example. Also, explain how would you access the members of a structure or a nested structure using pointers? (5)
- (d) Given an integer n , what does the following function compute? (3)

```

int function(int n)
{
    int i;

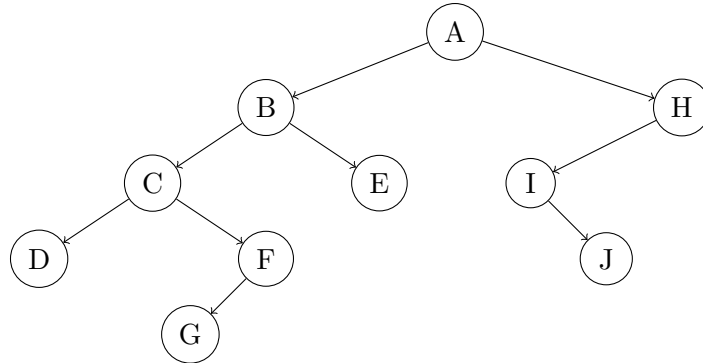
```

```

    for(i = 0; n != 0; n %=10, i++)
    return i;
}

```

- (e) Explain, with an example, the use of the keywords **break** and **continue**. (3)
6. (a) Write a C program which reads a line of text from keyboard, and writes the line to a file with lower case letters converted to upper case and vice-versa. (4)
- (b) Write the inorder, preorder and postorder traversals of the following binary search tree. (3)



- (c) Define a structure of type **hms** containing three integer members, called **hour**, **minute** and **second**, respectively. Then define a union containing two members, each a structure of type **hms**. Call the union members **local** and **home**, respectively. Declare a pointer variable called **time** that points to this union. (3)
7. Write a function that evaluates an expression in RPN that is given as a string. (10)
8. (a) Explain the meaning of the terms garbage collection, fragmentation, relocation and compaction. (5)
- (b) What do you understand by file organisation? Explain the methods of file organisation. (5)