

2025

MATHEMATICS — HONOURS**Paper : SEC - 1****(C Language with Mathematical Applications)****Full Marks : 75***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.**Notations and Symbols have their usual meaning.***1. Answer any five questions :****3×5****(a) Write the output of the following C program :**

```
#include<stdio.h>
main()
{
    int a = 5, b = 10, Result;
    Result = (a < b) && (b == 10);
    printf("%d", Result);
}
```

(b) What will be the output of the following C program? Give reasons in support of your answer.

```
#include<stdio.h>
main()
{
    int x = 3, y = 2, z;
    z = (x++) + (++y);
    printf("z = %d", z);
}
```

(c) What is the difference between = and == operators in C? Give an example.**(d) Identify the error(s) in the following snippet :**

```
#include<stdio.h>
main()
{
    int x = 3
    if x > 0;
        printf("Positive");
}
```

Please Turn Over**(5631)**

- (e) Write the following expression in C.

$$e^{x^4+3\tan x} + \cot(x^3+7) + 5\sqrt{x} \sec(3x).$$

- (f) What is the difference between **While** and **do-while** loops in C?

- (g) Explain the concept of a **function prototype** in C.

2. Answer **any five** questions :

- (a) Write short notes on Compiler, Interpreter, Machine Language and High Level Language.

2+2+2+2

- (b) (i) What is the **output** of the following C code?

```
#include <stdio.h>
int main()
{
    int a = 3;
    printf("%d%d", a, a++);
}
```

- (ii) What is meant by an operator in C? Explain the functions of logical AND and logical OR operators.

3+(1+4)

- (c) (i) Explain the use of **for loop** with an example.

- (ii) Write a C program to find the sum of all even numbers between 1 and 30.

3+5

- (d) (i) Describe the different relational operators available in C.

- (ii) Write a program to read 20 integers from the keyboard and calculate their average.

3+5

- (e) (i) What is an array? How do you initialize a 1D array?

- (ii) Write a C program to find the maximum element in a given array of 20 numbers.

3+5

- (f) (i) Compare the float and double data types in terms of precision and memory.

- (ii) Write a C program to find the transpose of a 3×3 matrix.

3+5

- (g) What is recursion? Write a function to evaluate factorial of n to show how the recursion works.

2+6

3. Answer **any two** questions :

- (a) (i) Write a C program to check whether a given positive integer is a Perfect Number.

- (ii) Write a program to read a list of 15 numbers and sort them in descending order.

5+5

- (b) Write a C program that takes three real numbers a , b , c as user inputs, then identifies the nature of the roots of the quadratic equation $ax^2 + bx + c = 0$, and finally prints the roots of the equation.

- (c) (i) Write a program to find the value of

$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \dots + \frac{1}{2025}$$

- (ii) Write a C program to compute the value of $f(x)$ for $x = 0, 1, 2, \dots, 10$, where $f(x)$ is defined as

$$f(x) = \begin{cases} x \cos x; & 0 \leq x \leq 2 \\ xe^x; & 2 < x \leq 5 \\ \log_e(1+x); & x > 5. \end{cases}$$

5+5