2024

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 x = 7, y = 3, z;
z = x%y + x/y;
printf("z = %d", z);
}
```

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

```
#include<stdio.h>
main()
   {
      int  n = 2025;
      printf("Result=%d",  n/2);
   }
```

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

```
#include<stdio.h>
main()
   {
      int  m,  n=6,  p=6;
      m=n==p;
      printf("%d",  m);
   }
```

(d) Write the following expression in C :

$$\tan\left(1+\sqrt{x}\right)+3^{\cos x^3}+\log_{10}\left|1+\sec^3 x\right|$$

(e) Explain the use of `if-else` statement in C with the help of an example.

(f) Compare and contrast RAM and ROM.

(g) State the conditions that a variable name in C must satisfy.

2. Answer ***any five*** questions :

(a) (i) What are the main data types in C? Write short note on any one of them.

(ii) Write a program in C to find the sum of odd numbers between 0 and 100. 3+5

(b) (i) What is a loop in C? Explain its necessity with the help of an example.

(ii) Write a program in C to sort 25 real numbers in ascending order. 3+5

(c) (i) Describe the use of logical operators in C.

(ii) Write a program to check whether a given number is divisible by both 3 and 5. 3+5

(d) (i) Compare between for and while loops.

(ii) Develop a C program to compute the product of two matrices of order 2×2. 3+5

(e) (i) Find the errors in the following C program :

```
#include<stdio.h>
int main()
   {
   int i;
   for  (i = 0,  i! = 4;  i++)
   print("%f", - - i);
   return 0,
   }
```

(ii) Write a program in C to read three numbers x, y, z and rotate their values, such that x has the value of y, y has the value of z and z has the value of x. 3+5

(f) (i) Write the different relational operators used in C language.

(ii) Write a C program to find the variance of a given set of numbers. 3+5

(g) Explain the differences between "break" and "continue" statements in C. Write a program to illustrate the use of both. 3+5

3. Answer ***any two*** questions :

(a) (i) Write a C program to find the approximate value of π.

(ii) Write a program in C that reads a positive integer, and checks whether it is an Armstrong number or not. 5+5

(b) (i) Write a program in C that reads 20 names and sorts them in alphabetical order.

(ii) Write a C program to evaluate $f(x)$ for $x = 0, 2, ..., 10$ using a function sub-program, where

$$f(x) = \begin{cases} x^2 + 2\sin x, & x < 2 \\ 2, & x = 2 \\ x^3 + e^x, & x > 2 \end{cases}$$ 5+5

(c) (i) Write a program in C to compute the sum $1 - \frac{2}{2!} + \frac{3}{3!} - \frac{4}{4!} + \frac{5}{5!} - ... - \frac{50}{50!}$.

(ii) Write a program in C that reads a positive integer and prepares its multiplication table. 5+5
