

2023

## 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 :

(a) What do you understand by a constant and a variable in C-language? Explain with a suitable example. 3

(b) Write the output of the following C-program. 3

```
#include<stdio.h>
main()
{
    int m,n,p=5;
    m=p++;
    n=++p;
    printf("m=%d, n=%d, p=%d", m,n,p);
}
```

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(c) Write the following expression in C : 3

$$e^{x^3+2\cos x} + \ln |1 + \sin x| + 2\sin^2 x$$

(d) Distinguish between the user-defined function and standard built-in function. 3

(e) Write the syntax of for-loop and explain it with suitable example. 3

(f) Compare between primary and secondary memory. 3

(g) What is an one-dimensional array? Give an example. 2+1

2. Answer *any five* questions :

(a) What is the objective of the main() function in C? What is the purpose of the printf() function and the scanf() function? Explain with examples. 3+2+3

(b) Consider the following function  $f: [0, 4] \rightarrow \mathbb{R}$ :

$$\begin{aligned} f(x) &= x^3 + \sin x^2, & 0 \leq x < 2, \\ &= 2 \cos x + e^{x^2}, & 2 \leq x < 4. \end{aligned}$$

Write a program in C which will ask for a value of  $x$  in  $[0, 4]$  and will print the corresponding value of  $f(x)$ . [ $\mathbb{R}$  stands for the set of real numbers]. 8

Please Turn Over

- (c) Explain the difference between while loop and do-while loop. Write a program in C to read a non-negative integer and find its factorial. 3+5
- (d) (i) What is meant by an operator in C-program? Explain the function of logical AND operator.  
 (ii) Using logical AND and logical OR operators, write a C-program to test whether a given year is a leap year or not. (1+2)+5
- (e) (i) Write three differences between a Compiler and an Assembler.  
 (ii) Write a C-program to find the maximum element of a given array. 3+5
- (f) (i) Write a C-program to print the following pattern :
- ```

*
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```
- (ii) What is a header file in C? Write a short note on any one of the header files. 4+(2+2)
- (g) (i) What is a keyword in C? Mention any four key words.  
 (ii) Write a C-program to find the transpose of the matrix  $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 7 \end{pmatrix}$ . (1+2)+5

3. Answer **any two** questions :

- (a) (i) Write a program in C to read three numbers  $a, b, c$  and find the roots of the quadratic equation  $ax^2 + bx + c = 0$ .  
 (ii) Write a program in C to read a number  $x$  and find the sum :  $x + \frac{x^3}{3} + \frac{x^5}{5} + \dots + \frac{x^{25}}{25}$ . 5+5
- (b) (i) Write a C-program to evaluate the sum of two matrices of same order.  
 (ii) Using for-loop, write a C-program to print first 40 terms of the Fibonacci sequence  
 0 1 1 2 3 5 8 13 21 ... . 5+5
- (c) (i) Write a C-program to solve a system of two linear equations in two unknowns  $x$  and  $y$ .  
 (ii) Write a C-program to find the AM, GM, HM of {3, 8.3, 8.8, 5, 3.1, 2, 6.6}. 5+5