2024

MATHEMATICS — HONOURS

Paper : SEC-A-1 and SEC-A-2

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.

Paper : SEC-A-1

(C-Programming Language)

Full Marks : 80

1. Each question below is followed by four possible answers of which exactly one is correct. Choose the correct answer with proper justification. 2×10

(a) Which one of the following is invalid variable name?

    (i) math_sec   (ii) secmath

    (iii) _mathsec   (iv) sec-math.

(b) C programs are converted into machine language with the help of

    (i) an Editor   (ii) an Interpreter

    (iii) a Compiler   (iv) None of these.

(c) The value of the expression 5/4 * 4 + 25/3 % 2 is

    (i) 29   (ii) 30

    (iii) 4   (iv) 5.

(d) What is the work of 'break' keyword?

    (i) Half execution of program   (ii) Restart execution of program

    (iii) Exit from loop or switch statement   (iv) None of these.

(e) Arrange the operators according to higher to lower order precedence :

    (I) & &   (II) %   (III) > =   (IV) + +

    (i) (II), (I), (III), (IV)   (ii) (I), (II), (III), (IV)

    (iii) (IV), (II), (III), (I)   (iv) (III), (IV), (I), (II).

(f) How many times will "SEC" be printed in the following program?

```c
# include <stdio.h>
main ()
{
    int i;
    for (i = 10;   i <= 2;   i = i-2)
    printf ("SEC");
}
```

   (i) 5

   (ii) 4

   (iii) 3

   (iv) 6.

(g) Which one of the following operators is used for decision making in C?

   (i) Arithmetic operator

   (ii) Relational operator

   (iii) Assignment operator

   (iv) Conditional operator.

(h) Which one is the correct way to initialize an one-dimensional array?

   (i) `int n(5] = {20,30,40,50}`

   (ii) `int num[4] = {20,30,40,50}`

   (iii) `int n{5} = {20,30,40,50}`

   (iv) `int n(5) = {20,30,40,50}`.

(i) In the following C program segment, the value of z is

```c
x = 15;
y = 25;
z = (x > y) ? x : y;
```

   (i) z = 15

   (ii) z = 20

   (iii) z = 0

   (iv) None of these.

(j) The keyword used to transfer control from a function back to the calling function is

   (i) switch

   (ii) goto

   (iii) stop

   (iv) return.

2. Answer *any one* question :

   (a) (i) Differentiate between :

         (A) high-level and low-level language

         (B) compiler and assembler.

      (ii) Write a C-program to calculate area and circumference of a circle. .   (3+3)+4

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

      (ii) Write a C-program to find the GCD and LCM of two distinct positive integers.   (2+2+2)+4

3. Answer *any one* question :

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

      (ii) Write a C-program to find out whether a given number is odd or even.   (2+2+2)+4

  (b) (i) Write a short note on Branching statements in C.

      (ii) Write a C-program to add two matrices and print the resultant matrix.   4+6

4. Answer *any one* question :

  (a) (i) Write a C-program to find the sum of the following series :

$$1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots\cdots + \frac{1}{n^2}$$

      (ii) Write the syntex of for-loop and explain it with suitable example.   5+5

  (b) (i) Write the valid C-expressions for the following functions :

        (A) $e^{x^{2024 + \sin x}} + \ln|\sec x + 1|$

        (B) $\tan^{-1}(\coth(x + 2)) + \log_5(x^2 + 2024)$.

      (ii) Write a C-program to evaluate the values of the function $f(x)$ for $x = 1.0\ (0.1)\ 1.5$, where $f(x) = 1 + 2x + 3x^2 + 4x^3 + 5x^4$.   4+6

5. Answer *any one* question :

  (a) (i) Write the syntax of while loop and explain it with suitable example.

      (ii) Using any loop, write a program in C to find first 50 Fibonacci numbers.   4+6

  (b) (i) What do you mean by a two-dimensional array? Give an example.

      (ii) Write a C-program to find the trace of a given square matrix.   4+6

6. Answer *any one* question :

  (a) (i) Write a C-program to find the maximum and minimum element of an array of integers.

      (ii) Write a C-program to compute the sum of the following series :

$$S = 1 - \frac{2}{2!} + \frac{3}{3!} - \frac{4}{4!} + \frac{5}{5!} - \ldots \text{ up to } N\text{-terms.}$$
      (2+2)+6

  (b) (i) Write down the syntax of switch statement in C and explain it.

      (ii) Using if-else statement, write a C-program to check whether the entered age is greater than or equal to 18 (years). If this condition meets then display the message "You are eligible for voting", however if the condition does not meet then display the message "You are not eligible for voting".   4+6

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(1230+1187)

7. Answer *any one* question :

   (a)   (i) Distinguish between function call by value and function call by address.

        (ii) Write a C-program to find the factorial of a positive integer.   (2+2)+6

   (b)   (i) What is recursion in C? Explain with suitable example.

        (ii) Write a C-program to find sum of first n positive integers using recursion.   (2+3)+5