2022

MATHEMATICS — HONOURS

Paper : SEC-A-1

(C-Programming Language)

Full Marks : 80

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. 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) getch() is defined under the header file

       (i) <assert.h>   (ii) <stdio.h>

       (iii) <stdlib.h>   (iv) <conio.h>

   (b) The output of the following code is

   ```
   #include<stdio.h>
   main()
   {
   int a, c;
   a = 10;
   double b = 5.6;
   c=a+b;
   printf("%d", c);
   }
   ```

       (i) 15   (ii) 16   (iii) 15.6   (iv) 10

   (c) How many times will "SEC-A" be printed in the following program?

   ```
   #include<stdio.h>
   int main()
   {
   int n;
   for (n=1; n<=30;n++)
   printf("SEC-A");
   return;
   }
   ```

       (i) 30   (ii) 31   (iii) Infinite   (iv) None of these.

Please Turn Over

(2)

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

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

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

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

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

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

(e) How many times will the following loop execute?

```
for (j = 1; j<=10; j=j-1)
```

   (i) Forever

   (iii) 0

   (ii) Never

   (iv) 1

(f) The output of the following C-code is

```
#include<stdio.h>
int main()
{
int n=2;
int k=++n+n;
printf("%d\n", k);
}
```

   (i) 6   (ii) 5   (iii) 4   (iv) none of these

(g) What will be the output of the following C code?

```
#include<stdio.h>
void main()
{
int x, y=5, z=5;
x = y = = z;
printf("%d", x);
}
```

   (i) 0   (ii) 1   (iii) 5   (iv) Error

(h) Maximum number of elements in the array declaration `int a[5][8]` is

   (i) 28   (ii) 32   (iii) 35   (iv) 40

(i) Which is the correct way to initialize the array structure?

   (i) `int ary[4] ={10,20,30,40}`

   (ii) `int ary[4] =(10,20,30,40)`

   (iii) `int ary[4) ={10,20,30,40}`

   (iv) `int ary(4) ={10,20,30,40}`

(j) What will be the output if the following executes?

```
#include<stdio.h>
int main()
{
char arr [7]= "Networking"
printf("%s", arr);
return 0;
}
```

   (i) Network   (ii) N   (iii) network   (iv) garbage value

2. Answer *any one* question :

  (a) (i) What is a 'variable' in C? Distinguish between local and global variables giving examples.

       (ii) Write a C-program to find all the roots of a quadratic equation with real coefficients.

          (2+3)+5

  (b) (i) Distinguish between the function `Call by value` with `Call by address`.

       (ii) Write a C-program to test a number is prime or not.   (2+2)+6

3. Answer *any one* question :

  (a) (i) Write down the classification of the flow control statement in C language. Explain any one statement with proper example.

       (ii) Write down a C-program to find the area of a triangle if the triangle is formed by three line segments.   (3+3)+4

  (b) (i) What is the difference between the User-defined and Standard library functions in C? Explain with example.

       (ii) Write a C-program to evaluate the value of function $f(x)$ for $x = 1, 2, ..., 10$ using the subprogram, where $f(x)$ is given by

$$f(x)=\begin{cases} x^2 +5, & \text{if } 0 \le x < 5 \\ -2x + \tan^{-1}x, & \text{if } 5 \le x < 10 \end{cases}$$

          (3+2)+5

4. Answer *any one* question :

  (a) (i) Write a C-program to find the sum of first n even positive integers to illustrate a function 'Call by value'.

       (ii) Write down the C expressions for the following functions :

         (I) $x^{y^2} + \left(yz^z/10 \right)^5$ (II) $\cot^2 x + |x \log_{10} x|$ 6+(2+2)

Please Turn Over

(4)

(b)   (i) Write short notes on :

              (I) Arithmetic operator   (II) Relational operator   (III) Logical operator.

     (ii) What would be printed on the screen if the following program is executed :

```
main()
{
    int i, j;
    for(i=1; i<=5; i++)
    {
    for (j=1; j<=i; j++)
    printf("%d", j);
    printf("\n");
    }
}
```
                                                                                              (2+2+2)+4

5. Answer *any one* question :

   (a) (i) Using a `for-loop` write a program in C to find first 20 Fibonacci numbers.

        (ii) Distinguish between higher level language and lower level language. Give examples.   5+5

   (b) (i) What are the main data types in C? Explain with example.

        (ii) Write a C-program to find the trace of a square matrix.   (2+3)+5

6. Answer *any one* question :

   (a) (i) Write a brief note on object oriented programming.

        (ii) Write two differences between a compiler and an assembler.

        (iii) Write a C-program to find the HCF and LCM of two numbers.   3+2+5

   (b) (i) What do you mean by recursion in C-language? Differentiate between recursion and iteration.

        (ii) Write a C-program to test whether a given year is leap year or not.

        (iii) Write a C-program to find the hypotenuse of a right angled triangle when other two sides are
               given.   (2+2)+3+3

7. Answer *any one* question :

   (a) (i) What is `if-else` statement? Explain with example.

        (ii) Write down a C-program to evaluate the multiplication of two square matrices of same order.
                                                                                              (2+2)+6

(5)

(b) (i) Write a C-program to find the sum of array elements by passing to a function.

(ii) Write a C-program that use a function to sort an array of integers.

(iii) Write the output of the following C-program :

```c
#include<stdio.h>
main()
{
int a, b, c;
a=12;
++a;
b=a++;
c=++a;
printf("a=%d, b=%d, c=%d", a, b, c);
}
```

4+4+2

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