

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

(d) 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)

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

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

(i) Forever

(ii) Never

(iii) 0

(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 $x = 1, 2, \dots, 10$ using the subprogram, where $f(x)$ is given by

$$f(x) = \begin{cases} x^2 + 5, & \text{if } 0 \leq x < 5 \\ -2x + \tan^{-1}x, & \text{if } 5 \leq x < 10 \end{cases} \quad (3+2)+5$$

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

Please Turn Over

(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

- (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 :

```
#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