

CH. DEVI LAL STATE INSTITUTE OF ENGINEERING AND TECHNOLOGY



LAB MANNUAL OF PROGRAMMING FOR PROBLEM SOLVING

1. Introduction to programming language and basic of c program.

C is a general-purpose computer programming language. It was created in the 1970s by Dennis Ritchie, and remains very widely used and influential. By design, C's features cleanly reflect the capabilities of the targeted CPUs. It has found lasting use in operating system, device-drivers, protocol-stocks, though decreasingly for application software. C is commonly used on computer architectures that range from the largest supercomputers to the smallest microcontrollers and embedded systems.

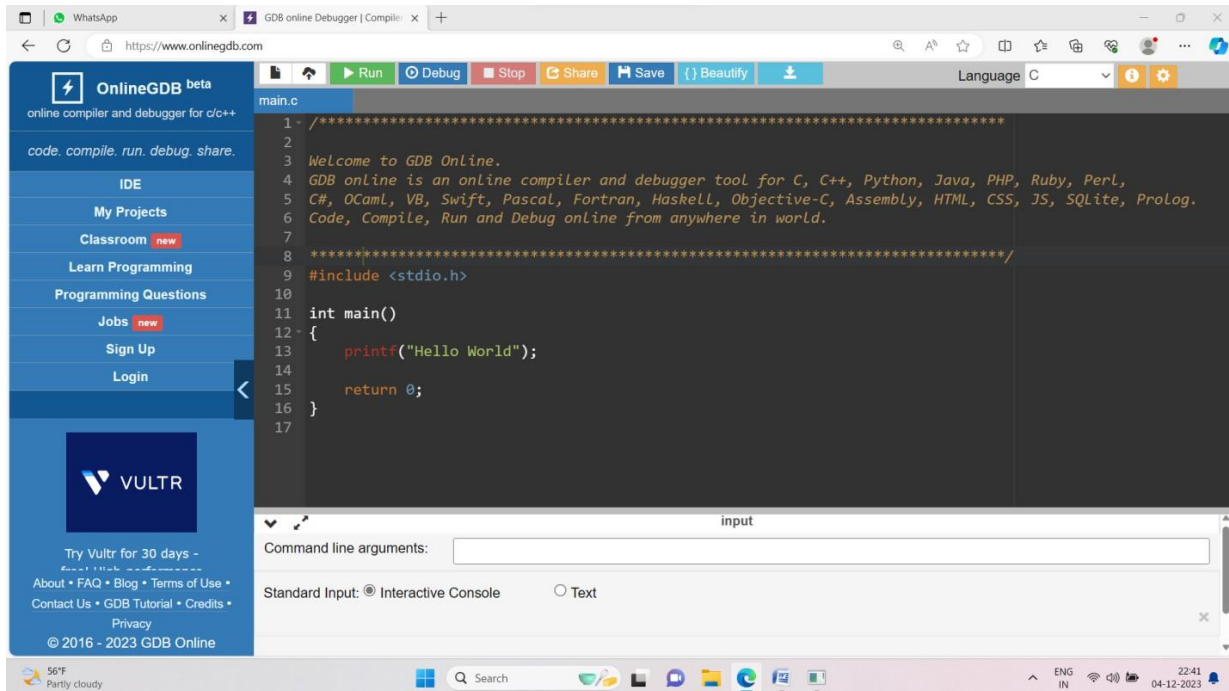
A successor to the programming language B, C was originally developed at Bell Labs by Ritchie between 1972 and 1973 to construct utilities running on Unix. It was applied to re-implementing the kernel of the UNIX operating system. During the 1980s, C gradually gained popularity. It has become one of the most widely used programming languages, with C compilers available for almost all modern computer architectures and operating systems. C has been standardized by ANSI since 1989 (ANSI C) and by the International Organization for Standardization (ISO).

C is an imperative procedural language supporting structured programming, lexical variable scope, and recursion, with a static type system. It was designed to be compiled to provide low-level access to memory and language

NOW

- **Open any Browser , search online GDB compiler and open first link**

constructs that map efficiently to machine-instructions, all with minimal runtime-support. Despite its low-level capabilities, the language was designed to encourage cross-platform programming. A standards-compliant C program written with portability in mind can be compiled for a wide variety of computer platforms and operating systems with few changes to its source code.

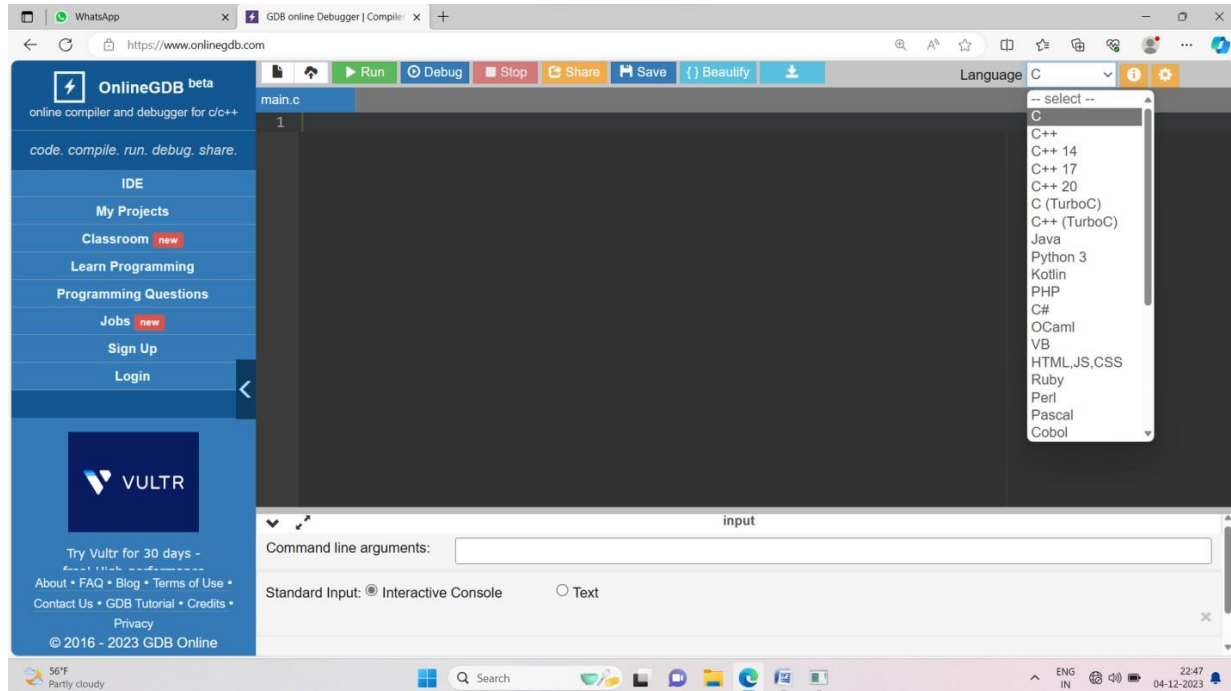


The screenshot displays the OnlineGDB website interface. The browser address bar shows the URL <https://www.onlinegdb.com>. The page features a navigation menu on the left with options like 'IDE', 'My Projects', 'Classroom', 'Learn Programming', 'Programming Questions', 'Jobs', 'Sign Up', and 'Login'. The main content area shows a C program named 'main.c' with the following code:

```
1 - /*****  
2  
3 Welcome to GDB OnLine.  
4 GDB online is an online compiler and debugger tool for C, C++, Python, Java, PHP, Ruby, Perl,  
5 C#, OCaml, VB, Swift, Pascal, Fortran, Haskell, Objective-C, Assembly, HTML, CSS, JS, SQLite, ProLog.  
6 Code, Compile, Run and Debug online from anywhere in world.  
7  
8 *****/  
9 #include <stdio.h>  
10  
11 int main()  
12 {  
13     printf("Hello World");  
14  
15     return 0;  
16 }  
17
```

Below the code editor, there is an 'input' field for command line arguments and a 'Standard Input' section with radio buttons for 'Interactive Console' (selected) and 'Text'. The bottom of the page shows a Windows taskbar with the date and time '04-12-2023 22:41'.

- Select the c language from the top corner and start coding.

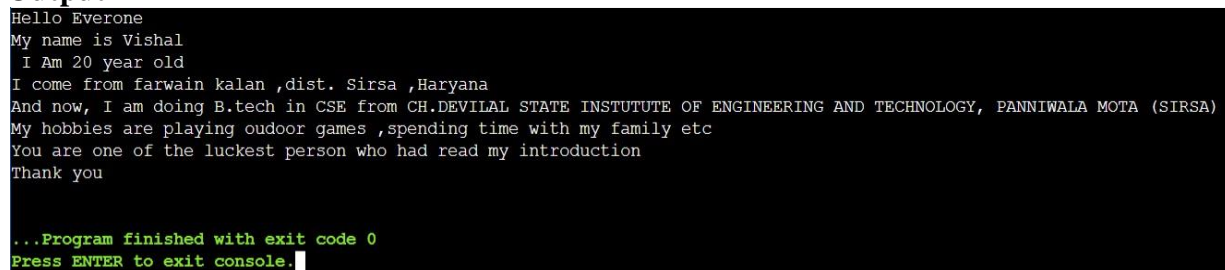


2. Write a program to print your basic detail in multi- statements.

Input --

```
#include<stdio.h>
#include<conio.h>
int main()
{
printf("Hello Everone\n");
printf("My name is Vishal\n ");
printf("I Am 20 year old\n");
printf("I come from farwain kalan ,dist. Sirsa ,Haryana\n");
printf("And now, I am doing B.tech in CSE from CH.DEVILAL STATE INSTUTUTE OF
ENGINEERING AND TECHNOLOGY, PANNIWALA MOTA (SIRSA)\n");
printf("My hobbies are playing outdoor games ,spending time with my family etc\n");
printf("You are one of the luckest person who had read my introduction\n");
printf("Thank you\n");
return 0;
}
```

Output –



```
Hello Everone
My name is Vishal
I Am 20 year old
I come from farwain kalan ,dist. Sirsa ,Haryana
And now, I am doing B.tech in CSE from CH.DEVILAL STATE INSTUTUTE OF ENGINEERING AND TECHNOLOGY, PANNIWALA MOTA (SIRSA)
My hobbies are playing outdoor games ,spending time with my family etc
You are one of the luckest person who had read my introduction
Thank you

...Program finished with exit code 0
Press ENTER to exit console.█
```

3. Program to perform simple Arithmetic , logical, bitwise, relational operations in C.

[A]. Simple Arithmetic

Input--

```
#include<stdio.h>
#include<conio.h>
int main()
{
int a,b,c;
printf("Enter two number \n"); scanf("%d %d",&a,&b);
c=a+b;
printf("\n%d+%d=%d",a,b,c);
c=a-b;
printf("\n %d-%d=%d",a,b,c); c=a*b;
printf("\n%d*%d=%d",a,b,c);
c=a/b;
printf("\n%d/%d=%d",a,b,c); c=a%b;

printf("\n modulus of %d and %d is %d",a,b,c);
getch();
}
```

Output--

```
Enter two number
5
5

5+5=10
 5-5=0
5*5=25
5/5=1
 modulus of 5 and 5 is 0

...Program finished with exit code 0
Press ENTER to exit console.
```

[B]. Logical Operator

Input--

```
#include<stdio.h>
int main ()
{
    int a=6 ,b=7,c=8, x;
    printf("a=6,b=7,C=8\n");
    x=(a==b) && (c>b);
    printf("(a==b) && (c>b) is %d\n",x);
    x=(a==b) || (c<b);
    printf("(a==b) || (c<b) is %d \n ",x);
    x=(a==b) && (c<b);
    printf("(a==b) && (c<b) is %d \n",x);
    x=(a!=b)|| (c<b);
    printf("(a!=b)|| (c<b) is %d \n",x);
    x!=(a==b);
    printf("!(a==b) is %d \n",x);
    return 0;
}
```

Output--

```
a=6,b=7,C=8
(a==b) && (c>b) is 0
(a==b) || (c<b) is 0
(a==b) && (c<b) is 0
(a!=b)|| (c<b) is 1
!(a==b) is 1

...Program finished with exit code 0
Press ENTER to exit console.█
```

[C]. Bitwise Operator

Input--

```
#include<stdio.h>
int main()
{
int a=2,b=3;
printf("output for bitwise XOR =%d\n",a^b);
printf("output for bitwise OR=%d\n",a|b);
printf("output for bitwise AND=%d\n",a&b);
printf("output for bitwise <<=%d\n",a<<b);
printf("output for bitwise >>=%d\n",a>>b);
return 0;
}
```

Output -

```
output for bitwise XOR =1
output for bitwise OR=3
output for bitwise AND=2
output for bitwise <<=16
output for bitwise >>=0
```

```
...Program finished with exit code 0
Press ENTER to exit console.
```

[D]. Relational Operator

Input--

```
#include<stdio.h>
int main ()
{
    int a=6 ,b=7;
    printf("%d==%d is %d\n",a,b,a==b);

    printf("%d>%d is%d\n",a,b,a>b);
    printf("%d<%d is%d\n",a,b,a<b);
    printf("%d!=%d is%d\n",a,b,a!=b);
    printf("%d>=%d is%d\n",a,b,a>=b);
    printf("%d<=%d is%d\n",a,b,a<=b);
    return 0;
}
```

Output--

```
6==7 is 0
6>7 is0
6<7 is0
6!=7 is1
6>=7 is0
6<=7 is1
```

```
...Program finished with exit code 0
Press ENTER to exit console. 
```

4.Program to find area and perimeter of rectangle and Circle

[A]. Area and perimeter of rectangle

Input –

```
#include<stdio.h>
#include<conio.h>
int main()
{
float lenght ,breadth,area ,perimeter;
printf("enter lenght of rectangle \n");
scanf("%f",&lenght);
printf("enter breadth of rectangle\n");
scanf("%f",&breadth);
area=lenght*breadth;
perimeter=(2*lenght)+(2*breadth);
printf("area of rectangle:%2f\n",area);
printf("perimeter of rectangle:%2f\n",perimeter);
return(0);
}
```

Output—

```
enter lenght of rectangle
5
enter breadth of rectangle
5
area of rectangle:25.000000
perimeter of rectangle:20.000000

...Program finished with exit code 0
Press ENTER to exit console. █
```

[B]. Area and perimeter Circle

Input –

```
#include<stdio.h>
main ()
{
float radius,area,perimeter;
printf("enter radius:");
scanf("%f",&radius);
area=3.14*radius*radius;
perimeter=2*3.14*radius;
printf("area of circle: %f\n", area);
printf("perimeter of circle:%f\n",perimeter);
getch();
}
```

Output—

```
enter lenght of rectangle
5
enter breadth of rectangle
5
area of rectangle:25.000000
perimeter of rectangle:20.000000

...Program finished with exit code 0
Press ENTER to exit console.
```

5. Program to find greatest of three number using nested if and else if statements.

Input—

```
#include<stdio.h>
int main()
{
int n1,n2,n3;
printf("Enter three numbers:");
scanf("%d%d%d",&n1,&n2,&n3);
if(n1>=n2&& n1>=n3)
printf("%d is the largest number ",n1);
else if(n2>=n1 && n2>=n3)
printf("%d is the largest number ",n2);
else
printf("%d is the largest number ",n3);
}
```

Output—

```
Enter three numbers:100
200
500
500 is the largest number

...Program finished with exit code 0
Press ENTER to exit console.
```

6. Program to find whether a given number odd or even .

Input—

```
#include<stdio.h>
int main ()
{
int num ;
printf("enter an integer");
scanf("%d",&num);
if(num%2==0)
printf("%d is even,",num);
else
printf("%d is odd.",num);
return 0;
}
```

Output—

```
main.c: In function 'main':
main.c:4:1: warning: implicit declaration of function 'printf' [-Wimplicit-function-declaration]
   4 | printf("enter an integer");
     | ^~~~~~
main.c:1:1: note: include '<stdio.h>' or provide a declaration of 'printf'
+++ |+#include <stdio.h>
   1 | int main ()
main.c:4:1: warning: incompatible implicit declaration of built-in function 'printf' [-Wbuiltin-declaration-mismatch]
   4 | printf("enter an integer");
     | ^~~~~~
main.c:4:1: note: include '<stdio.h>' or provide a declaration of 'printf'
main.c:5:1: warning: implicit declaration of function 'scanf' [-Wimplicit-function-declaration]
   5 | scanf("%d", &num);
     | ^~~~~~
main.c:5:1: note: include '<stdio.h>' or provide a declaration of 'scanf'
main.c:5:1: warning: incompatible implicit declaration of built-in function 'scanf' [-Wbuiltin-declaration-mismatch]
main.c:5:1: note: include '<stdio.h>' or provide a declaration of 'scanf'
enter an integer455
455 is odd.

...Program finished with exit code 0
Press ENTER to exit console.
```

7. Program to compute and display value of x , where $x=a/(b-c)$.

Input—

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,c;
float x;
printf("enter the value of a,b,c\n");
scanf("%d%d%d",&a,&b,&c);
x=a/(b-c);
printf("the value of x=%f",x);
getch ();
}
```

Output—

```
enter the value of a,b,c
5
6
7
the value of x=-5.000000

...Program finished with exit code 0
Press ENTER to exit console. █
```

8. Program to create multiplication table for a given number.

Input—

```
#include<stdio.h>
int main()
{
int number,i;
printf("Enter the number for multiplication table:");
scanf("%d",&number);
printf("Multiplication table for %d:\n",number);
for(i=1;i<=10;++i)
{
printf("dx%d=%d\n",number,i,number*i);
}
return 0;
}
```

Output—

```
Enter the number for multiplication table:100
Multiplication table for 100:
100x1=100
100x2=200
100x3=300
100x4=400
100x5=500
100x6=600
100x7=700
100x8=800
100x9=900
100x10=1000

...Program finished with exit code 0
Press ENTER to exit console. █
```

9. Program to calculate average marks of a student and assign grade using if else.

Input—

```
#include<stdio.h>
int main()
{
float marks1, marks2, marks3, average;
char grade;
printf("Enter marks for three subjects:\n");
scanf("%f%f%f", &marks1, &marks2, &marks3);
average = (marks1 + marks2 + marks3) / 3.0;
if(average >= 90)
{
grade = 'A';
}
else if (average >= 80)
{
grade = 'B';
}
else if (average >= 70)
{
grade = 'C';
}
else if (average >= 60)
{
grade='D';
}
else
{
grade='F';
}
printf("Average Marks: %.2f\n", average);
printf("Grade: %c\n", grade);
return 0;
}
```

Output—

```
Enter marks for three subjects:
```

```
5
```

```
5
```

```
5
```

```
Average Marks: 5.00
```

```
Grade: F
```

```
-----
```

```
Process exited after 13.83 seconds with return value 0
```

```
Press any key to continue . . .
```

10. Program to print day of week using switch case statements.

Input—

```
#include<stdio.h>
#include<conio.h>
int main()
{
int num;
printf("enter the day no.");
scanf("%d",&num);
switch(num)
{
case 1:
printf("day is sunday");
break;
case 2:
printf("day is monday");
break;
case 3:
printf("day is tuesday");
break;
case 4:
printf("day is wednesday");
break;
case 5:
printf("day is thursday");
break;
case 6:
printf("day is friday");
break;
case 7:
printf("day is saturday");
break;
default:
printf("Wrong choice");
break;
}
getch();
}
```

Output—

```
enter the day no.5
```

```
day is thursday
```

```
...Program finished with exit code 0
```

```
Press ENTER to exit console. |
```

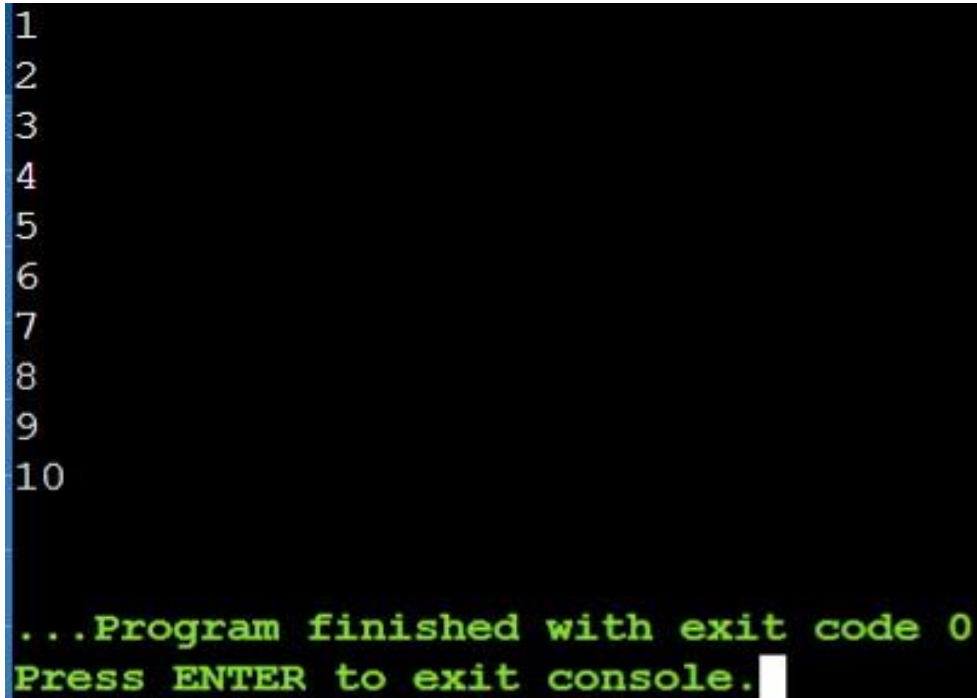
11. Program to print counting 1 to 10 using all loop.

[A]. FOR LOOP

Input—

```
#include<stdio.h>
#include<conio.h>
int main()
{
int m;
for(m=1;m<=10;m++)
printf("%d\n",m);
getch();
}
```

Output—



```
1
2
3
4
5
6
7
8
9
10

...Program finished with exit code 0
Press ENTER to exit console. █
```

[B].While Loop

Input—

```
#include<stdio.h>
#include<conio.h>
main()
{
int x;
x=1;
while(x<11)
{
printf("%d\n",x);
x++;
}
getch();
}
```

Output—

```
main.c:3:1: warning: return type defaults to 'int' [-Wimplicit-int]
  3 | main()
    | ^~~~
1
2
3
4
5
6
7
8
9
10

...Program finished with exit code 0
Press ENTER to exit console.█
```

[C]. Do While Loop

Input—

```
#include<stdio.h>
#include<conio.h>
main()
{
int x;
x=1;
do
{
printf("%d\n",x);
x++;
}
while(x<11);
getch();
}
```

Output—

```
main.c:3:1: warning: return type defaults to 'int' [-Wimplicit-int]
   3 | main()
     | ^~~~
1
2
3
4
5
6
7
8
9
10

...Program finished with exit code 0
Press ENTER to exit console. █
```

12. Program to insert 5 elements into array and print elements of array.

Input—

```
include<stdio.h>
int main()
{
    int arr[10], i, element;
    printf("Enter 5 array elements:\n");
    for (i = 0; i < 5; i++)
        scanf("%d", &arr[i]);
    printf("\nEnter element to insert:");
    scanf("%d", &element);
    arr[5] = element; // Insert the new element at index 5
    printf("\nThe new array:\n");
    for (i = 0; i < 6; i++)
        printf("%d ", arr[i]);
    return 0 ;
}
```

Output—

```
Enter 5 array elements:
```

```
1
```

```
2
```

```
3
```

```
4
```

```
5
```

```
Enter element to insert:6
```

```
The new array:
```

```
1 2 3 4 5 6
```

```
...Program finished with exit code 0
```

```
Press ENTER to exit console. 
```

13. Program to find average marks of class.

Input—

```
#include <stdio.h>
int main()
{
int numStudents, i;
float totalMarks = 0, averageMarks;
printf("Enter the number of students: ");
scanf("%d", &numStudents);
for (i = 1; i <= numStudents; i++) {
float marks;
printf("Enter marks for student %d: ", i);
scanf("%f", &marks);
totalMarks += marks; // Accumulate total marks
}
averageMarks = totalMarks / numStudents;
printf("The average marks of the class are: %.2f\n", averageMarks);
return 0;
}
```

Output—

```
Enter the number of students: 10
Enter marks for student 1: 50
Enter marks for student 2: 60
Enter marks for student 3: 20
Enter marks for student 4: 27
Enter marks for student 5: 18
Enter marks for student 6: 68
Enter marks for student 7: 74
Enter marks for student 8: 96
Enter marks for student 9: 99.9
Enter marks for student 10: 45
The average marks of the class are: 55.79

...Program finished with exit code 0
Press ENTER to exit console.
```

14. Program to add two matrices in 2 D array.

Input—

```
#include <stdio.h>
int main()
{
int A[3][3], B[3][3], C[3][3], i, j;
printf("Enter 9 numbers for the first matrix:\n");
for (i = 0; i <= 2; i++)
for (j = 0; j <= 2; j++)
scanf("%d", &A[i][j]);
printf("Enter 9 numbers for the second matrix:\n");
for (i = 0; i <= 2; i++)
for (j = 0; j <= 2; j++)
scanf("%d", &B[i][j]);
for (i = 0; i <= 2; i++)
for (j = 0; j <= 2; j++) {
C[i][j] = A[i][j] + B[i][j];
printf("%d ", C[i][j]);
if (j == 2)
printf("\n");
}
return 0;
}
```

Output—

```
Enter 9 numbers for the first matrix:
```

```
7
```

```
5
```

```
6
```

```
3
```

```
9
```

```
2
```

```
78
```

```
5
```

```
6
```

```
Enter 9 numbers for the second matrix:
```

```
1
```

```
2
```

```
8
```

```
6
```

```
5
```

```
9
```

```
4
```

```
5
```

```
5
```

```
8 7 14
```

```
9 14 11
```

```
82 10 11
```

```
...Program finished with exit code 0
```

```
Press ENTER to exit console. █
```

15. Program to multiplication two matrices in array.

Input—

```
#include <stdio.h>
int main()
{
int A[3][3], B[3][3], C[3][3], i, j, k;
printf("Enter 9 numbers for the first matrix:\n");
for (i = 0; i < 3; i++)
for (j = 0; j < 3; j++)
scanf("%d", &A[i][j]);
printf("Enter 9 numbers for the second matrix:\n");
for (i = 0; i < 3; i++)
for (j = 0; j < 3; j++)
scanf("%d", &B[i][j]);
for (i = 0; i < 3; i++)
{
for (j = 0; j < 3; j++)
{
C[i][j] = 0;
for (k = 0; k < 3; k++)
{
C[i][j] += A[i][k] * B[k][j];
}
}
}
printf("Resultant Matrix (Multiplication):\n");
for (i = 0; i < 3; i++) {
for (j = 0; j < 3; j++) {
printf("%d ", C[i][j]);
}
printf("\n");
}
return 0;
}
```

Output—

```
Enter 9 numbers for the first matrix:
```

```
86
```

```
4
```

```
5
```

```
4
```

```
5
```

```
8
```

```
9
```

```
7
```

```
8
```

```
Enter 9 numbers for the second matrix:
```

```
6
```

```
5
```

```
4
```

```
5
```

```
.
```

```
5
```

```
8
```

```
4
```

```
6
```

```
5
```

```
Resultant Matrix (Multiplication):
```

```
556 480 401
```

```
81 93 96
```

```
121 128 132
```

```
...Program finished with exit code 0
```

```
Press ENTER to exit console.
```

16. Program to print string with there different specifications.

Input—

```
#include <stdio.h>
int main()
{
char country[15]="United Kingdom";
printf("\n\n");
printf("%15s\n",country);
printf("%6s\n",country);
printf("%15.6s\n",country);
printf("%-15.0s\n",country);
printf("%3s\n",country);
printf("%s\n",country);
printf("%s",country);
return 0;
}
```

Output—

```
United Kingdom
United Kingdom
    United

United Kingdom
United Kingdom
United Kingdom

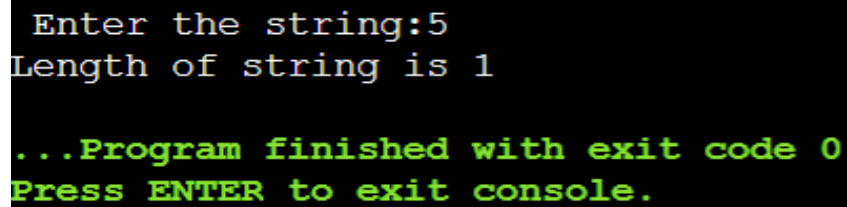
...Program finished with exit code 0
Press ENTER to exit console. □
```

17. Program to calculate length of string.

Input—

```
#include<stdio.h>
int main()
{
char str[1000];
int i;
printf("\n Enter the string:");
scanf("%s" , str);
for(i=0;str[i]!='\0;++i);
printf("Length of string is %d",i);
return 0;
}
```

Output—



```
Enter the string:5
Length of string is 1

...Program finished with exit code 0
Press ENTER to exit console.
```

18. Program to implement linear search .

Input—

```
#include <stdio.h>
int main()
{
int a[10], i, item,n;
printf("\nEnter number of elements of an array:\n");
scanf("%d",&n);
printf("\nEnter elements: \n");
for (i=0; i<n; i++)
scanf("%d", &a[i]);
printf("\nEnter key to search: ");
scanf("%d", &item);
for (i=0; i<=9; i++)
if (item == a[i])
{
printf("\nkey found at location %d", i+1);
break;
}
if (i > 9)
printf("\nKey is not found.");
return 0;
}
```

Output—

```
Enter number of elements of an array:
5
Enter elements:
5
7
8
9
4
Enter key to search: 8
key found at location 3
...Program finished with exit code 0
Press ENTER to exit console.
```

19. Program to implement binary search.

Input—

```
#include<stdio.h>
int main()
{
int A[5] = {10, 20, 30, 40, 50};
int key = 50, flag = 0;
int low = 0, high = 4, mid;
while (low <= high)
{
mid = (low + high) / 2;
if (key == A[mid])
{
flag = 1;
break;
}
else if (key < A[mid])
{
high = mid - 1;
}
else
{
low = mid + 1;
}
}
if (flag == 1)
printf("Key is found");
else
printf("Key is not found");
return 0;
}
```

Output—

```
Key is found
```

```
...Program finished with exit code 0
Press ENTER to exit console.
```

20. Program to find root of quadratic equation.

Input—

```
#include<stdio.h>
#include<math.h>
int main()
{
int a,b,c,d,r1,r2;
printf("enter the value of a,b and c: \n");
scanf("%d%d%d",&a,&b,&c);
d=b*b-4*a*c;
r1=(-b+sqrt(d))/(2*a);
r2=(-b-sqrt(d))/(2*a);
printf("Root1=%d and Root2=%d",r1,r2);
return 0;
}
```

Output—

```
enter the value of a,b and c:
5
5
6
Root1=-2147483648 and Root2=-2147483648

...Program finished with exit code 0
Press ENTER to exit console. █
```

21. Program to implement sorting using insertion sort, selection sort, bubble sort.

[A]. Insertion sort

Input—

```
#include <stdio.h>
void insertionSort(int arr[], int n) {
    int i, key, j;
    for (i = 1; i < n; i++) {
        key = arr[i];
        j = i - 1;
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }
}
void printArray(int arr[], int size) {
    for (int i = 0; i < size; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
}
int main() {
    int arr[] = {11, 88, 100, 999, 10};
    int n = sizeof(arr) / sizeof(arr[0]);
    printf("Original array: ");
    printArray(arr, n);
    insertionSort(arr, n);
    printf("Sorted array: ");
    printArray(arr, n);
    return 0;
}
```

Output—

```
Original array: 11 88 100 999 10
Sorted array: 10 11 88 100 999
```

```
...Program finished with exit code 0
Press ENTER to exit console.
```

[B]. Selection Sort

Input—

```
#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
void selection_sort(int A[],int n);
void main()
{
int i,n,A[100];
printf("\n enter the size of the list:");
scanf("%d",&n);
if(n>100)
{
printf("\n size should be less or equal to 100");
}
printf("\n enter the elements of the array:");
for(i=0;i<n;i++)
{
printf("\n enter A[%d]",i);
scanf("%d",&A[i]);
}
selection_sort(A,n);
printf("\n the sorted list is as follows:");
for(i=0;i<n;i++)
printf("\n A[%d]=%d",i,A[i]);
}
void selection_sort(int A[],int n)
{
int i,j,pos,min;
for(i=0;i<n-1;i++)
{
pos=i;
min=A[i];
```

```
for(j=i+1;j<n;j++)
if(A[j]<min){
min=A[j];
pos=j;
}
A[pos]=A[i];
A[i]=min;
}
return 0 ;
}
```

Output—

```
main.c: In function 'selection_sort':
main.c:42:8: warning: 'return' with a value, in function returning void
 42 | return 0 ;
    |         ^
main.c:27:6: note: declared here
 27 | void selection_sort(int A[],int n)
    |         ^~~~~~

enter the size of the list:5

enter the elements of the array:
enter A[0]4

enter A[1]5

enter A[2]9

enter A[3]7

enter A[4]8

the sorted list is as follows:
A[0]=4
A[1]=5
A[2]=7
A[3]=8
A[4]=9

...Program finished with exit code 0
Press ENTER to exit console.
```

[C]. Bubble sort

Input—

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
void bubblesort(int arr[],int n)

{

    for(int i=0;i<n-1;i++)
    {
    int flag=0;
    for( int j=0;j<n-1-i;j++)
    {
    if (arr[j]>arr[j+1])
    {
    int temp=arr[j];
    arr[j]=arr[j+1];
    arr[j+1]=temp;
    flag=1;
    }
    }
    if(flag==0)
    break;
    }
}

void display(int arr[],int n)
{
for (int i=0;i<n;i++)
{
printf("%d\n",arr [i]);
}
}

int main()
{
int arr[]={3,5,8,4,1};
int n= sizeof(arr[0]);
printf("element before sorting");
display(arr,n);
bubblesort(arr,n);
printf("element after sorting :\n");
display(arr,n);
}

Output—
```

```
element before sorting3
```

```
5
```

```
8
```

```
4
```

```
element after sorting :
```

```
3
```

```
4
```

```
5
```

```
8
```

```
...Program finished with exit code 0
```

```
Press ENTER to exit console.
```

22. Program to create a function to swap two numbers using call by value and call by reference.

[A]. Call by value

Input—

```
#include<stdio.h>
#include<conio.h>
int add(int a,int b);
int add(int a,int b)
{
int c;
c=a+b;
return c;
}
main()
{
int x,y,result;
printf("enter the value of x and y:");
scanf("%d%d",&x,&y);
result=add(x,y);
printf("%d + %d = %d\n",x,y,result);
getch();
}
```

Output—

```
main.c:10:1: warning: return type defaults to 'int' [-Wimplicit-int]
  10 | main()
     | ^~~~
enter the value of x and y:5
8
5 + 8 = 13

...Program finished with exit code 0
Press ENTER to exit console.█
```

[B]. Call by reference

Input—

```
#include<stdio.h>
#include<conio.h>
void swap(int *a,int *b);
void swap(int *a,int *b)
{
int t;
t=*a;
*a=*b;
*b=t;
}

main()
{
int x,y;
printf("enter the value of x and y:");
scanf("%d%d",&x,&y);
printf("Before swap: x=%d, y=%d\n",x,y);
swap(&x,&y);
printf("After swap: x=%d, y=%d\n",x,y);
getch();
}
```

Output—

```
main.c:12:1: warning: return type defaults to 'int' [-Wimplicit-int]
 12 | main()
    | ^~~~
enter the value of x and y:7
5
Before swap: x=7, y=5
After swap: x=5, y=7

...Program finished with exit code 0
Press ENTER to exit console.
```

23. Program to calculate factorial of number using recursion.

Input—

```
#include<stdio.h>
int fact(int);
void main()
{
int n, result;
printf("Enter any number: ");
scanf("%d", &n);
result = fact(n);
printf("Factorial is = %d", result);
}
int fact(int x)
{
int f;
if (x == 1 || x == 0) {
return 1;
}
else
{
f = x * fact(x - 1);
return f;
}
}
```

Output—

```
Enter any number: 9
Factorial is = 362880

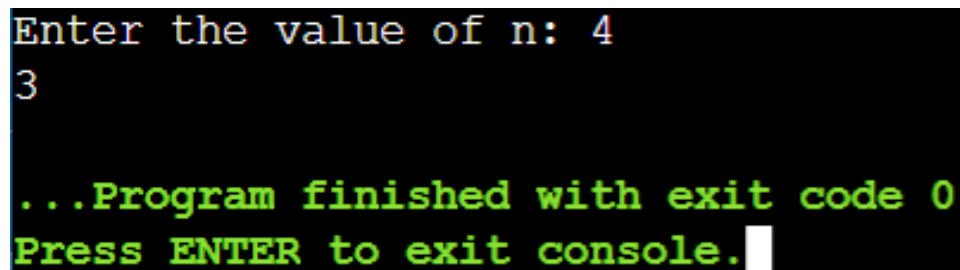
...Program finished with exit code 0
Press ENTER to exit console.
```

24. Program to Fibonacci series up to 20 using recursive numbers.

Input—

```
#include<stdio.h>
int fibonacci(int);
void main()
{
int n, f;
printf("Enter the value of n: ");
scanf("%d", &n);
f = fibonacci(n);
printf("%d", f);
}
int fibonacci(int n)
{
if (n == 0)
{
return 0;
}
else if (n == 1)
{
return 1;
}
else
{
return fibonacci(n - 1) + fibonacci(n - 2);
}
}
```

Output—



```
Enter the value of n: 4
3
...Program finished with exit code 0
Press ENTER to exit console.
```

25. Program to understand basic use of pointers.

Input—

```
#include<stdio.h>
int main()
{
int var=12;
int *p;
p=&var;
printf("Address of variable:%x\n",&var);
printf("Address stored in ip variable:%x\n",p);
printf("value of *ip variable:%x\n",p);
return 0;
}
```

Output—

```
main.c: In function 'main':
main.c:7:30: warning: format '%x' expects argument of type 'unsigned int', but argument 2 has type 'int **' [-Wformat=]
 7 | printf("Address of variable:%x\n",&var);
   |                               ^~  ~~~~
   |                               |   |
   |                               |   int *
   |                               unsigned int
   |                               %ls
main.c:8:40: warning: format '%x' expects argument of type 'unsigned int', but argument 2 has type 'int **' [-Wformat=]
 8 | printf("Address stored in ip variable:%x\n",p);
   |                               ^~  ~
   |                               |   |
   |                               |   int *
   |                               unsigned int
   |                               %ls
main.c:9:32: warning: format '%x' expects argument of type 'unsigned int', but argument 2 has type 'int **' [-Wformat=]
 9 | printf("value of *ip variable:%x\n",p);
   |                               ^~  ~
   |                               |   |
   |                               |   int *
   |                               unsigned int
   |                               %ls
Address of variable:13e6dec
Address stored in ip variable:13e6dec
value of *ip variable:13e6dec

...Program finished with exit code 0
Press ENTER to exit console.
```

26. Program to find user define data type namely student and implement it using structure.

Input—

```
#include<stdio.h>
struct student
{
char name[30];
int roll_number;
float marks;
};
int main()
{
struct student s1;
printf("Enter student details:\n");
printf("Name:vishal kumar ");
scanf("%s", s1.name);
printf("Roll Number:232058 ");
scanf("%d", &s1.roll_number);
printf("Marks:90 ");
scanf("%f", &s1.marks);
printf("\nStudent Details:\n");
printf("Name: %s\n", s1.name);
printf("Roll Number: %d\n", s1.roll_number);
printf("Marks: %.2f\n", s1.marks);
return 0;
}
```

Output—

```
Enter student details:
Name:vishal kumar
rollno.=232058
Roll Number:232058
branch cse
Marks:90
Student Details:
Name: rollno.=232058
Roll Number: 0
Marks: 0.00

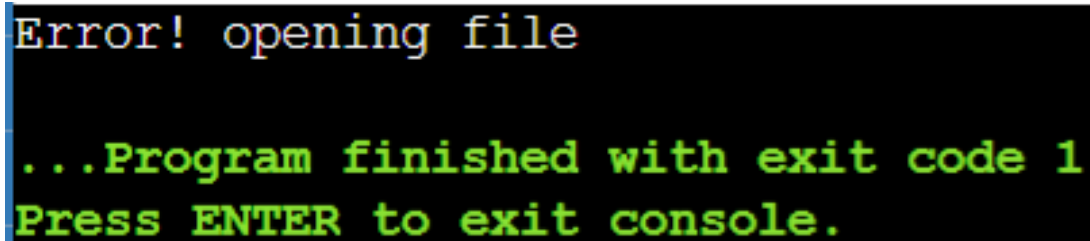
...Program finished with exit code 0
Press ENTER to exit console. █
```

27. Program to read a simple file using file handling.

Input—

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
int num;
FILE *fptr;
if ((fptr = fopen("C:\\program.txt", "r")) == NULL){
printf("Error! opening file");
exit(1);
}
fscanf(fptr, "%d", &num);
printf("Value of n=%d", num);
fclose(fptr);
return 0;
}
```

Output—



```
Error! opening file

...Program finished with exit code 1
Press ENTER to exit console.
```