**Module 2 – Introduction to Programming**

**(1)** **Research and provide three real-world applications where C programming is extensively used, such as in embedded systems, operating systems, or game development**.

**Ans.**

(1) Embedded Systems:

(2) Operating Systems:

(3) Game Development:

**(2) Install a C compiler on your system and configure the IDE. Write your first program to print "Hello, World!" and run it.**

**Ans.**

#include <stdio.h>

int main(){

    printf ("\n Hello World");

    return 0;

}

**(3) Write a C program that includes variables, constants, and comments. Declare and use different data types (int, char, float) and display their values.**

**Ans.**

#include <stdio.h>

#define PIE 3.14

int main ()

{

int num1 = 27;

char ch = 'a';

float num3 = 10.5;

// num1 for the any numerical value,

// ch for the alphabetic value

// num3 for float value

// PIE for constant

Printf ("\nThe value of num1 = %d", num1);

Printf ("\nThe value of ch = %c", ch);

Printf ("\nThe value of num3 = %.2f", num3);

Printf ("\nThe value of PIE = %.2f", PIE);

return 0;

}

**(4) Write a C program that accepts two integers from the user and performs arithmetic, relational, and logical operations on them. Display the results.**

**Ans.**

#include <stdio.h>

int main()

{

int n1, n2;

printf ("\n The value of n1 = ");

scanf ("%d", &n1);

printf ("\n The value of n2 = ");

scanf ("%d", &n2);

// Arithmetic

Printf ("\n The Addition of %d and %d is %d", n1, n2, n1 + n2);

Printf ("\n The Subtraction of %d and %d is %d", n1, n2, n1 - n2);

Printf ("\n The multiplication of %d and %d is %d", n1, n2, n1 \* n2);

Printf ("\n The division of %d and %d is %.2f", n1, n2, (float)n1 / (float)n2);

// Relational operators

Printf ("\n\n n1 > n2 : %d", n1 > n2);

Printf ("\n n1 < n2 : %d", n1 < n2);

Printf ("\n n1 <= n2 : %d", n1 <= n2);

Printf ("\n n1 >= n2 : %d", n1 >= n2);

Printf ("\n n1 == n2 : %d", n1 == n2);

printf ("\n n1! = n2: %d", n1 != n2);

// Logical operators

printf ("\n\n n1 > 0 && n2 > 0 : %d", n1 > 0 && n2 > 0);

printf ("\n n1 > 0 || n2 < 0 : %d", n1 > 0 || n2 < 0);

printf ("\n! (n1 > 0) : %d", !(n1 > 0));

return 0;

}

**(5) Write a C program to check if a number is even or odd using an if-else statement. Extend the program using a switch statement to display the month name based on the user’s input (1 for January, 2 for February, etc.).**

**Ans.**

#include<stdio.h>

int main()

{

int n;

up:

printf ("\n Enter the value = ");

scanf ("%d",&n);

if (n%2==0)

{

Printf ("\n\n %d is the even number",n);

}

else

{

Printf ("\n\n %d is the odd Number",n);

}

Switch (n)

{

case 1 :

printf ("\n %d for January ",n);

break;

case 2 :

printf ("\n %d for February",n);

break;

case 3 :

printf ("\n %d for March",n);

break;

case 4 :

printf ("\n %d for April",n);

break;

case 5 :

printf ("\n %d for May",n);

break;

case 6 :

printf ("\n %d for June",n);

break;

case 7 :

printf ("\n %d for July",n);

break;

case 8 :

printf ("\n %d for August",n);

break;

case 9 :

printf ("\n %d for September",n);

break;

case 10 :

printf ("\n %d for October",n);

break;

case 11 :

printf ("\n %d for November",n);

break;

case 12 :

printf ("\n %d for December",n);

break;

}

goto up;

return 0;

}

**(6) Write a C program to print numbers from 1 to 10 using all three types of loops (while, for, do-while).**

**Ans.**

#include<stdio.h>

int main()

{

int i;

printf ("\n\n For loop :=");

for (i=1;i<=10;i++)

{

Printf("\n%d",i);

}

printf("\n\n while loop :=");

i=1;

while(i<=10)

{

printf("\n%d",i);

i++;

}

printf("\n\n do while loop :=");

i=1;

do

{

printf("\n%d",i);

i++;

}

while(i<=10);

return 0;

}

**(7) Write a C program that uses the break statement to stop printing numbers when it reaches 5. Modify the program to skip printing the number 3 using the continue statement.**

**Ans.**

#include<stdio.h>

int main()

{

int n,i;

printf("\n Enter the value of n = ");

scanf("%d",&n);

for(i=1;i<=n;i++)

{

if(i%3==0)

{

continue;

}

if(i%5==0)

{

break;

}

printf("%d \n",i);

}

return 0;

}

**(8) Write a C program that calculates the factorial of a number using a function. Include function declaration, definition, and call.**

**Ans.**

#include<stdio.h>

// Without return type with argument

int fact(int n1);//Declaration

int fact(int n1)//definition

{

int ans,i;

for(i=1;i<=n1;i++)

{

ans = ans \* i;

}

printf("\n The factorial of %d is = %d",n1,ans);

}

int main()

{

int num1;

printf("\n The value of num1 = ");

scanf("%d",&num1);

fact(num1);//calling

return 0;

}

**(9) Write a C program that stores 5 integers in a one-dimensional array and prints them. Extend this to handle a two-dimensional array (3x3 matrix) and calculate the sum of all elements.**

**Ans.**

#include<stdio.h>

int main()

{

int c[5],i;

for(i=0;i<5;i++)

{

printf("\n Enter the element c[%d] = ",i);

scanf("%d",&c[i]);

}

printf("\n Array = ");

for(i=0;i<5;i++)

{

printf("%d ",c[i]);

}

int a[3][3],b[3][3],j,sum=0;

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

printf("\n Enter the element a[%d][%d] = ",i,j);

scanf("%d",&a[i][j]);

}

}

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

printf("\n Enter the element b[%d][%d] = ",i,j);

scanf("%d",&b[i][j]);

}

}

printf("\n 1st \t 2nd \t =sum\n");

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

printf("%d ",a[i][j]);

}

printf("\t");

for(j=0;j<3;j++)

{

printf("%d ",b[i][j]);

}

printf("\t");

for(j=0;j<3;j++)

{

sum = a[i][j]+b[i][j];

printf("%2d ",sum);

}

printf("\n");

}

return 0;

}

**(10) Write a C program to demonstrate pointer usage. Use a pointer to modify the value of a variable and print the result.**

**Ans.**

#include <stdio.h>

int main()

{

int a[100];

int \*ptr = &a;

printf("\n Enter the value of a = ");

scanf("%d",&a);

printf("\n The address of a = %p ",ptr);

printf("\n The value of a = %d ",\*ptr);

return 0;

}

**(11) Write a C program that takes two strings from the user and concatenates them using strcat (). Display the concatenated string and its length using strlen ().**

**Ans.**

#include <stdio.h>

#include<string.h>

int main()

{

char c1[100],c2[100];

printf ("\n Enter the string c1 = ");

gets (c1);

printf ("\n Enter the string c2 = ");

gets (c2);

printf ("\n String c1 = %s",c1);

printf ("\n String c2 = %s",c2);

strcat (c1,c2);

printf ("\n After using concat string 1 = %s",c1);

printf ("\n After using concat string 2 = %s",c2);

int length = strlen(c1);

printf ("\n After using length of string 1 = %d ",length);

printf ("\n After using length of string 2 = %d ",strlen(c2));

return 0;

}

**(12) Write a C program that defines a structure to store a student's details (name, roll number, and marks). Use an array of structures to store details of 3 students and print them.**

**Ans.**

#include<stdio.h>

int main()

{

int n,i,ans,sum=0;

printf ("\n Enter the value of n = ");

scanf ("%d",&n);

printf ("\n square natural upto %d terms are : ",n);

for (i=1 ;i<=n; i++)

{

ans = I \* i;

printf (" %d ",ans);

sum = sum + ans;

}

Printf ("\n Sum of Square Natural Number upto %d terms = %d",n,sum)

return 0;

}

**(13) Write a C program to create a file, write a string into it, close the file, then open the file again to read and display its contents.**

**Ans.**

#include <stdio.h>

int main()

{

FILE \*fp1;

char text[100];

fp1 = fopen("second.txt","w");

fprintf (fp1,"\n name of student.");

fprintf (fp1,"\n mrugal patel \n meet nayak \n nisarg patel \n jay patel");

fclose(fp1);

fp1 = fopen ("second.txt","r");

while(fgets(text,sizeof(text),fp1));

{

printf ("%s",&text);

}

fclose(fp1);

printf ("\n operation sucessfull");

return 0;

}