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
```

```c
        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.

```c
    #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);
```

```c
    // 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.

```c
#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);
```

```c
            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.

```c
#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.

```c
#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.

```c
#include<stdio.h>
// Without return type with argument
int fact(int n1);//Declaration
int fact(int n1)//definition
{
 int ans,i;
```

```c
 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.

```c
#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;
```

```c
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);
```

```c
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.

```c
#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.

```c
#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;

}
```