PARUL UNIVERSITY
COMPUTER SCIENCE & ENGINEERING DEPARTMENT
CTSD-1
Lab MANUAL

Program 1
AIM : Write a program to Print your name.

Program –

```
#include <stdio.h>

int main()

 {

// Print the name to the screen

printf("Kiran Sharma\n");

return 0;

}
```

Program 2
AIM : Write a program to Print full name in 2 lines.

Program –

```
#include <stdio.h>
int main()
 {
 // Print the first name on the first line
 printf("Kiran\n");
 // Print the last name on the second line
printf("Sharma\n");
 return 0;
}
```

Program 3

AIM : Write a program to Print your name in the centre of the screen.

Program –

```
#include <stdio.h>
#include <string.h>

int main()

{

// Define the name to print

const char *name = "Kiran Sharma";

// Calculate the length of the name

int nameLength = strlen(name);

 // Define the total width of the screen (commonly 80 characters)
 int screenWidth = 80;
Calculate the position to start printing the name to center it

int startPosition = (screenWidth - nameLength) / 2;

// Print the necessary spaces to center the name

 for (int i = 0; i < startPosition; i++) {

  printf(" ");

 }

// Print the name

  printf("%s\n", name);

 return 0;

}
```

Program 4
AIM : Write a program to Print some patterns using '\n' & '\t'.

Program – Do it by yourself

Program 5
AIM : Write a program to Print some patterns using '\n' & '\t'.

Program – Do it by yourself

Program 6
AIM : Write a program to Add 2 numbers.

Program –

```
#include <stdio.h>
int main()
 {
   // Variables to store the numbers
   int num1, num2, sum;
   // Prompt the user to enter the first number
   printf("Enter the first number: ");
   scanf("%d", &num1);
   // Prompt the user to enter the second number
   printf("Enter the second number: ");
   scanf("%d", &num2);
   // Calculate the sum of the two numbers
```

```
    sum = num1 + num2;
    // Print the sum
    printf("The sum of %d and %d is %d\n", num1, num2, sum);
    return 0;
}
```

Program 7
AIM : Write a program to Find average of 3 numbers.

Program –

```
#include <stdio.h>
int main()
 {
    float num1, num2, num3, average;
    // Input three numbers
    printf("Enter three numbers: ");
    scanf("%f %f %f", &num1, &num2, &num3);
    // Calculate the average
    average = (num1 + num2 + num3) / 3;
    // Output the result
    printf("The average is: %.2f\n", average);
    return 0;
}
```

Program 8
AIM : Write a program to Find area of rectangle and circle.

Program – For area of rectangle

```
#include <stdio.h>
void main()
{
   float length, width, area;

   //Input the length and width of the rectangle
   printf("Enter the length of the rectangle: ");
   scanf("%f", &length);
   printf("Enter the width of the rectangle: ");
   scanf("%f", &width);
   // Calculate the area of the rectangle
   area = length * width;
   // Output the result
   printf("The area of the rectangle is: %.2f\n", area);
   getch();
}
```

Program – For area of circle

```
#include <stdio.h>
#define PI 3.14159
int main()
{
   float r, a;
   // Input the radius of the circle
```

```
    printf("Enter the radius of the circle: ");
    scanf("%f", &r);
    // Calculate the area of the circle
    a = PI * r * r;
    // Output the result
    printf("The area of the circle is: %.2f\n", a);
    return 0;
}
```

Program 9

AIM : Write a program to Swap 2 numbers using 3rd variable

Program –

```
 #include <stdio.h>
int main() {
    int a, b, temp;
    // Input two numbers from the user
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    // Display the numbers before swapping
    printf("Before swapping: a = %d, b = %d\n", a, b);
    // Swap the numbers using a temporary variable
    temp = a;
    a = b;
    b = temp;
    // Display the numbers after swapping
    printf("After swapping: a = %d, b = %d\n", a, b);
```

```
    return 0;
}
```

Program 10
AIM : Write a program to Swap 2 numbers without 3rd variable.

Program –

```
#include <stdio.h>
int main() {
    int a, b;
    // Input two numbers from the user
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    // Display the numbers before swapping
    printf("Before swapping: a = %d, b = %d\n", a, b);
    // Swap the numbers without using a third variable
    a = a + b;
    b = a - b;
    a = a - b;
    // Display the numbers after swapping
    printf("After swapping: a = %d, b = %d\n", a, b);
    return 0;
}
```

Program 11

AIM : Write a program to Find the maximum of 2 numbers

Program –

```
#include <stdio.h>
int main()
{
   int a, b, max;
   // Input two numbers from the user
   printf("Enter two numbers: ");
   scanf("%d %d", &a, &b);
   // Find the maximum number
   if (a > b)
        {
      max = a;
   }
         else
          {
      max = b;
   }
   // Display the maximum number
   printf("The maximum of %d and %d is %d.\n", a, b, max);
   return 0;
}
```

Program 12

AIM : Write a program to Find the maximum of 3 numbers using nested if

Program –

```
#include <stdio.h>
int main()
 {
   int a, b, c, max;
   // Input three numbers from the user
   printf("Enter three numbers: ");
   scanf("%d %d %d", &a, &b, &c);
   // Find the maximum number using nested if
   if (a >= b)
        {
      if (a >= c)
                {
         max = a;
      }
                else
                {
         max = c;
      }
   }
         else
  {
      if (b >= c)
```

```
            {
        max = b;
    } else
            {
        max = c;
    }
}
    // Display the maximum number
    printf("The maximum of %d, %d, and %d is %d.\n", a, b, c, max);
    return 0;
}
```

Program 13

AIM : Write a program to Find the maximum of 3 numbers using else if else ladder.

Program –

```
#include <stdio.h>
int main()
{
    int num1, num2, num3, max;
    // Input three numbers from the user
    printf("Enter three numbers: ");
    scanf("%d %d %d", &num1, &num2, &num3);
    // Nested if ladder to find the maximum number
    if (num1 >= num2)
```

```
        {
    if (num1 >= num3)
                {
        max = num1;
    } else
                {
        max = num3;
    }
} else
        {
    if (num2 >= num3)
                {
        max = num2;
    }
                else
                {
        max = num3;
    }
}

// Print the maximum number
printf("The maximum number is: %d\n", max);
return 0;
}
```

Program 14

AIM : Write a program to Generate student's result based on percentage.

Program –

```
#include <stdio.h>
int main()
{
   float percentage;
   // Input the percentage from the user
   printf("Enter the percentage: ");
   scanf("%f", &percentage);
   // Check the result based on the percentage
   if (percentage >= 90)
        {
      printf("Result: Grade A\n");
   }
         else
        if (percentage >= 80)
        {
      printf("Result: Grade B\n");
   }
         else
          if (percentage >= 70)
        {
      printf("Result: Grade C\n");
   }
        else
        if (percentage >= 60)
        {
      printf("Result: Grade D\n");
   }
        else
         if (percentage >= 50) {
      printf("Result: Grade E\n");
   } else
        {
```

```
        printf("Result: Fail\n");
    }
    return 0;
}
```

Program 15

AIM : Write a program to Generate electricity bill based on usage of units.

Program –

```
#include <stdio.h>
int main()
 {
    int units;
    float bill;
    // Input the number of units consumed
    printf("Enter the number of units consumed: ");
    scanf("%d", &units);
    // Calculate the electricity bill based on unit consumption
    if (units <= 100)
          {
        bill = units * 1.5;  // Rate for first 100 units: Rs 1.50 per unit
    }
         else
         if (units <= 200)
         {
        bill = 100 * 1.5 + (units - 100) * 2.0;  // Next 100 units: Rs 2.00 per unit
    }
         else
         if (units <= 300)
          {
        bill = 100 * 1.5 + 100 * 2.0 + (units - 200) * 3.0;  // Next 100 units: Rs
3.00 per unit
    }
         else
          {
        bill = 100 * 1.5 + 100 * 2.0 + 100 * 3.0 + (units - 300) * 5.0;  // Above 300
units: Rs 5.00 per unit
```

```
    }

    // Print the electricity bill
    printf("The total electricity bill is: Rs %.2f\n", bill);
    return 0;
}
```

Program 16
AIM : Write a program to Create calculator using switch case

Program –

```
#include <stdio.h>

int main()

 {

    char operator;

    float num1, num2, result;

    // Input the operator

    printf("Enter an operator (+, -, *, /)= ");

    scanf("%c", &operator);

    // Input the numbers

    printf("Enter two operands: ");

    scanf("%f %f", &num1, &num2);

    // Switch case for the operator

    switch (operator)

          {

       case '+':
```

```
    result = num1 + num2;
    printf("%f + %f = %.f\n", num1, num2, result);
    break;

case '-':
    result = num1 - num2;
    printf("%f - %f = %.f\n", num1, num2, result);
    break;

case '*':
    result = num1 * num2;
    printf("%.f * %.f = %.f\n", num1, num2, result);
    break;
case '/':
    if (num2 != 0)
                    {
        result = num1 / num2;
        printf("%.f / %.f = %.f\n", num1, num2, result);
    }
                else
                {
        printf("Error! Division by zero.\n");
    }
    break;
```

```
        default:
            printf("Error! Invalid operator.\n");
            break;
    }
    return 0;
}
```

Program 17
AIM : Write a program to Find area of rectangle, circle and square using switch case.

Program –

```
#include <stdio.h>
#define PI 3.14159
int main()
 {
    int choice;
    float length, breadth, radius, side, area;
    // Display menu
    printf("Choose the shape to calculate area:\n");
    printf("1. Rectangle\n");
    printf("2. Circle\n");
    printf("3. Square\n");
    printf("Enter your choice (1-3): ");
```

```
scanf("%d", &choice);
switch (choice)
    {
   case 1: // Area of Rectangle
      printf("Enter length and breadth of the rectangle: ");
      scanf("%f %f", &length, &breadth);
      area = length * breadth;
      printf("Area of Rectangle: %.2f\n", area);
      break;
   case 2: // Area of Circle
      printf("Enter radius of the circle: ");
      scanf("%f", &radius);
      area = PI * radius * radius;
      printf("Area of Circle: %.2f\n", area);
      break;
   case 3: // Area of Square
      printf("Enter the side of the square: ");
      scanf("%f", &side);
      area = side * side;
      printf("Area of Square: %.2f\n", area);
      break;
   default:
      printf("Invalid choice!\n");
      break;
```

```
    }
    return 0;
}
```

Program 18
AIM : Write a program to Print the sum of first 10 numbers.

Program –

```
#include <stdio.h>
int main()
 {
    int sum, i;
    sum=0;
    for (i =51 ; i <= 100; i++)
          {
       sum =sum+ i;
    }
    printf("The sum of the first 10 natural numbers is: %d\n", sum);
    return 0;
}
```

Program 19
AIM : Write a program to Print the sum of odd and even numbers between 51 and 550.

Program –

```
#include <stdio.h>
int main()
```

```
{
   int even_sum = 0, odd_sum = 0, i;


   for ( i = 51; i <= 550; i++)
         {
      if (i % 2 == 0)
                {
         even_sum = even_sum + i;  // Add to even sum if number is even
      }
                else
                 {
         odd_sum = odd_sum + i;   // Add to odd sum if number is odd
      }
   }
   printf("Sum of even numbers between 51 and 550: %d\n", even_sum);
   printf("Sum of odd numbers between 51 and 550: %d\n", odd_sum);
   return 0;
}
```

Program 20
AIM : Write a program to Reverse a given number.

Program –

```
#include <stdio.h>
int main()
```

```
{
   int number, reversed = 0, remainder;
// Input a number from the user
   printf("Enter an integer: ");
   scanf("%d", &number);

   // Reverse the number
   while (number != 0)
         {
      remainder = number % 10;                              // Get the last digit
      reversed = reversed * 10 + remainder;      // Build the reversed number
      number /= 10;                                  // Remove the last digit from the
number
   }                                                          // Output the reversed number
   printf("Reversed Number: %d\n", reversed);

   return 0;
}
```

Program 21

AIM : Write a program to Check whether given number is palindrome.

Program –

```
#include <stdio.h>

int main()

{

   int num, reversed = 0, remainder, original;

   // Input the number from the user

   printf("Enter an integer: ");

   scanf("%d", &num);

   original = num;  // Store the original number

   // Reverse the number
```

```
    while (num != 0)
        {
        remainder = num % 10;
        reversed = reversed * 10 + remainder;
        num /= 10;
    }
    // Check if the original number and reversed number are the same
    if (original == reversed)
        {
        printf("%d is a palindrome.\n", original);
    }
         else
        {
        printf("%d is not a palindrome.\n", original);
    }
    return 0;
}
```

Program 22
AIM : Write a program to Check whether given number is Armstrong.

Program –

```
#include <stdio.h>
#include <math.h>
int main()
```

```
{
  int num, original, remainder, result = 0, n = 0;
  // Input the number from the user
  printf("Enter an integer: ");
  scanf("%d", &num);
  original = num;
  // Find the number of digits (n)
  while (original != 0)
       {
     original /= 10;
     ++n;
  }
  original = num;
  // Calculate the sum of the nth power of its digits
  while (original != 0)
        {
     remainder = original % 10;
     result += pow(remainder, n);
     original /= 10;
  }
  // Check if the sum is equal to the original number
  if (result == num)
        {
     printf("%d is an Armstrong number.\n", num);
```

```
    }
        else
        {
      printf("%d is not an Armstrong number.\n", num);
    }
   return 0;
}
```

Program 23
AIM : Write a program to Generate a Fibonacci series of N Numbers

Program –

```
#include <stdio.h>
int main()
 {
   int i, n, first = 0, second = 1, next;
   // Input the number of terms from the user
   printf("Enter the number of terms in Fibonacci series: ");
   scanf("%d", &n);
   for (i = 1; i <= n; ++i)
        {
      if (i == 1)
                {
         printf("%d ", first);
```

```
            continue;
        }
        if (i == 2)
                    {
            printf("%d ", second);
            continue;
        }
        next = first + second;
        first = second;
        second = next;
        printf("%d ", next);
    }
    printf("\n");
    return 0;
}
```

Program 24

AIM : Write a program to Generate a Fibonacci series up to N Numbers

Program –

```
#include <stdio.h>
int main()
 {
    int limit, first = 0, second = 1, next;

    // Input the limit from the user
```

```
    printf("Enter the limit for Fibonacci series: ");
    scanf("%d", &limit);
    printf("Fibonacci series up to %d: ", limit);
    // Print Fibonacci numbers as long as the next number is within the limit
    while (first <= limit)
          {
        printf("%d ", first);
        next = first + second;
        first = second;
        second = next;
    }

    printf("\n");
    return 0;
}
```

Program 25

AIM : Write a program to Generate a multiplication table for any given number.

Program –

```
#include <stdio.h>

int main()

{

    int num, range;

    // Input the number and range from the user

    printf("Enter the number for the multiplication table: ");

    scanf("%d", &num);

    printf("Enter the range for the multiplication table: ");

    scanf("%d", &range);

    printf("Multiplication table of %d up to %d:\n", num, range);
```

```
    // Generate the multiplication table
    for (int i = 1; i <= range; ++i)
        {
        printf("%d x %d = %d\n", num, i, num * i);
    }
    return 0;
}
```

Program 26

AIM : Write a program to Generate result sheet for 5 students using for loop.

Program –

```
#include <stdio.h>
int main()
{
   int i;
   char name[50];
   int marks[5], totalMarks;
   float percentage;
   printf("Result Sheet for 5 Students\n");
   printf("-------------------------\n");
   for (i = 1; i <= 5; i++) {
      printf("\nEnter details for Student %d\n", i);
      // Input name
      printf("Enter student's name: ");
```

```
        scanf("%s", name);
        // Input marks for 5 subjects
        totalMarks = 0; // Reset total marks for each student
        for (int j = 0; j < 5; j++) {
            printf("Enter marks for Subject %d: ", j + 1);
            scanf("%d", &marks[j]);
            totalMarks += marks[j];
        }
        // Calculate percentage
        percentage = (float)totalMarks / 5;
        // Display result
        printf("\nResult for %s\n", name);
        printf("Total Marks: %d\n", totalMarks);
        printf("Percentage: %.2f%%\n", percentage);
    }
    return 0;
}
```

Program 27

AIM : Write a program to print simple prymid

Program –

```
#include <stdio.h>
int main()
{
```

```
   int i, j, space, rows = 5;
   for(i = 1; i <= rows; i++)
         {
      for(space = 1; space <= rows - i; space++)
         printf(" ");
      for(j = 1; j <= (2 * i - 1); j++)
         printf("*");
      printf("\n");
    }
   return 0;
}
```

Program 28

AIM : Write a program to print inverted pyramid

Program –

```
#include <stdio.h>
int main() {
   int i, j, space, rows = 5;
   for(i = rows; i >= 1; i--) {
      for(space = 0; space < rows - i; space++)
         printf(" ");
      for(j = 1; j <= (2 * i - 1); j++)
         printf("*");
      printf("\n");
   }
   return 0;
}
```

Program 29
AIM : Write a program to print right angled triangle

Program –

```
#include <stdio.h>

int main() {

   int i, j, rows = 5;

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

{

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

 {

         printf("*");

      }

      printf("\n");

   }

   return 0;

}
```

Program 30
AIM : Write a program to inverted right angled triangle

Program –

```
#include <stdio.h>
int main()
{
   int i, j, rows = 5;
```

```
   for(i = rows; i >= 1; i--)
 {
      for(j = 1; j <= i; j++)
 {
          printf("*");
       }
       printf("\n");
   }
   return 0;
}
```

Program 31
AIM : Write a program to print right angled triangle (right allineged)

Program –

```
#include <stdio.h>

int main() {

   int i, j, space, rows = 5;

   for(i = 1; i <= rows; i++) {

      for(space = 1; space <= rows - i; space++)

         printf(" ");

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

         printf("*");

      printf("\n");

   }

   return 0;

}
```

Program 32

AIM : Write a program to inverted right angled triangle (right aligned)

Program –

```
#include <stdio.h>
int main()
 {
   int i, j, space, rows = 5;
   for(i = rows; i >= 1; i--)
{
       for(space = 0; space < rows - i; space++)
           printf(" ");
       for(j = 1; j <= i; j++)
           printf("*");
       printf("\n");
   }
   return 0;
}
```

Program 33

AIM : Write a program to print Dimond pattern

Program –

```
#include <stdio.h>
int main()
 {
```

```
    int i, j, space, rows = 5;
    // Upper part of the diamond
    for(i = 1; i <= rows; i++)
{
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++)
            printf("*");
        printf("\n");
    }
    // Lower part of the diamond
    for(i = rows - 1; i >= 1; i--)
 {
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++)
            printf("*");
        printf("\n");
    }
    return 0;
}
```

Program 34

AIM : Write a program to print hollow Dimond pattern

Program –

```
#include <stdio.h>
int main() {
    int i, j, space, rows = 5;
    // Upper part
    for(i = 1; i <= rows; i++)
{
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++)
{
            if(j == 1 || j == (2 * i - 1))
                printf("*");
            else
                printf(" ");
        }
        printf("\n");
    }
    // Lower part
    for(i = rows - 1; i >= 1; i--) {
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++) {
```

```
            if(j == 1 || j == (2 * i - 1))
                printf("*");
            else
                printf(" ");
        }
        printf("\n");
    }
    return 0;
}
```

Program 35

AIM : Write a program to print number pyramid pattern

Program –

```
#include <stdio.h>
int main()
{
    int i, j, space, rows = 5;
    for(i = 1; i <= rows; i++)
 {
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= i; j++)
            printf("%d", j);
        for(j = i - 1; j >= 1; j--)
            printf("%d", j);
```

```
        printf("\n");
    }
    return 0;
}
```

Program 36

AIM : Write a program to print inverted number pyramid pattern

Program –

```
#include <stdio.h>
int main()
 {
   int i, j, space, rows = 5;
   for(i = rows; i >= 1; i--)
 {
       for(space = 1; space <= rows - i; space++)
          printf(" ");
       for(j = 1; j <= i; j++)
          printf("%d", j);
       for(j = i - 1; j >= 1; j--)
          printf("%d", j);
       printf("\n");
   }
   return 0;
}
```

Program 37
AIM : Write a program to print Floyd's triangle

Program –

```
#include <stdio.h>
int main()
 {
```

```
   int i, j, number = 1, rows = 5;
   for(i = 1; i <= rows; i++)
 {
      for(j = 1; j <= i; j++)
 {
         printf("%d ", number);
         number++;
      }
      printf("\n");
   }
   return 0;
}
```

Program 38
AIM : Write a program to print pascal's triangle

Program –

```
#include <stdio.h>

int main()

 {

   int rows = 5, coef = 1, space, i, j;

   for(i = 0; i < rows; i++) {

      for(space = 1; space <= rows - i; space++)

         printf(" ");

      for(j = 0; j <= i; j++) {

         if (j == 0 || i == 0)

            coef = 1;

         else

            coef = coef * (i - j + 1) / j;

         printf("%4d", coef);
```

```
        }
        printf("\n");
    }
    return 0;
}
```

Program 39
AIM : Write a program to print Binary pyramid

Program –

```
#include <stdio.h>
int main() {
    int rows = 5, i, j, k;
    for(i = 1; i <= rows; i++) {
        for(j = 1; j <= rows - i; j++)
            printf(" ");
        for(k = 1; k <= 2 * i - 1; k++) {
            if(k == 1 || k == 2 * i - 1)
                printf("1");
            else
                printf("0");
            if(k < 2 * i - 1)
                printf(" ");
        }
        printf("\n");
```

```
    }
    return 0;
}
```

Program 40

AIM : Write a program to print Hourglass pattern

Program –

```
#include <stdio.h>
int main()
{
    int i, j, space, rows = 5;
    // Upper half
    for(i = rows; i >= 1; i--)
 {
        for(space = 0; space < rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++)
            printf("*");
        printf("\n");
    }
    // Lower half
    for(i = 2; i <= rows; i++) {
        for(space = 1; space <= rows - i; space++)
            printf(" ");
        for(j = 1; j <= (2 * i - 1); j++)
            printf("*");
        printf("\n");
    }
    return 0;
}
```

Program 41
AIM : Write a program to Multiply first 10 numbers using 1-D Array.

Program –

```
#include <stdio.h>
int main()
 {
   int numbers[10];
   int product = 1;
   // Initialize the array with the first 10 natural numbers
   for (int i = 0; i < 10; i++)
         {
      numbers[i] = i + 1;
   }
   // Multiply all elements in the array
   for (int i = 0; i < 10; i++)
         {
      product *= numbers[i];
   }
   printf("The product of the first 10 natural numbers is: %d\n", product);
   return 0;
}
```

Program 42
AIM : Write a program to Arrange a given numbers in ascending order.

Program –

```
#include <stdio.h>
int main()
 {
   int n;
   // Input: number of elements in the array
   printf("Enter the number of elements: ");
   scanf("%d", &n);
   int arr[n];
   // Input: elements of the array
   printf("Enter %d numbers:\n", n);
   for (int i = 0; i < n; i++) {
      scanf("%d", &arr[i]);
```

```
    }
    // Bubble Sort algorithm to arrange the numbers in ascending order
    for (int i = 0; i < n - 1; i++) {
        for (int j = 0; j < n - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                // Swap arr[j] and arr[j + 1]
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
    // Output: sorted array in ascending order
    printf("Numbers in ascending order:\n");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

Program 43

AIM : Write a program to Arrange a given numbers in descending order.

Program –

```
#include <stdio.h>
int main()
{
    int n;
    // Input: number of elements in the array
    printf("Enter the number of elements: ");
    scanf("%d", &n);
    int arr[n];
    // Input: elements of the array
    printf("Enter %d numbers:\n", n);
    for (int i = 0; i < n; i++)
          {
        scanf("%d", &arr[i]);
    }
```

```
    // Bubble Sort algorithm to arrange the numbers in descending order
    for (int i = 0; i < n - 1; i++)
          {
        for (int j = 0; j < n - i - 1; j++)
                  {
            if (arr[j] < arr[j + 1])
                        {
                // Swap arr[j] and arr[j + 1]
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
    // Output: sorted array in descending order
    printf("Numbers in descending order:\n");
    for (int i = 0; i < n; i++)
          {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

Program 45

AIM : Write a program to Add two matrix

Program –

```
#include <stdio.h>
int main()
{
    int rows, columns;
    // Input: dimensions of the matrices
    printf("Enter the number of rows and columns: ");
    scanf("%d   %d", &rows, &columns);
    int matrix1[rows][columns], matrix2[rows][columns], sum[rows][columns];
    // Input: elements of the first matrix
    printf("Enter elements of the first matrix:\n");
```

```
    for (int i = 0; i < rows; i++)
          {
        for (int j = 0; j < columns; j++)
                {
            printf("Element [%d][%d]: ", i + 1, j + 1);
            scanf("%d", &matrix1[i][j]);
        }
    }
    // Input: elements of the second matrix
    printf("Enter elements of the second matrix:\n");
    for (int i = 0; i < rows; i++)
         {
        for (int j = 0; j < columns; j++)
                {
            printf("Element [%d][%d]: ", i + 1, j + 1);
            scanf("%d", &matrix2[i][j]);
        }
    }
    // Add the two matrices
    for (int i = 0; i < rows; i++)
         {
        for (int j = 0; j < columns; j++)
                {
            sum[i][j] = matrix1[i][j] + matrix2[i][j];
        }
    }
    // Output: sum of the two matrices
    printf("Sum of the two matrices:\n");
    for (int i = 0; i < rows; i++)
          {
        for (int j = 0; j < columns; j++)
                {
            printf("%d ", sum[i][j]);
        }
        printf("\n");
    }
    return 0;
}
```

Program 46

AIM : Write a program to Multiply 2 Matrix.

Program –

```
#include <stdio.h>
int main()
 {
   int rows1, columns1, rows2, columns2;
   // Input: dimensions of the first matrix
   printf("Enter the number of rows and columns of the first matrix: ");
   scanf("%d %d", &rows1, &columns1);
   // Input: dimensions of the second matrix
   printf("Enter the number of rows and columns of the second matrix: ");
   scanf("%d %d", &rows2, &columns2);
   // Check if matrix multiplication is possible
   if (columns1 != rows2) {
      printf("Matrix multiplication is not possible. The number of columns in the
first matrix must be equal to the number of rows in the second matrix.\n");
      return 0;
   }
   int matrix1[rows1][columns1], matrix2[rows2][columns2],
product[rows1][columns2];

   // Initialize the product matrix to 0
   for (int i = 0; i < rows1; i++)
{
      for (int j = 0; j < columns2; j++)
{
         product[i][j] = 0;
      }
   }
   // Input: elements of the first matrix
   printf("Enter elements of the first matrix:\n");
   for (int i = 0; i < rows1; i++)
{
      for (int j = 0; j < columns1; j++)
 {
         printf("Element [%d][%d]: ", i + 1, j + 1);
         scanf("%d", &matrix1[i][j]);
      }
   }
   // Input: elements of the second matrix
   printf("Enter elements of the second matrix:\n");
   for (int i = 0; i < rows2; i++)
{
```

```
        for (int j = 0; j < columns2; j++)
{
            printf("Element [%d][%d]: ", i + 1, j + 1);
            scanf("%d", &matrix2[i][j]);
        }
    }
    // Multiply the matrices
    for (int i = 0; i < rows1; i++)
{
        for (int j = 0; j < columns2; j++)
 {
            for (int k = 0; k < columns1; k++)
{
                product[i][j] += matrix1[i][k] * matrix2[k][j];
            }
        }
    }
    // Output: product of the two matrices
    printf("Product of the two matrices:\n");
    for (int i = 0; i < rows1; i++) {
        for (int j = 0; j < columns2; j++)
 {
            printf("%d ", product[i][j]);
        }
        printf("\n");
    }
    return 0;
}
```

Program 47

AIM : Write a program to Count total number of words in a string.

Program –

```
#include <stdio.h>
#include <string.h>
#include <ctype.h>
int countWords(const char *str) {
    int count = 0;
    int inWord = 0; // Flag to check if we are in a word

    for (int i = 0; str[i] != '\0'; i++) {
```

```
        if (isspace(str[i])) {
            // If we encounter a space, we are not in a word
            inWord = 0;
        } else if (!inWord) {
            // If we encounter a non-space and not in a word, increment word count
            inWord = 1;
            count++;
        }
    }

    return count;
}

int main() {
    char str[1000];

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);

    // Remove trailing newline character if exists
    str[strcspn(str, "\n")] = '\0';

    int wordCount = countWords(str);

    printf("Total number of words: %d\n", wordCount);

    return 0;
}
```

Program 48
AIM : Write a program to Find the length of a string.

Program –

```
#include <stdio.h>

#include <string.h>

int main()

 {

    char str[1000];
```

```
    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);
    // Remove trailing newline character if it exists
    str[strcspn(str, "\n")] = '\0';
    int length = strlen(str);
    printf("Length of the string: %d\n", length);
    return 0;
}
```

Program 49
AIM : Write a program to Toggling of string.

Program –

```
#include <stdio.h>
void toggleString(char *str)
{
    for (int i = 0; str[i] != '\0'; i++)
          {
        if (str[i] >= 'A' && str[i] <= 'Z')
                {
            // Convert uppercase to lowercase
            str[i] = str[i] + ('a' - 'A');
        } else if (str[i] >= 'a' && str[i] <= 'z')
                {
            // Convert lowercase to uppercase
            str[i] = str[i] - ('a' - 'A');
        }
    }
}

int main()
 {
    char str[1000];

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);
```

```
    // Remove trailing newline character if it exists
    str[strcspn(str, "\n")] = '\0';

    toggleString(str);

    printf("Toggled string: %s\n", str);

    return 0;
}
```

Program 50

AIM : Write a program to Check whether given string is palindrome.

Program –

```
#include <stdio.h>
#include <string.h>
#include <ctype.h>

int isPalindrome(char *str) {
    int left = 0;
    int right = strlen(str) - 1;

    while (left < right) {
        // Skip non-alphanumeric characters and make the comparison case-
insensitive
        while (left < right && !isalnum(str[left])) left++;
        while (left < right && !isalnum(str[right])) right--;

        if (tolower(str[left]) != tolower(str[right])) {
            return 0; // Not a palindrome
        }

        left++;
        right--;
    }

    return 1; // It is a palindrome
}

int main() {
```

```
    char str[1000];

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);

    // Remove trailing newline character if it exists
    str[strcspn(str, "\n")] = '\0';

    if (isPalindrome(str)) {
        printf("The string is a palindrome.\n");
    } else {
        printf("The string is not a palindrome.\n");
    }

    return 0;
}
```

Program 51
AIM : Write a program to Create a calculator using UDF.

Program –

```
#include <stdio.h>

int main()

{

   char operator;

   double num1, num2, result;

   char choice;

   do

{

      printf("Select an operation (+, -, *, /): ");

      scanf(" %c", &operator);

      printf("Enter two numbers: ");
```

```
scanf("%lf %lf", &num1, &num2);
switch (operator) {
    case '+':
        result = num1 + num2;
        printf("Result: %.2lf + %.2lf = %.2lf\n", num1, num2, result);
        break;
    case '-':
        result = num1 - num2;
        printf("Result: %.2lf - %.2lf = %.2lf\n", num1, num2, result);
        break;
    case '*':
        result = num1 * num2;
        printf("Result: %.2lf * %.2lf = %.2lf\n", num1, num2, result);
        break;
    case '/':
        if (num2 != 0) {
            result = num1 / num2;
            printf("Result: %.2lf / %.2lf = %.2lf\n", num1, num2, result);
        } else {
            printf("Error: Division by zero is not allowed.\n");
        }
        break;
    default:
```

```
            printf("Invalid operator. Please try again.\n");
        }
        printf("Do you want to perform another operation? (y/n): ");
        scanf(" %c", &choice);
    }
 while (choice == 'y' || choice == 'Y');
    printf("Calculator exited.\n");
    return 0;
}
```

Program 52

AIM : Write a program to Find area of rectangle, square and circle using UDF.

Program –

```
#include <stdio.h>
#define PI 3.14159

// Function prototypes
double areaRectangle(double length, double width);
double areaSquare(double side);
double areaCircle(double radius);

int main() {
   int choice;
   double length, width, side, radius;

   do {
      printf("\nChoose an option to calculate the area:\n");
      printf("1. Rectangle\n");
      printf("2. Square\n");
      printf("3. Circle\n");
      printf("4. Exit\n");
      printf("Enter your choice: ");
      scanf("%d", &choice);

      switch (choice) {
         case 1:
            printf("Enter length and width of the rectangle: ");
            scanf("%lf %lf", &length, &width);
            printf("Area of Rectangle: %.2lf\n", areaRectangle(length, width));
            break;
         case 2:
            printf("Enter side of the square: ");
            scanf("%lf", &side);
            printf("Area of Square: %.2lf\n", areaSquare(side));
            break;
         case 3:
            printf("Enter radius of the circle: ");
            scanf("%lf", &radius);
            printf("Area of Circle: %.2lf\n", areaCircle(radius));
            break;
```

```
            case 4:
                printf("Exiting program.\n");
                break;
            default:
                printf("Invalid choice. Please try again.\n");
        }
    } while (choice != 4);

    return 0;
}

// Function to calculate area of a rectangle
double areaRectangle(double length, double width) {
    return length * width;
}

// Function to calculate area of a square
double areaSquare(double side) {
    return side * side;
}

// Function to calculate area of a circle
double areaCircle(double radius) {
    return PI * radius * radius;
}
```

Program 53

AIM : Write a program to Find Factorial of a number using Recursion.

Program –

```
#include <stdio.h>

// Recursive function to calculate factorial
long long factorial(int n) {
    if (n <= 1)
        return 1;
    else
        return n * factorial(n - 1);
}

int main() {
```

```
    int num;
    printf("Enter a number to find its factorial: ");
    scanf("%d", &num);

    if (num < 0) {
        printf("Factorial is not defined for negative numbers.\n");
    } else {
        printf("Factorial of %d is: %lld\n", num, factorial(num));
    }

    return 0;
}
```

Program 54

AIM : Write a program to Swap 2 numbers using Pass by Reference.

Program –

```
#include <stdio.h>

// Function to swap two numbers using pointers

void swap(int *a, int *b) {

    int temp = *a;

    *a = *b;

    *b = temp;

}

int main()

 {

    int num1, num2;

    printf("Enter two numbers: ");

    scanf("%d %d", &num1, &num2);


    printf("Before swapping: num1 = %d, num2 = %d\n", num1, num2);
```

```
    // Call the swap function
    swap(&num1, &num2);
    printf("After swapping: num1 = %d, num2 = %d\n", num1, num2);
    return 0;
}
```