ACHARYA INSTITUTE OF GRADUATE STUDIES
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DEPARTMENT OF COMPUTER APPLICATIONS

CA-C4P: PROBLEM SOLVING LAB USING C

LAB MANUAL

BY

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CA-C4P: Problem Solving Lab using C

Write, and execute C program for the following:

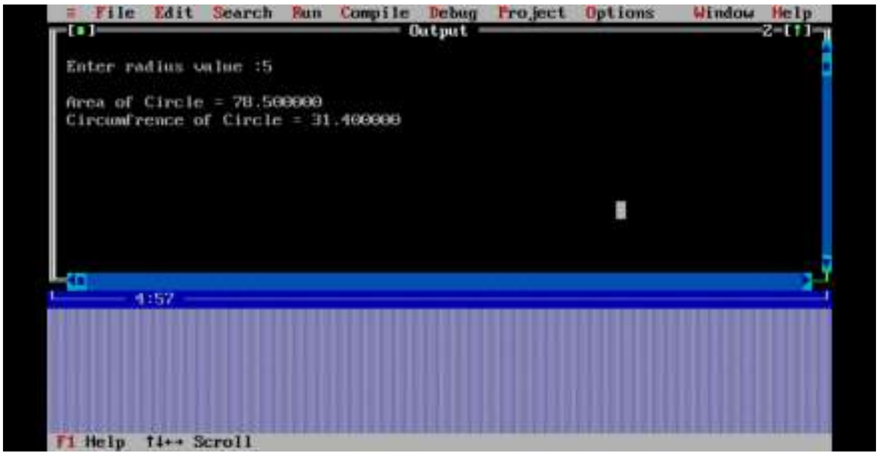
1. To read radius of a circle and to find area and circumference.
2. To read three numbers and find the biggest of three
3. To check whether the number is prime or not
4. To read a number, find the sum of the digits, reverse the number and check it for palindrome
5. To read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. To read percentage of marks and to display appropriate message (Demonstration of else-if ladder
7. To find the roots of quadratic equation
8. To read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
9. To remove Duplicate Element in a single dimensional Array
10. To perform addition and subtraction of Matrices
11. To find factorial of a number
12. To generate Fibonacci series
13. To remove Duplicate Element in a single dimensional Array
14. To find the length of a string without using built in function
15. To demonstrate string functions
16. To read, display and add two m x n matrices using functions
17. To read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
18. To Swap Two Numbers using Pointers
19. To demonstrate student structure to read & display records of n students
20. To demonstrate the difference between structure & union

1**. Write, and execute C program to read radius of a circle and to find area and circumference.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
        int r;
        float area, circum;
        clrscr();
        printf("\n Enter radius value :");
        scanf("%d", &r);
        area = 3.14 * r * r;
        circum = 2 * 3.14 * r;
        printf("\n Area of Circle = %f", area);
        printf("\n Circumfrence of Circle = %f", circum);
        getch();
}
```

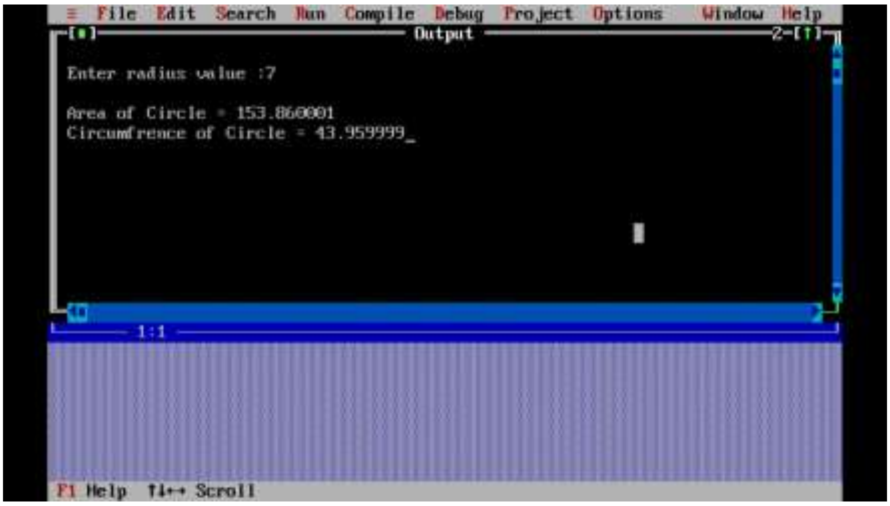
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
4:57
F1 Help ↑↓↔ Scroll

```
Enter radius value :5

Area of Circle = 78.500000
Circumfrence of Circle = 31.400000
```

CASE 2:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
1:1
F1 Help ↑↓↔ Scroll

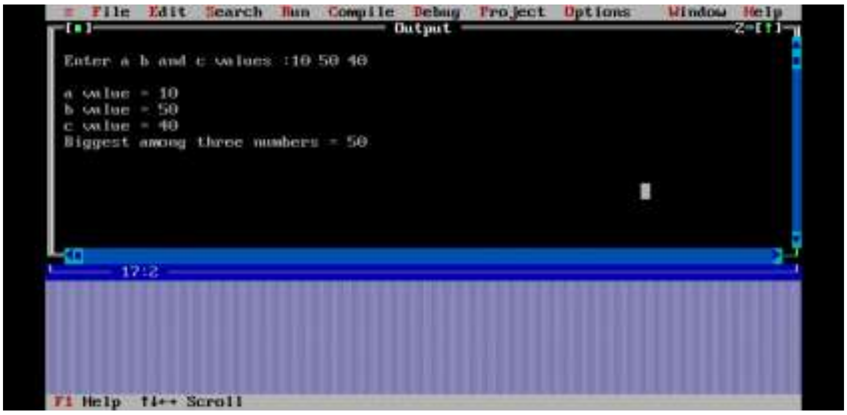
```
Enter radius value :7

Area of Circle = 153.860001
Circumfrence of Circle = 43.959999_
```

2. Write, and execute C program to read three numbers and find the biggest of three.

```
#include<stdio.h>
#include<conio.h>
void main()
{
        int a,b,c,big;
        clrscr();
        printf("\n Enter a b and c values :");
        scanf("%d%d%d", &a, &b, &c);
        printf("\n a value = %d", a);
        printf("\n b value = %d", b);
        printf("\n c value = %d", c);
        big = a;
        if(b > big) big = b;
        if(c > big) big = c;
        printf("\n Biggest among three numbers = %d", big);
        getch();
}
```

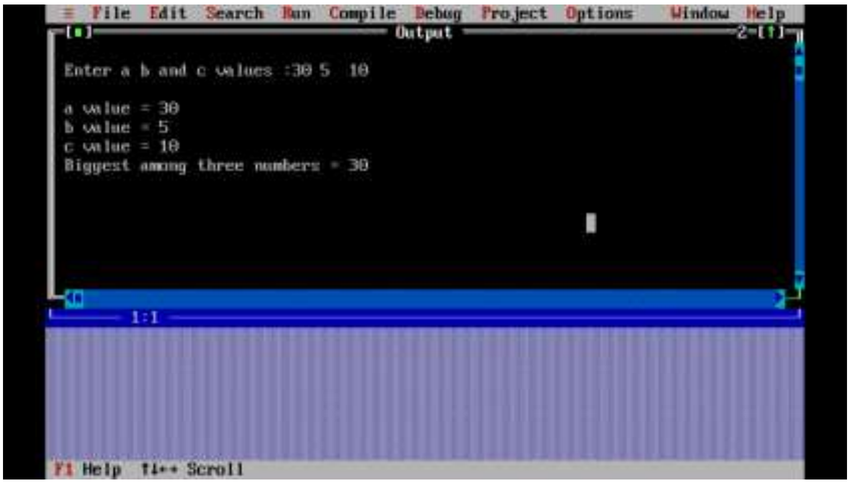
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
17:2
F1 Help ↑↓↔ Scroll

```
Enter a b and c values :10 50 40

a value = 10
b value = 50
c value = 40
Biggest among three numbers = 50
```

CASE 2:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
1:1
F1 Help ↑↓↔ Scroll

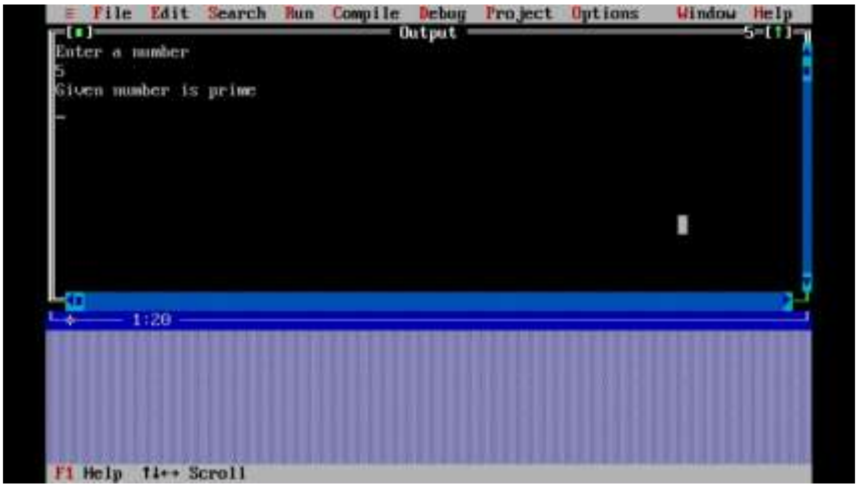
```
Enter a b and c values :30 5  10

a value = 30
b value = 5
c value = 10
Biggest among three numbers = 30
```

3. Write, and execute C program to check whether the number is prime or not

```
#include<stdio.h>
 #include<math.h>
 void main()
 {
 int num, i, flag=0;
 clrscr();
 printf("Enter a number\n");
 scanf("%d", &num);
 if(num == 0 || num == 1)
    printf("%d is not a prime \n",num);
 else
    {
    for(i=2; i<=sqrt(num); i++)
    if(num % i == 0)
        {
        flag = 1;
        break;
        }

    if(flag == 0)
        printf("Given number is prime \n");
    else
        printf("Given number is not a prime\n");

    }
    getch();
}
```

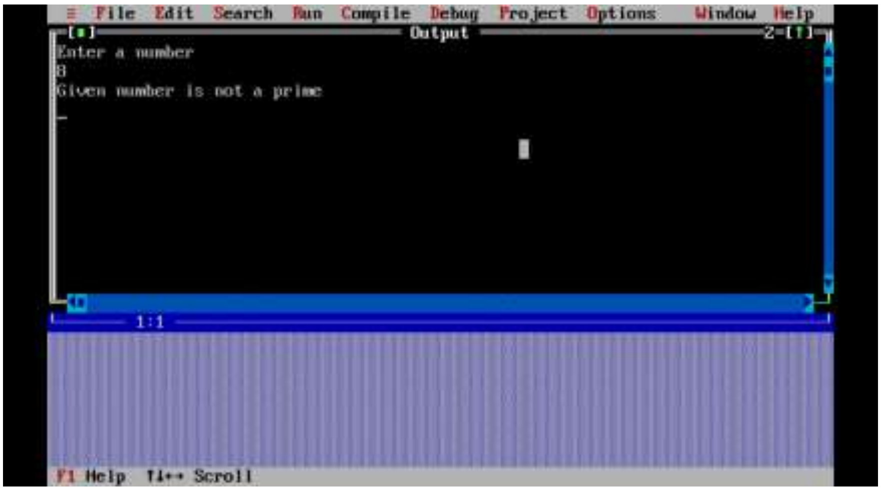
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
5=[↑]
1:20
F1 Help ↑↓←→ Scroll

```
Enter a number
5
Given number is prime
```

CASE 2:



≡ File Edit Search Run Compile Debug Project Options Window Help
Output
1:1
F1 Help ↑↓←→ Scroll

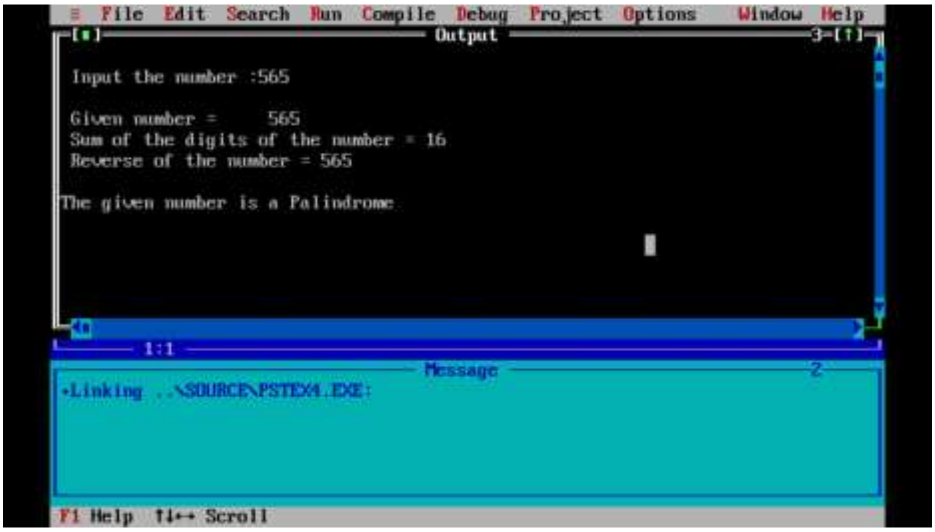
```
Enter a number
8
Given number is not a prime
```

4. Write, and execute C program to read a number, find the sum of the digits, reverse the number and check it for palindrome.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, num,digit, sum = 0, rev = 0;
    clrscr();
    printf("\n Input the number :");
    scanf("%d", &num);
    printf("\n Given number = %7d",num);

    n = num;
    do
    {
        digit = num % 10;
        sum += digit;
        rev = rev * 10 + digit;
        num /= 10;
    }while(num != 0);
    printf("\n Sum of the digits of the number = %d", sum);
    printf("\n Reverse of the number = %d", rev);

    if(n == rev)
        printf("\n\nThe given number is a Palindrome");
    else
        printf("\n\n The given number is not a Palindrome");
    getch();
}
```

OUTPUT:

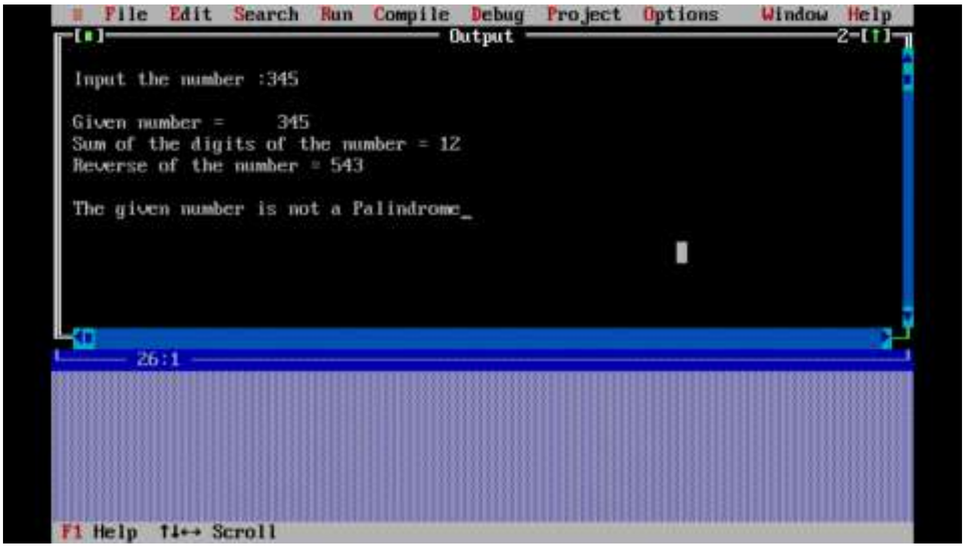
CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■]
Output
3-[↑]
1:1
Message
2
F1 Help ↑↓←→ Scroll

```
 Input the number :565

 Given number =     565
 Sum of the digits of the number = 16
 Reverse of the number = 565

The given number is a Palindrome
```

```
•Linking ..\SOURCE\PSTEX4.EXE:
```

CASE 2:



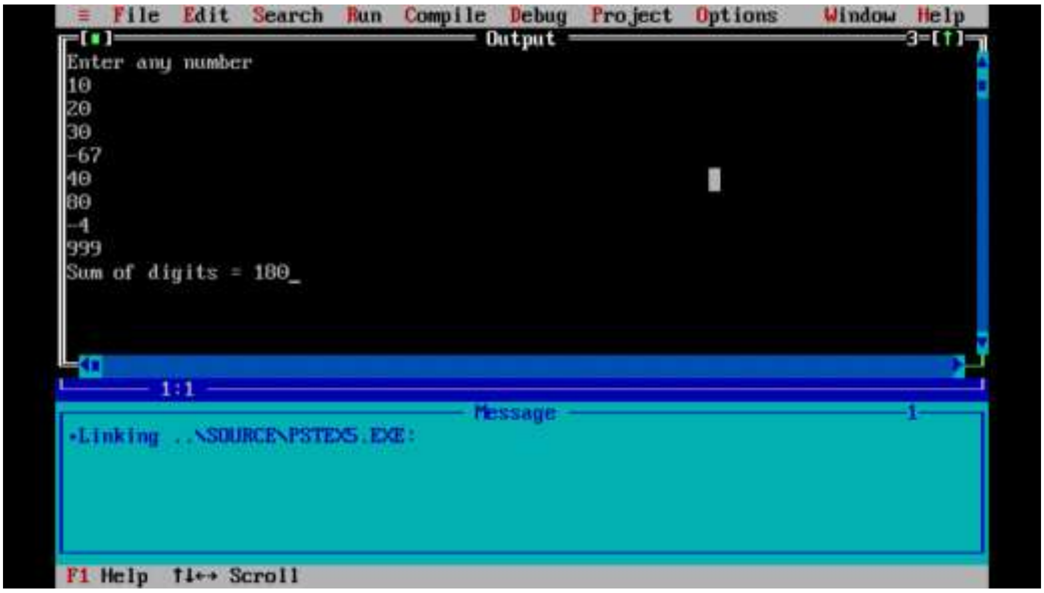
```
Input the number :345

Given number =     345
Sum of the digits of the number = 12
Reverse of the number = 543

The given number is not a Palindrome_
```

5. Write, and execute C program to read numbers from keyboard continuously until the user presses 999 and to find the sum of only positive numbers.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int number,sum=0;
clrscr();
printf("Enter any number\n");
scanf("%d", &number);
while(number != 999)
{
if(number <= 0)
{
scanf("%d", &number);
continue;
}
else
{
sum+=number;
scanf("%d", &number);
}

};
printf("Sum of digits = %d", sum);
getch();
}
```

OUTPUT:

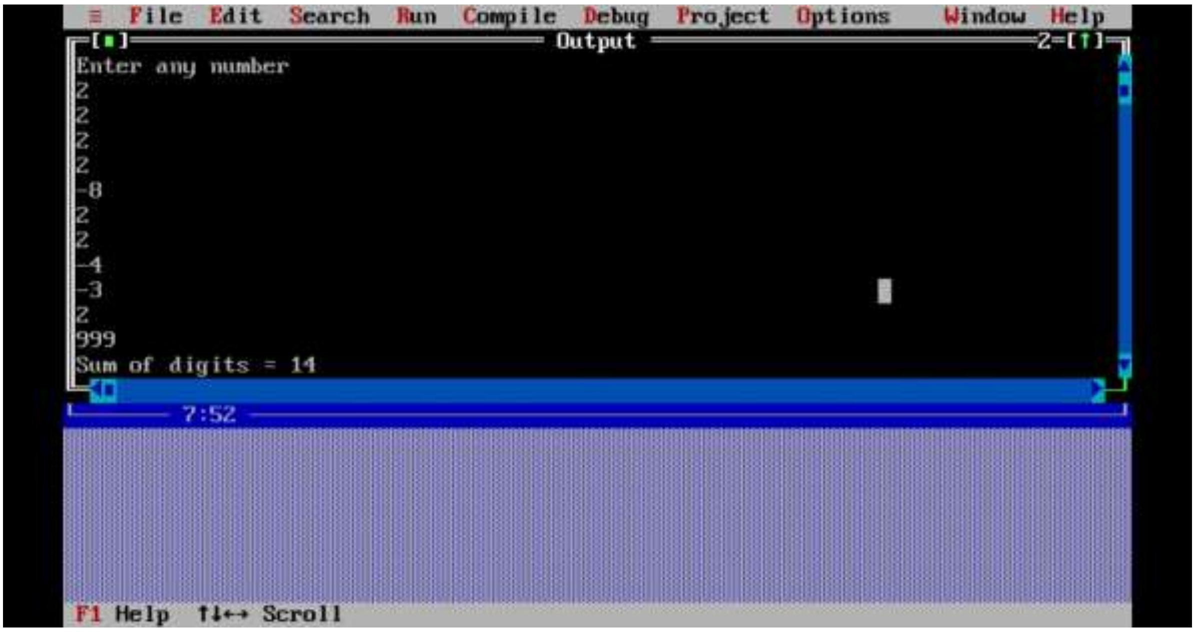
CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
3
1:1
Message
1
F1 Help ↑↓←→ Scroll

```
Enter any number
10
20
30
-67
40
80
-4
999
Sum of digits = 180_
```

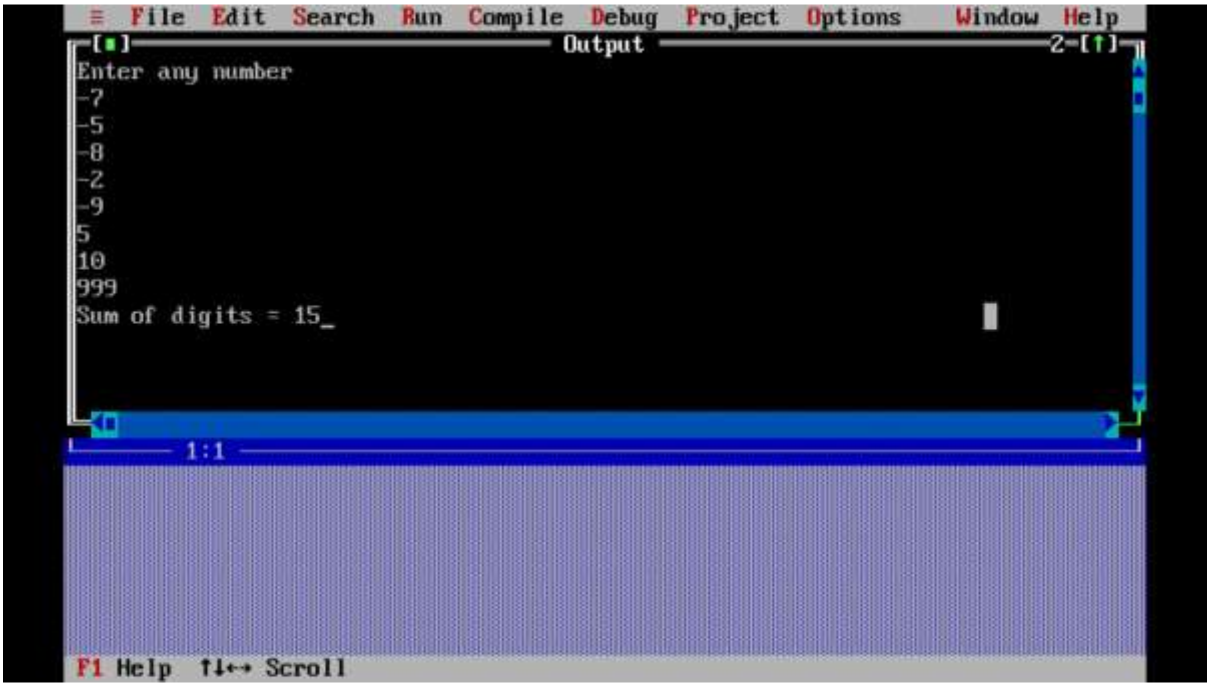
```
•Linking ..\SOURCE\PSTEX5.EXE:
```

CASE 2:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2=[↑]
7:52
F1 Help ↑↓←→ Scroll

```
Enter any number
2
2
2
2
-8
2
2
-4
-3
2
999
Sum of digits = 14
```

CASE 3:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2=[↑]
1:1
F1 Help ↑↓←→ Scroll

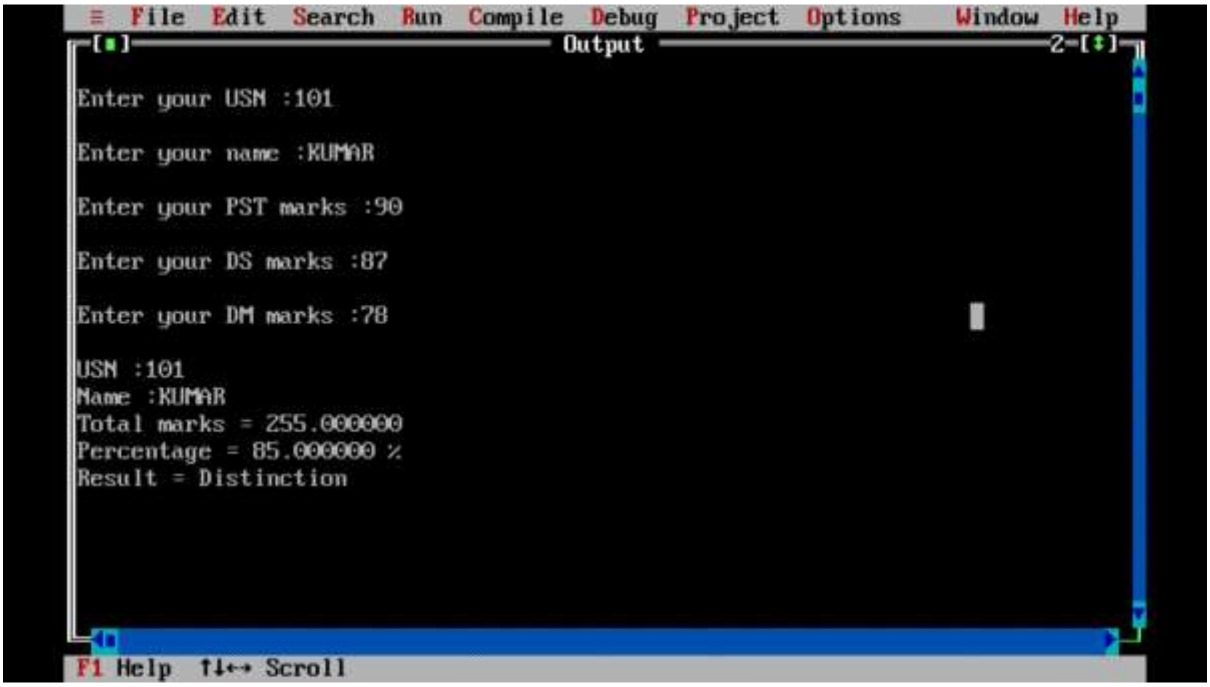
```
Enter any number
-7
-5
-8
-2
-9
5
10
999
Sum of digits = 15_
```

6. Write, and execute C program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder

```
#include<string.h>
#include<stdio.h>
#include<conio.h>
void main()
{
    int usn,m1,m2,m3;
    char name[30];
    float perc,total;
    clrscr();
    printf("\nEnter your USN :");
    scanf("%d", &usn);
    printf("\nEnter your name :");
    scanf("%s", &name);
    printf("\nEnter your PST marks :");
    scanf("%d", &m1);
    printf("\nEnter your DS marks :");
    scanf("%d", &m2);
    printf("\nEnter your DM marks :");
    scanf("%d", &m3);
    total = m1 + m2 + m3;
    perc = (total/300) * 100;

    printf("\nUSN :%d",usn);
    printf("\nName :%s", name);
    printf("\nTotal marks = %f", total);
    printf("\nPercentage = %f %", perc);

    if(perc >= 70)
        printf("\nResult = Distinction");
    else if(perc >= 60)
        printf("\nResult = First Class");
    else if(perc >= 50)
        printf("\nResult = Second class");
    else if(perc >= 40)
        printf("\nResult = Pass");
    else
        printf("\nResult = Fail");
    getch();
}
```

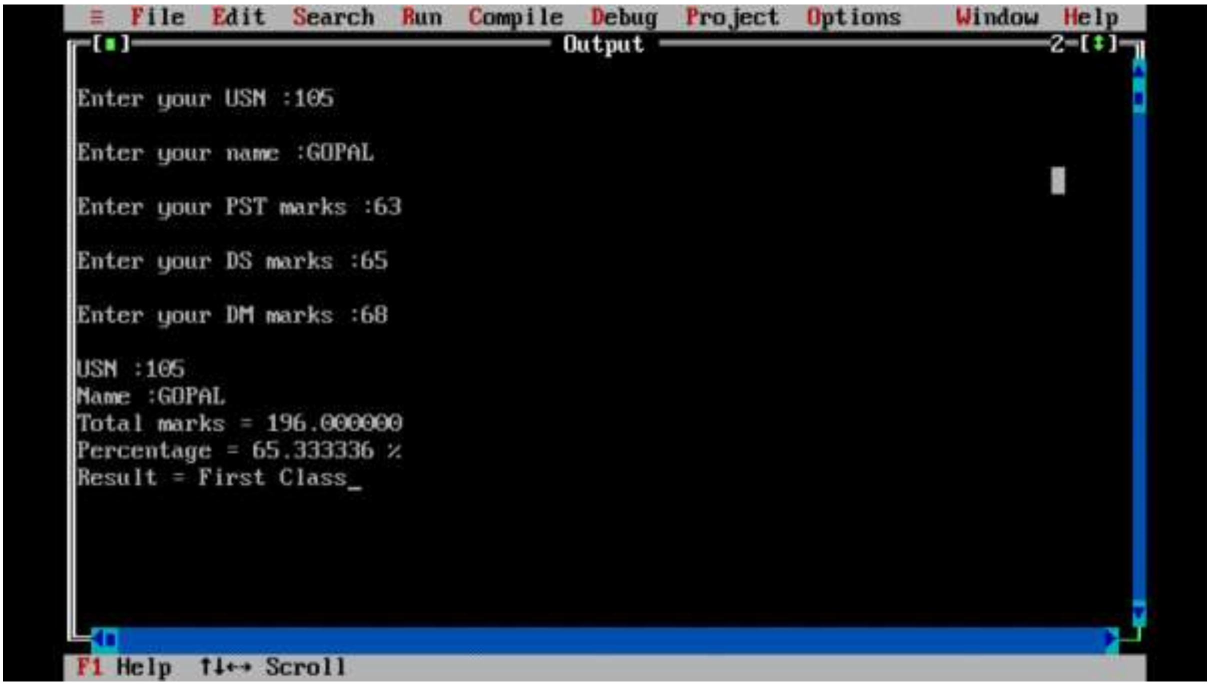
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

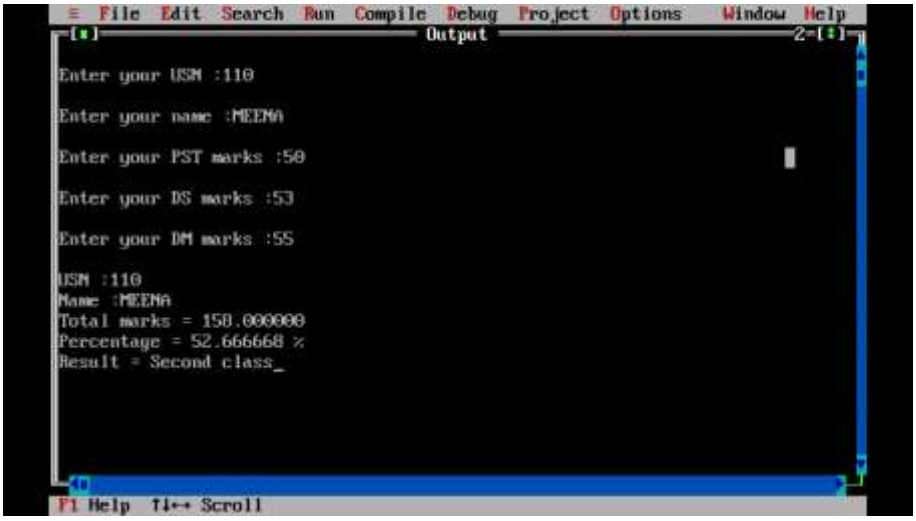
```
Enter your USN :101

Enter your name :KUMAR

Enter your PST marks :90

Enter your DS marks :87

Enter your DM marks :78

USN :101
Name :KUMAR
Total marks = 255.000000
Percentage = 85.000000 %
Result = Distinction
```

CASE 2:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

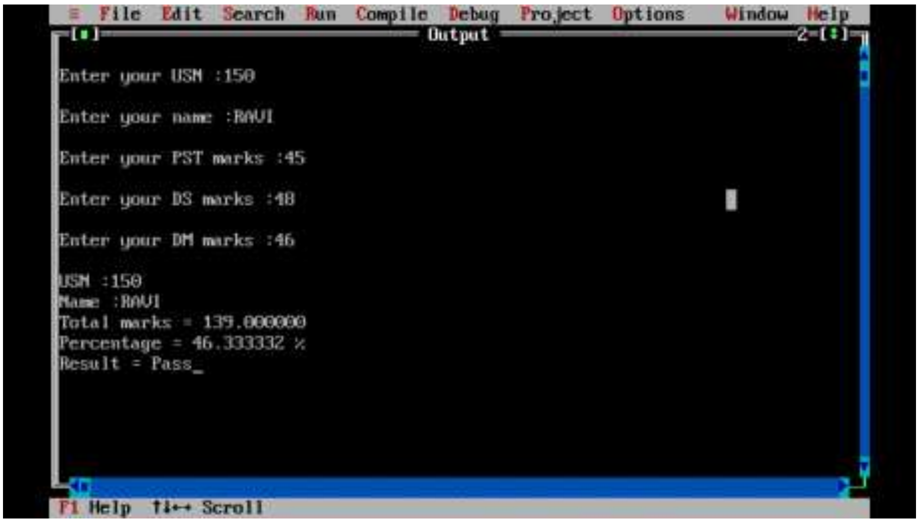
```
Enter your USN :105

Enter your name :GOPAL

Enter your PST marks :63

Enter your DS marks :65

Enter your DM marks :68

USN :105
Name :GOPAL
Total marks = 196.000000
Percentage = 65.333336 %
Result = First Class_
```

CASE 3:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

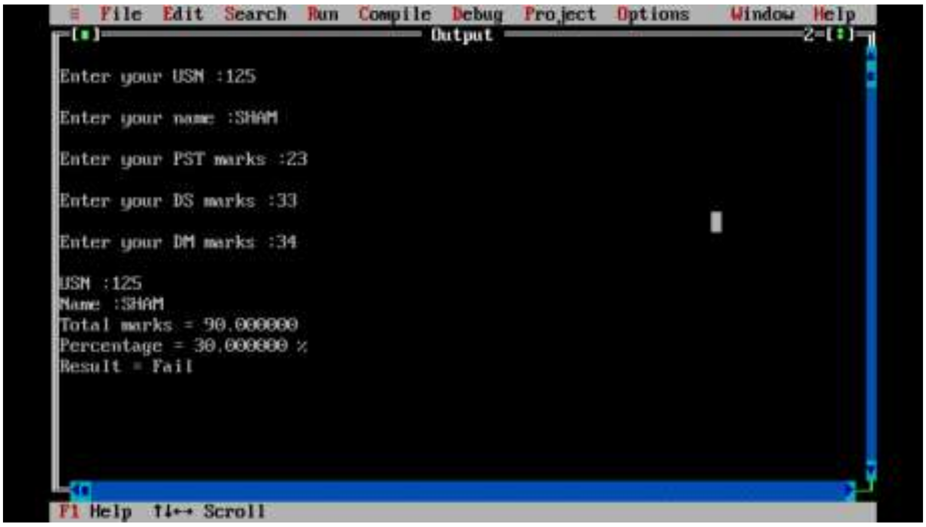
```
Enter your USN :110

Enter your name :MEENA

Enter your PST marks :50

Enter your DS marks :53

Enter your DM marks :55

USN :110
Name :MEENA
Total marks = 158.000000
Percentage = 52.666668 %
Result = Second class_
```

CASE 4:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

```
Enter your USN :150

Enter your name :RAVI

Enter your PST marks :45

Enter your DS marks :48

Enter your DM marks :46

USN :150
Name :RAVI
Total marks = 139.000000
Percentage = 46.333332 %
Result = Pass_
```

CASE 5:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

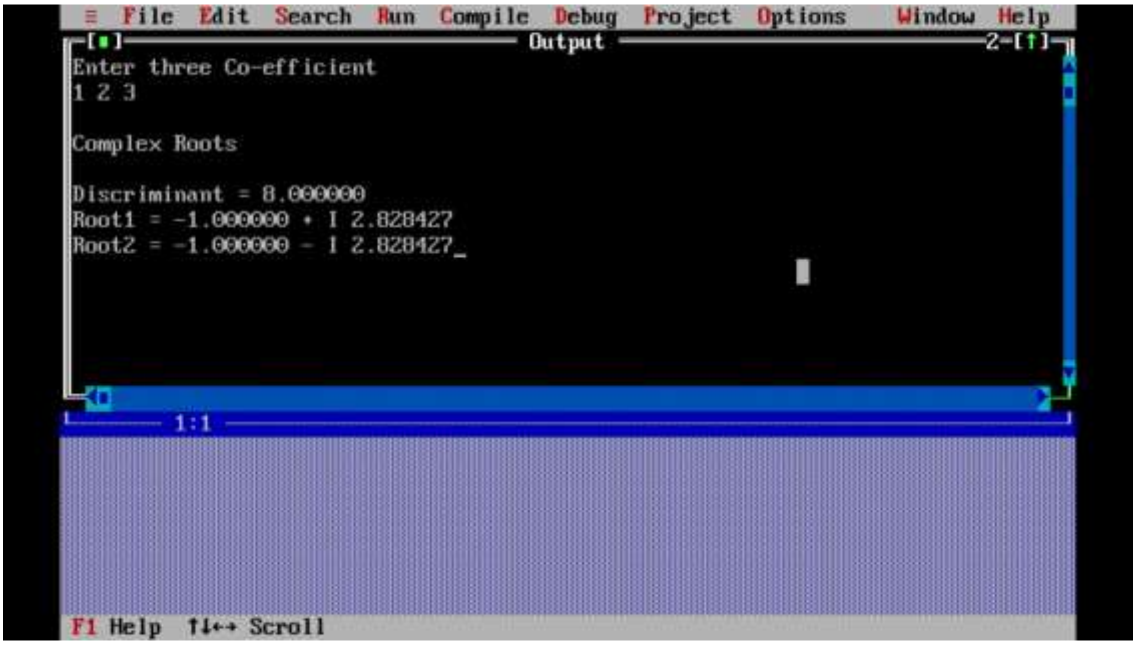
```
Enter your USN :125

Enter your name :SHAM

Enter your PST marks :23

Enter your DS marks :33

Enter your DM marks :34

USN :125
Name :SHAM
Total marks = 90.000000
Percentage = 30.000000 %
Result = Fail
```

7. Write, and execute C program to find the roots of quadratic equation

```
#include<stdio.h>
#include<math.h>
void main()
{
float a,b,c,disc,r1,r2;
clrscr();
printf("Enter three Co-efficient \n");
scanf("%f%f%f", &a,&b,&c);
if(a == 0)
   printf("\nNot a Quadratic Equation \n");
else
{   disc = b * b - 4.0 * a * c;
   if(disc < 0.0)
           {
           printf("\nComplex Roots\n");
           disc = -disc;
           r1 = -b / (2.0 * a);
           r2 = sqrt(disc);
           printf("\nDiscriminant = %f",disc);
           printf("\nRoot1 = %f + I %f", r1,r2);
           printf("\nRoot2 = %f - I %f", r1,r2);
           }
   else if(disc == 0.0)
           {
           printf("\nDiscriminant = %f", disc);
           printf("\nReal and Equal Roots");
           r1 = -b / (2.0 * a);
           printf("\nRoot1 = %f \nRoot2 = %f \n", r1, r1);
           }
   else
           {
           printf("\nDiscriminant = %f", disc);
           printf("\nReal and Unequal Roots \n");
           r1 = (-b + sqrt(disc)) / (2.0 * a);
           r2 = (-b - sqrt(disc)) / (2.0 * a);
           printf("\nRoo1 = %f \nRoot2 = %f", r1, r2);
           }
}
getch();
}
```

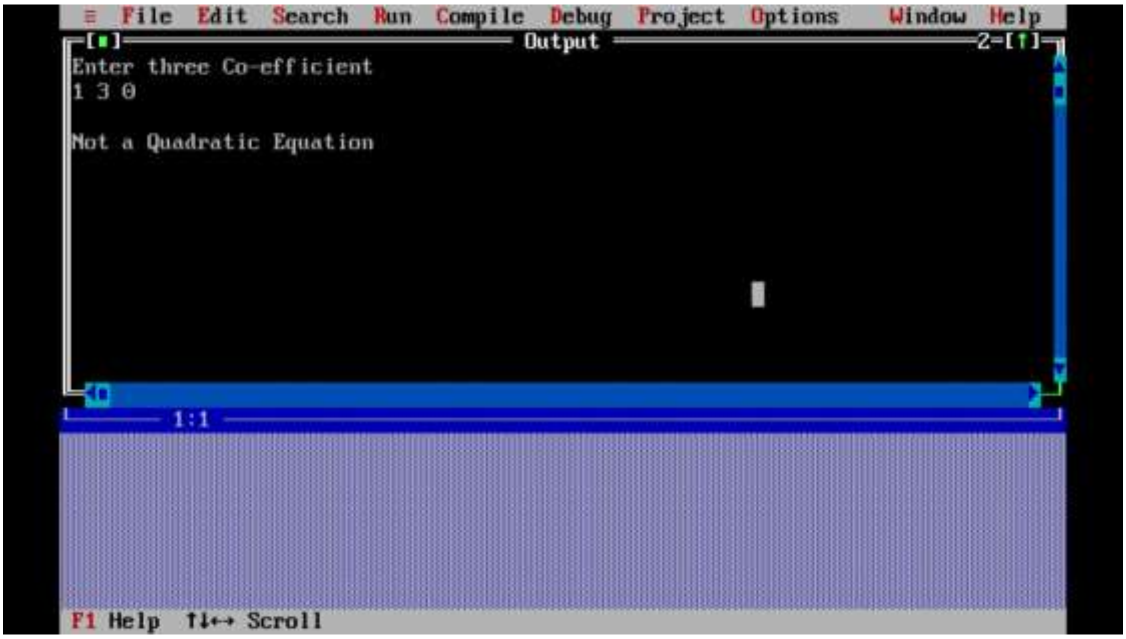
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
1:1
F1 Help ↑↓←→ Scroll

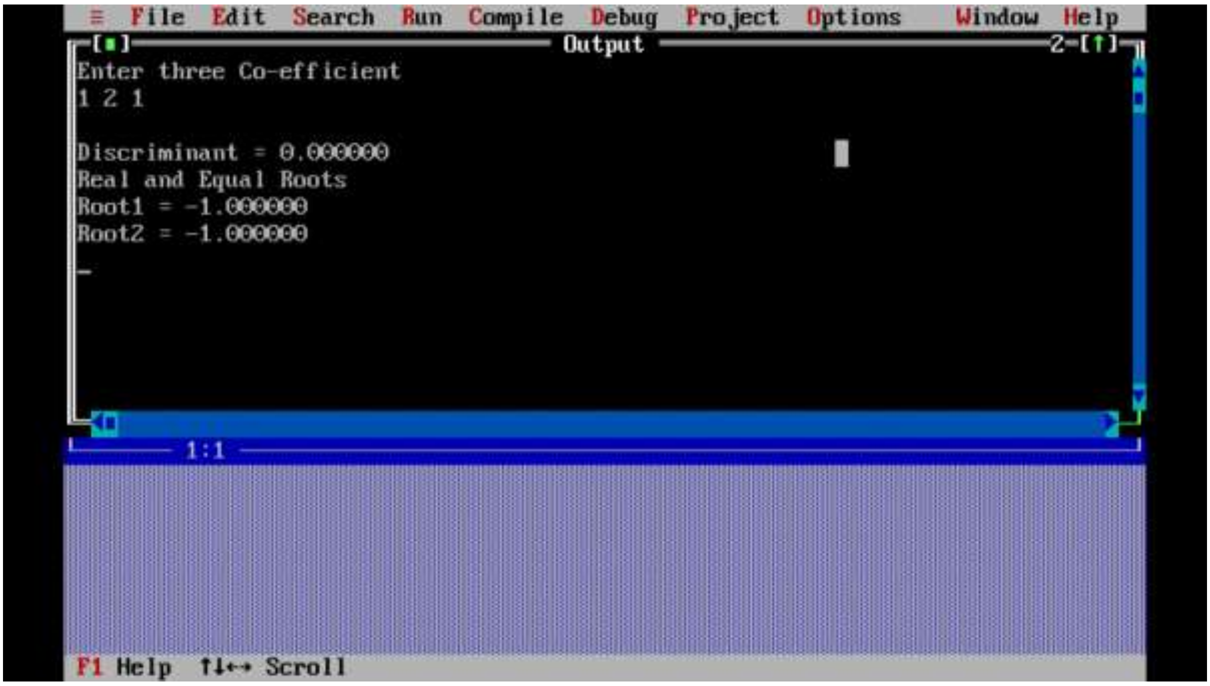
```
Enter three Co-efficient
1 2 3

Complex Roots

Discriminant = 8.000000
Root1 = -1.000000 + I 2.828427
Root2 = -1.000000 - I 2.828427_
```

CASE 2:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
1:1
F1 Help ↑↓←→ Scroll

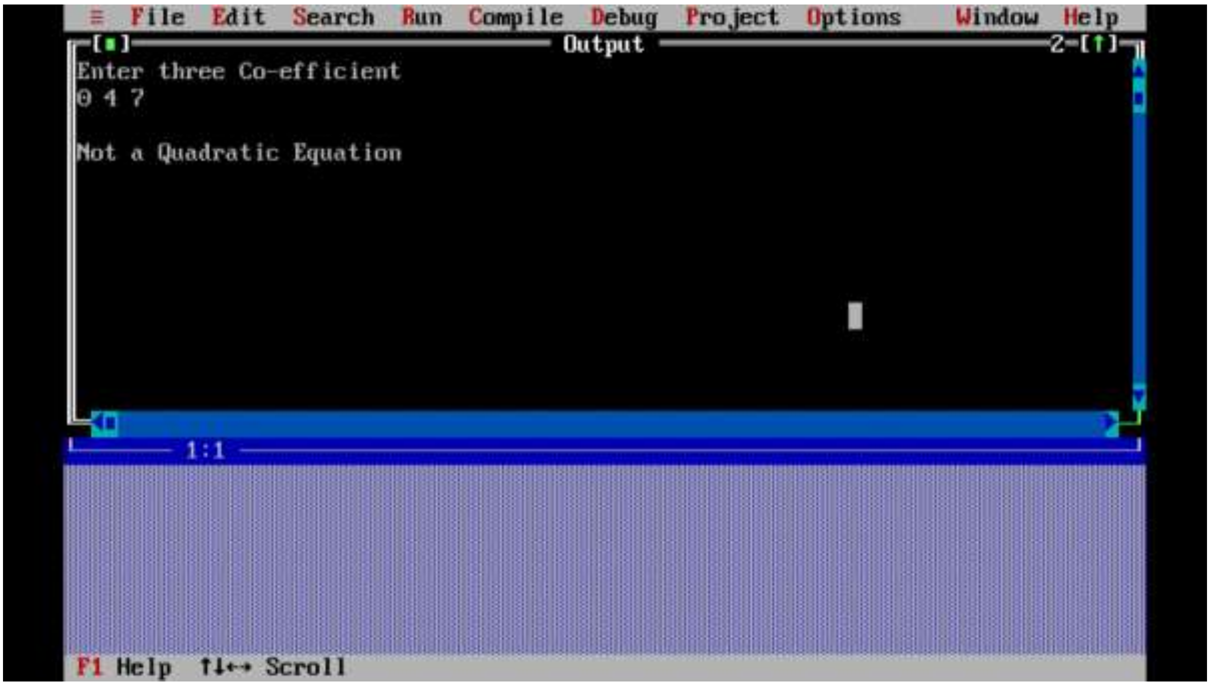
```
Enter three Co-efficient
1 3 0

Not a Quadratic Equation
```

CASE 3:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
1:1
F1 Help ↑↓↔ Scroll

```
Enter three Co-efficient
1 2 1

Discriminant = 0.000000
Real and Equal Roots
Root1 = -1.000000
Root2 = -1.000000
```

CASE 4:

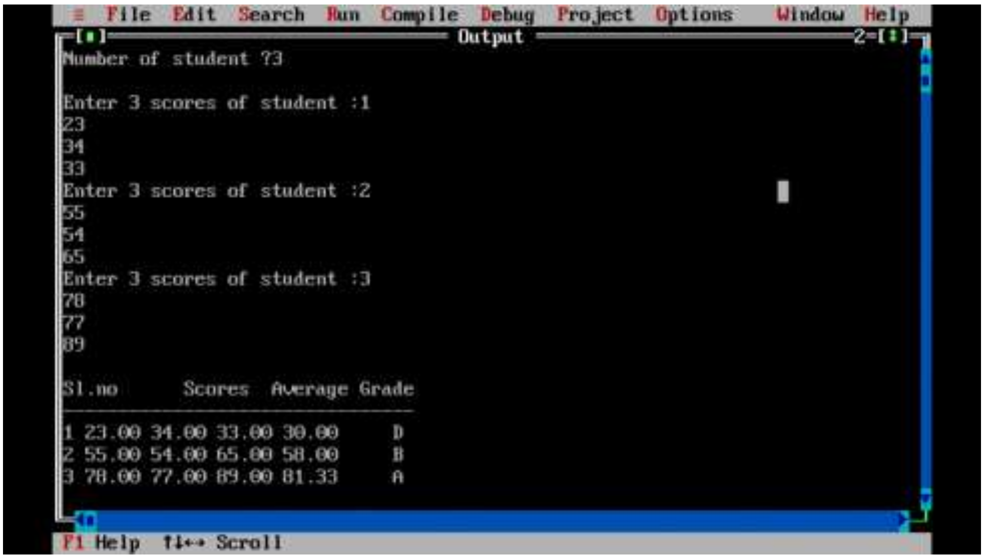

≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2-[↑]
1:1
F1 Help ↑↓↔ Scroll

```
Enter three Co-efficient
0 4 7

Not a Quadratic Equation
```

8. Write, and execute C program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j,k,n,m;
float a[10][10], sum, avg;
char grade[10];
clrscr();

printf("Number of student ?");
scanf("%d", &n);
printf("\n");
for(i=0;i<n;i++)
{
   sum = 0;
   printf("Enter 3 scores of student :%d\n",i+1);
   for(j=0;j<3;j++)
   {
            scanf("%f", &a[i][j]);
            sum += a[i][j];
   }
   avg = sum / 3.0;
   a[i][3] = avg;
   if(avg < 30.0)
            grade[i] = 'E';
   else if(avg < 40.0)
            grade[i] = 'D';
   else if(avg < 50.0)
            grade[i] = 'C';
   else if(avg < 60.0)
            grade[i] = 'B';
   else
            grade[i] = 'A';

}
printf("\nSl.no       Scores  Average Grade \n");
printf("--------------------------------\n");
for(i=0;i<n;i++)
{
   printf("%d",i+1);
   for(j=0;j<4;j++)
            printf("%6.2f", a[i][j]);
            printf("%6c", grade[i]);
            printf("\n");
}
getch();
}
```

OUTPUT:

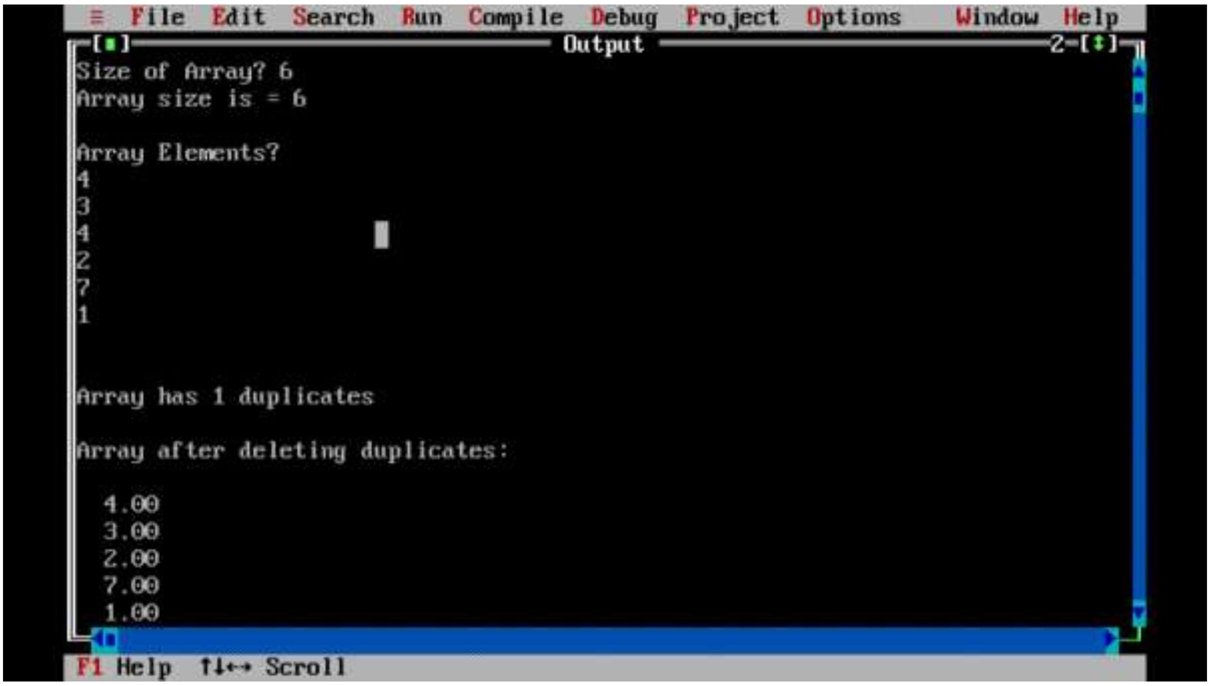

≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 2=[↕]
F1 Help ↑↓←→ Scroll

```
Number of student ?3

Enter 3 scores of student :1
23
34
33
Enter 3 scores of student :2
55
54
65
Enter 3 scores of student :3
78
77
89

Sl.no      Scores   Average Grade
---------------------------------
1 23.00 34.00 33.00 30.00     D
2 55.00 54.00 65.00 58.00     B
3 78.00 77.00 89.00 81.33     A
```

9. Write, and execute C program to remove Duplicate Element in a single dimensional Array

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j,k,n,num,flag=0;
float a[50];
clrscr();
printf("Size of Array? ");
scanf("%d", &n);
printf("Array size is = %d\n",n);
num = n;
printf("\nArray Elements? \n");
for(i = 0; i < n; i++)
    scanf("%f", &a[i]);
for(i = 0; i < n; i++)
    scanf("%6.2f", a[i]);
printf("\n");

/* Removing duplicate elements */
for(i = 0; i < n-1; i++)
    for(j=i+1; j<n; j++)
    {
               if(a[i] == a[j])
               {
               n = n -1;
               for(k=j; k<n; k++)
               a[k] = a[k+1];
               flag = 1;
               j = j - 1;
               }
    }
/* Use of IF and ELSE statement */
if(flag == 0)
    printf("\nNo duplicates found in Array\n");
else
{
    printf("\nArray has %d duplicates \n\n", num - n);
    printf("\Array after deleting duplicates:\n");
    for(i=0; i<n; i++)
               printf("\n%6.2f", a[i]);
    printf("\n");
 }
 getch();
}
```

OUTPUT:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
2
F1 Help ↑↓←→ Scroll

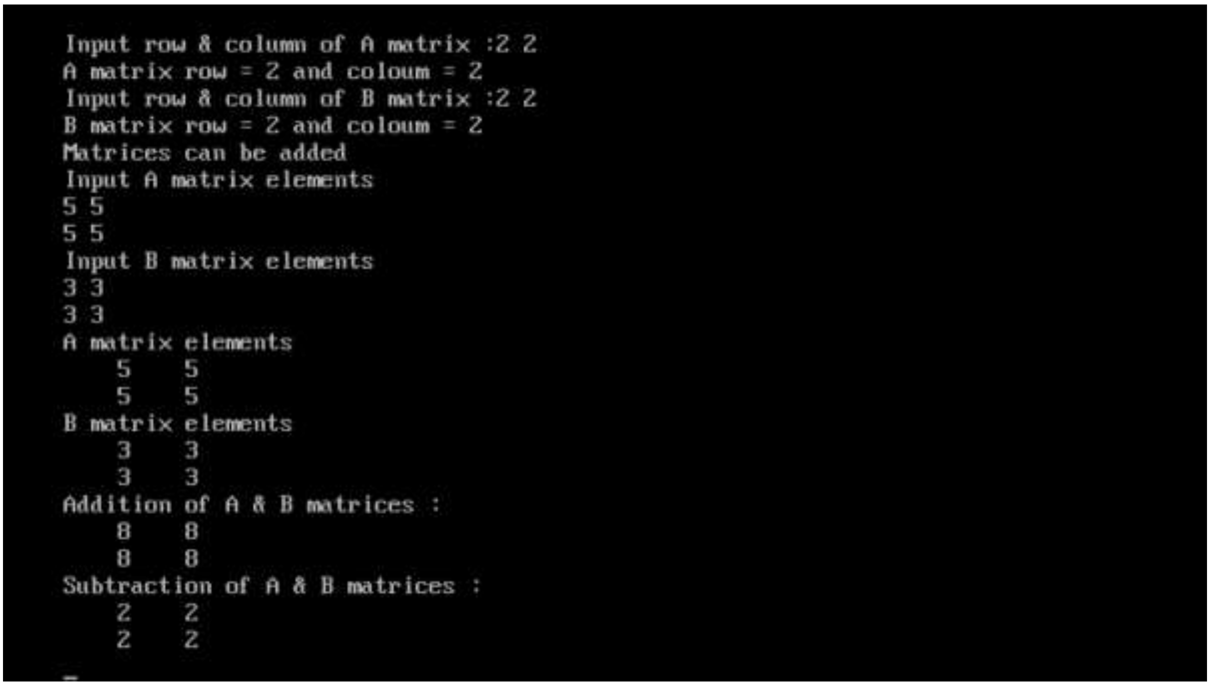
```
Size of Array? 6
Array size is = 6

Array Elements?
4
3
4
2
7
1


Array has 1 duplicates

Array after deleting duplicates:

   4.00
   3.00
   2.00
   7.00
   1.00
```

10. Write, and execute C program to perform addition and subtraction of Matrices

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[10][10], b[10][10], c[10][10],d[10][10],i,j,m,n,p,q;
clrscr();
printf("\nInput row & column of A matrix :");
scanf("%d%d", &n, &m);
printf("A matrix row = %d and coloum = %d", n,m);

printf("\nInput row & column of B matrix :");
scanf("%d%d", &p, &q);
printf("B matrix row = %d and coloum = %d", p,q);

/* Checks if matrixes can be added */
if((n == p) && (m==q))
{
    printf("\nMatrices can be added");
    printf("\nInput A matrix elements\n");
    for(i=0;i<n;++i)
     for(j=0;j<m;++j)
       scanf("%d", &a[i][j]);


    printf("Input B matrix elements\n");
    for(i=0;i<n;++i)
     for(j=0;j<m;++j)
       scanf("%d", &b[i][j]);
       /* Print A - matrix in matrix form */
    printf("A matrix elements\n");
    for(i = 0; i < n; ++i)
    {
               for(j=0; j < m; ++j)
                          printf("%5d", a[i][j]);
               printf("\n");
    }

    /* Print B - matrix in matrix form */
    printf("B matrix elements\n");
    for(i = 0; i < n; ++i)
    {
               for(j=0; j < m; ++j)
                          printf("%5d", b[i][j]);
               printf("\n");
    }

    /* Addition and Subtraction of two matrices */
    for(i=0;i<n;++i)
    for(j=0;j<m;++j)
```

```
        {
        c[i][j] = a[i][j] + b[i][j];
        d[i][j] = a[i][j] - b[i][j];
        }

        printf("Addition of A & B matrices :\n");
        for(i=0;i<n;++i)
        {
        for(j=0;j<m;++j)
        printf("%5d", c[i][j]);
        printf("\n");
        }
        printf("Subtraction of A & B matrices :\n");
        for(i=0;i<n;++i)
        {
        for(j=0;j<m;++j)
        printf("%5d", d[i][j]);
        printf("\n");
        }
    }
    else
        printf("\nMatrices can not be addted");
    getch();
    }
```

OUTPUT:



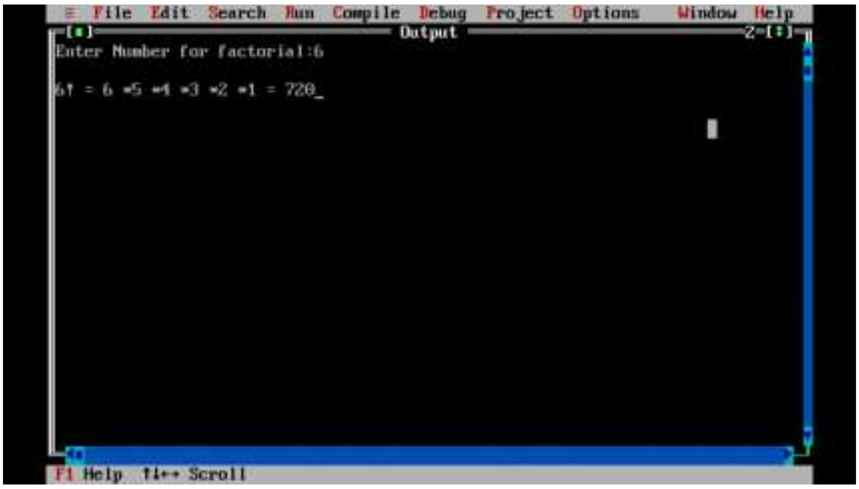
```
Input row & column of A matrix :2 2
A matrix row = 2 and coloum = 2
Input row & column of B matrix :2 2
B matrix row = 2 and coloum = 2
Matrices can be added
Input A matrix elements
5 5
5 5
Input B matrix elements
3 3
3 3
A matrix elements
    5    5
    5    5
B matrix elements
    3    3
    3    3
Addition of A & B matrices :
    8    8
    8    8
Subtraction of A & B matrices :
    2    2
    2    2
```

11. Write, and execute C program to find factorial of a number

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n,i,r,j;
   clrscr();
   printf("Enter Number for calculating factorial:");
   scanf("%d", &n);
   printf("%d! = ", n);
   switch(n)
   {
   case 0:
            {
            printf("0 = ");
            r=0;
            break;
            }
   case 1:
           {
           printf("1 = ");
           r=1;
           break;
           }
   default:
          {
          r = n * (n -1);
          for(j=n; j != 1; j--)
          {
          printf("%d *",j);
          }
          for(i=n-2; i != 1; i--)
          {
          r = r * i;
          }
   }
}
printf("1 = %d", r);
}
```

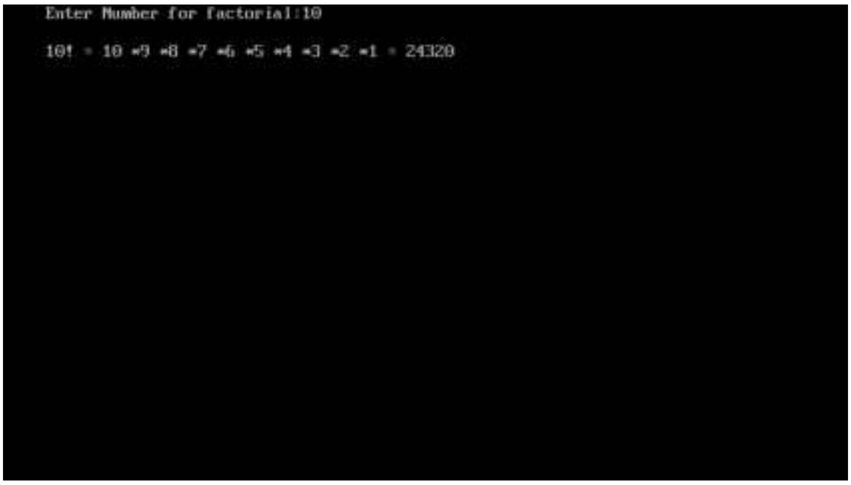
OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■]
Output
2 [↕]
F1 Help ↑↓←→ Scroll

```
Enter Number for factorial:6

6! = 6 *5 *4 *3 *2 *1 = 720_
```

CASE 2:



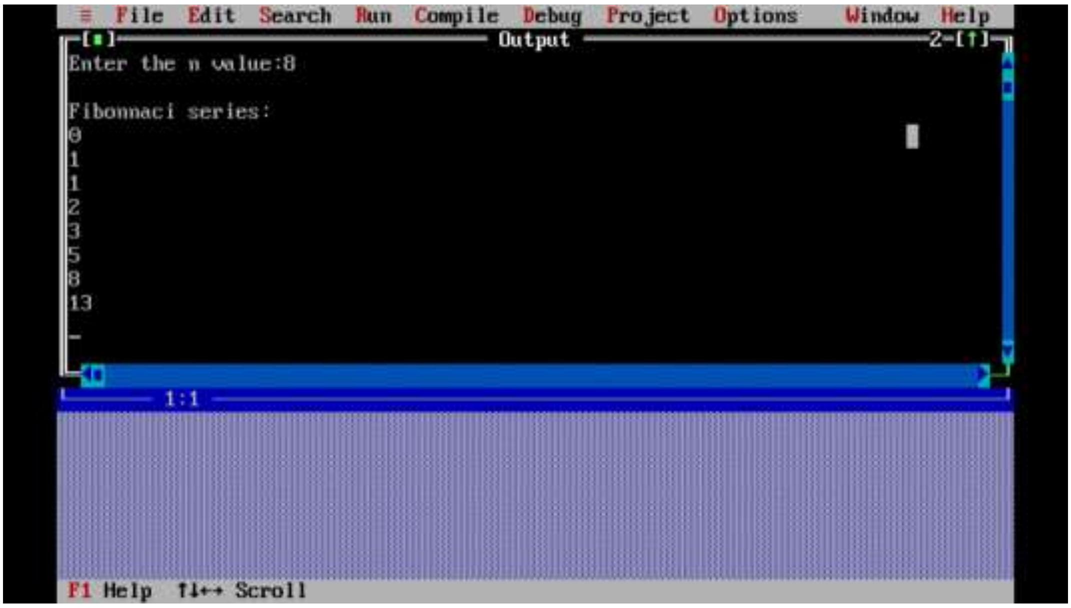
```
Enter Number for factorial:10

10! = 10 *9 *8 *7 *6 *5 *4 *3 *2 *1 = 24320
```

12. Write, and execute C program to generate Fibonacci series

```
#include<stdio.h>
#include<conio.h>
int fibonacci(int);
void main()
{
int n, i =0, c;
clrscr();
printf("Enter the n value:");
scanf("%d", &n);
printf("\nFibonnaci series:\n");
for(c=1; c<=n;c++)
{
printf("%d\n", fibonacci(i));
i++;
}
getch();
}
int fibonacci(int n)
{
if(n == 0)
return 0;
else if( n == 1)
return 1;
else
return(fibonacci(n-1) + fibonacci(n-2));
}
```

OUTPUT:

CASE 1:


≡ File Edit Search Run Compile Debug Project Options Window Help
[■]
Output
2-[↑]
1:1
F1 Help ↑↓←→ Scroll

```
Enter the n value:8

Fibonnaci series:
0
1
1
2
3
5
8
13
_
```

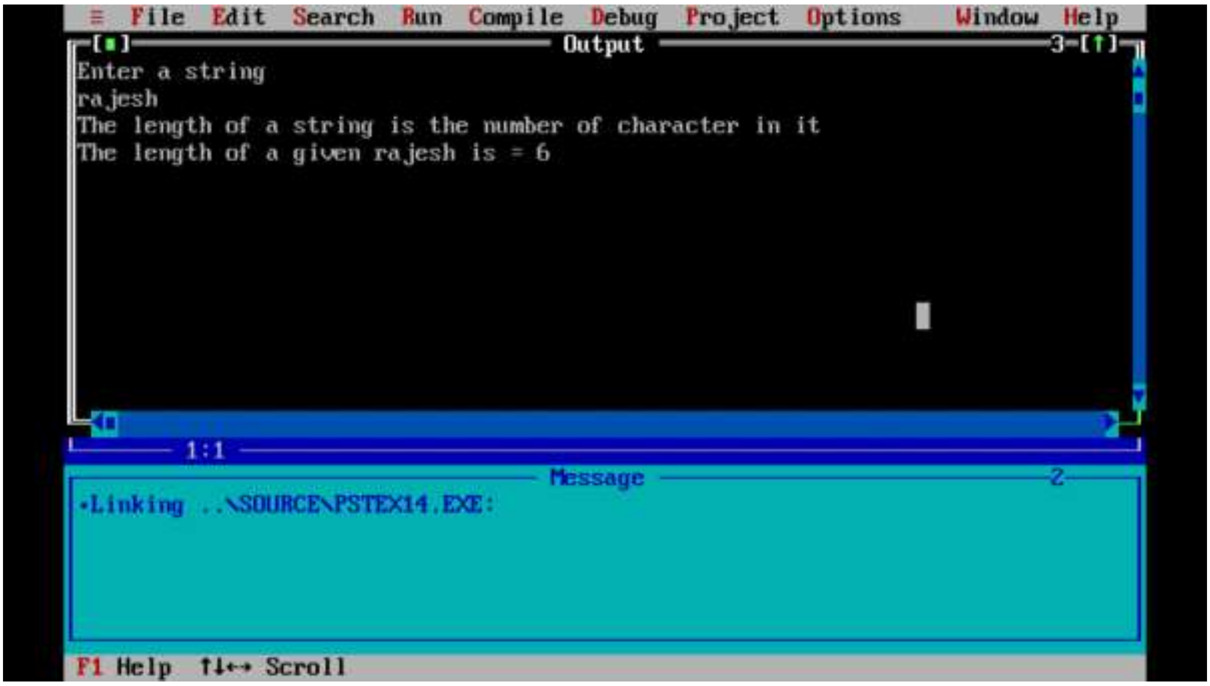
13. Write, and execute C program to remove Duplicate Element in a single dimensional Array

(Question 9 repeated)

14. Write, and execute C program to find the length of a string without using built in function

```
#include<stdio.h>
#include<conio.h>
void main()
{
  char string[50];
  int i, length =0;
  clrscr();
  printf("Enter a string \n");
  gets(string);
  for(i =0; string[i] != '\0'; i++)
  {
   length++;
  }
  printf("The length of a string is the number of character in it\n");
  printf("The length of a given %s is = %d\n", string, length);
getch();
}
```

OUTPUT:



≡ File Edit Search Run Compile Debug Project Options Window Help
Output
1:1
Message
F1 Help ↑↓↔ Scroll

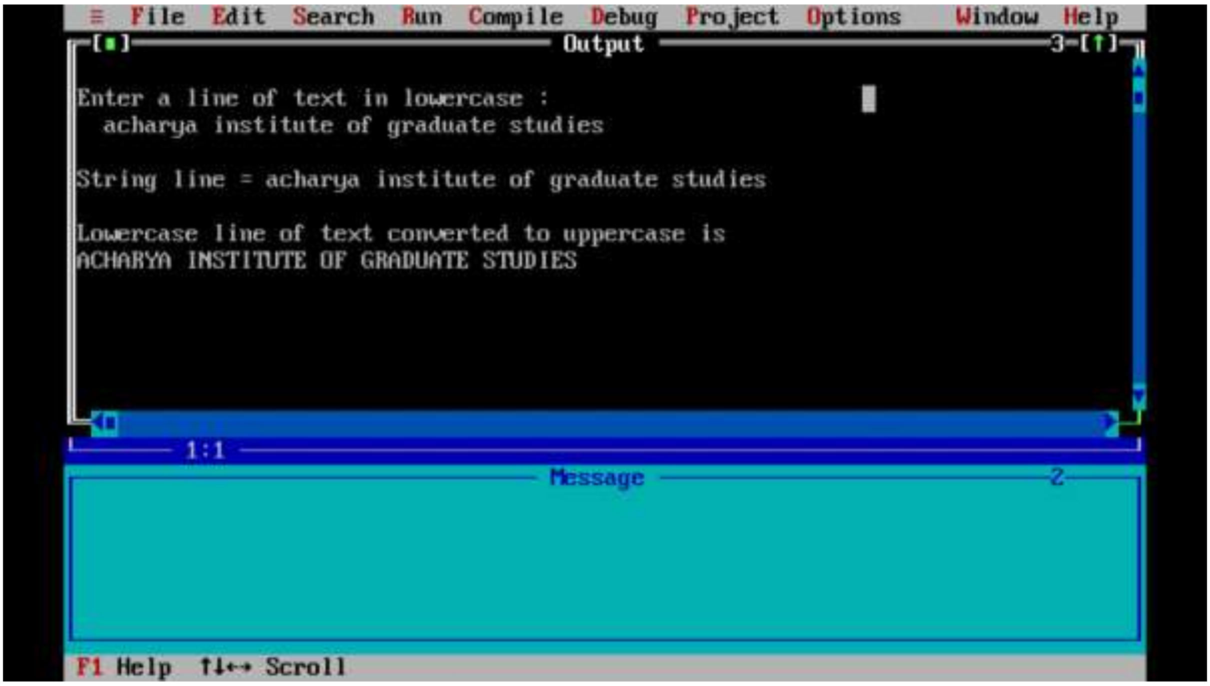
```
Enter a string
rajesh
The length of a string is the number of character in it
The length of a given rajesh is = 6
```

```
•Linking ..\SOURCE\PSTEX14.EXE:
```

15. Write, and execute C program to demonstrate string functions

```
#include<stdio.h>
#include<conio.h>
void main()
{
        char line[50];
        int i;
        clrscr();
        printf("\nEnter a line of text in lowercase :\n  ");
        scanf("%[^\n]", line);
        printf("\nString line = %s", line);

        printf("\n\nLowercase line of text converted to uppercase is \n");
            i = 0;
        while(line[i] != '\0')
            {
        printf("%c", toupper(line[i]));
           i++;
           }
        getch();
}
```

OUTPUT:


≡ File Edit Search Run Compile Debug Project Options Window Help
Output
3
1:1
Message
2
F1 Help ↑↓←→ Scroll

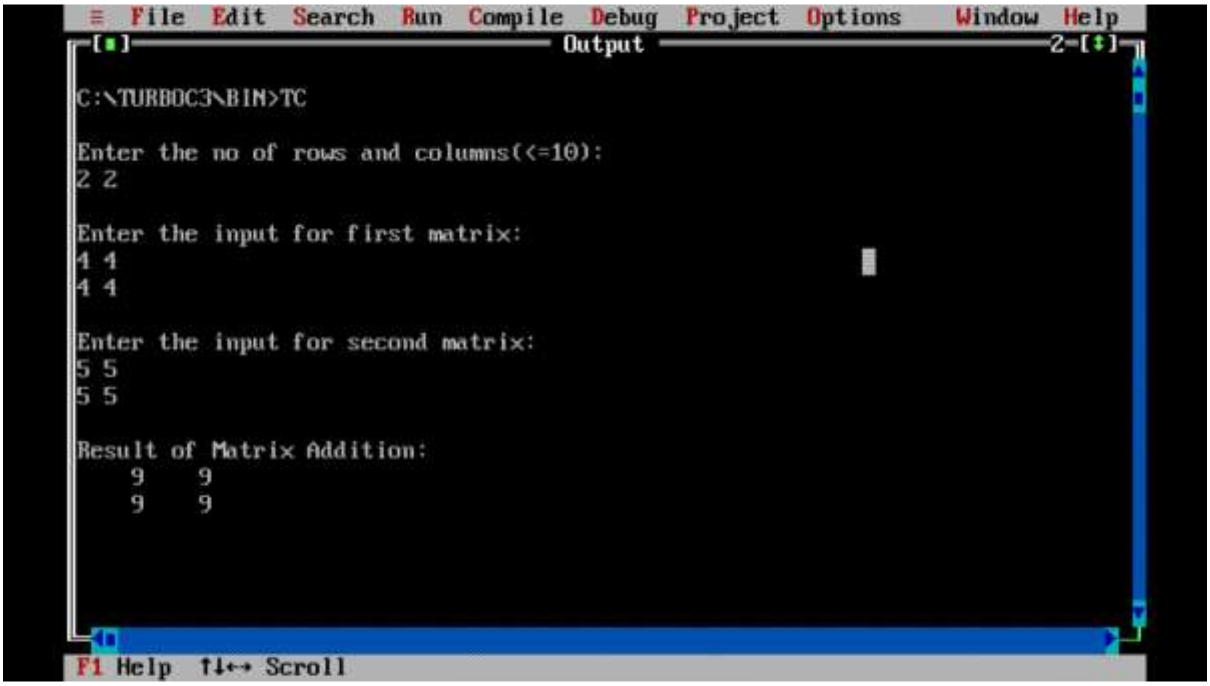
```
Enter a line of text in lowercase :
  acharya institute of graduate studies

String line = acharya institute of graduate studies

Lowercase line of text converted to uppercase is
ACHARYA INSTITUTE OF GRADUATE STUDIES
```

16. Write, and execute C program to read, display and add two m x n matrices using functions

```
#include <stdio.h>
#include<conio.h>
 int rows, columns;

 /* adds two matrices and stores the output in third matrix */
 void matrixAddition(int mat1[][10], int mat2[][10], int mat3[][10]) {
      int i, j;

      for (i = 0; i < rows; i++) {
            for (j = 0; j < columns; j++) {
                  mat3[i][j] = mat1[i][j] + mat2[i][j];
            }
      }
      return;
 }

 int main() {
      int matrix1[10][10], matrix2[10][10];
      int matrix3[10][10], i, j;

      /* get the number of rows and columns from user */
         printf("\nEnter the no of rows and columns(<=10):\n");
         scanf("%d%d", &rows, &columns);

         if (rows > 10 || columns > 10) {
                 printf("\nNo of rows/columns is greater than 10\n");
                 return 0;
         }

         /* input first matrix */
         printf("\nEnter the input for first matrix:\n");
         for (i = 0; i < rows; i++) {
                 for (j = 0; j < columns; j++) {
                         scanf("%d", &matrix1[i][j]);
                 }
         }

         /* input second matrix */
         printf("\nEnter the input for second matrix:\n");
         for (i = 0; i < rows; i++) {
                 for (j = 0; j < columns; j++) {
                         scanf("%d", &matrix2[i][j]);
                 }
         }
```

```
        /* matrix addtion */
        matrixAddition(matrix1, matrix2, matrix3);

        /* print the results */
        printf("\nResult of Matrix Addition:\n");
        for (i = 0; i < rows; i++) {
                for (j = 0; j < columns; j++) {
                        printf("%5d", matrix3[i][j]);
                }
                printf("\n");
        }
        return 0;
}
```

OUTPUT:

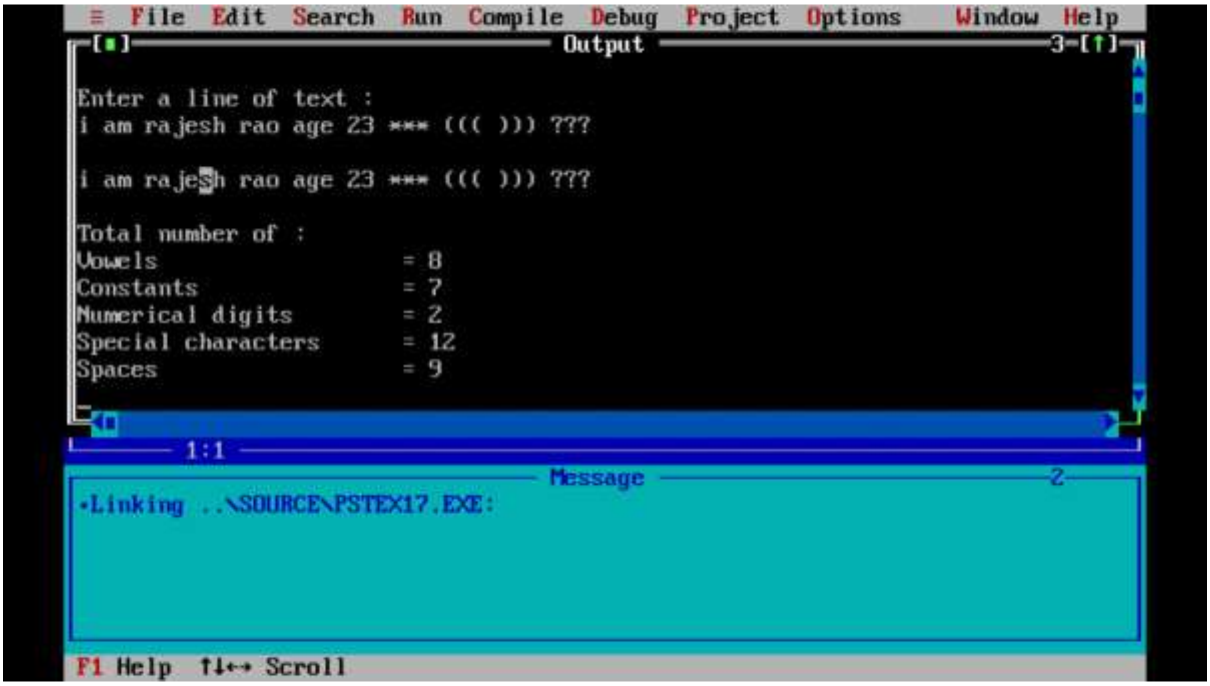

≡ File Edit Search Run Compile Debug Project Options Window Help
Output
F1 Help ↑↓←→ Scroll

```
C:\TURBOC3\BIN>TC

Enter the no of rows and columns(<=10):
2 2

Enter the input for first matrix:
4 4
4 4

Enter the input for second matrix:
5 5
5 5

Result of Matrix Addition:
    9    9
    9    9
```

17. Write, and execute C program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

```
#include<stdio.h>
#include<conio.h>
void main()
{
        char line[80],c;
        int i, vow, cons, dig,space,spechar;
        i=vow=cons=dig=space=spechar=0;
        clrscr();
        printf("\nEnter a line of text :\n");
        scanf("%[^\n]", line);
        printf("\n%s", line);

        while((c = tolower(line[i++])) != '\0')
        {
                if(c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u')
                        ++vow;
                else if(c >= 'a' && c <= 'z')
                        ++cons;
                else if(c >= '0' && c <= '9')
                        ++dig;
                else if(c == ' ')
                {
                        ++space;
                        while(line[i] == ' ')
                        {
                                i++;
                                space++;
                        }
                }
                else
                        ++spechar;
        }
        printf("\n\nTotal number of :\n");
        printf("Vowels                  = %d\n", vow);
        printf("Constants               = %d\n", cons);
        printf("Numerical digits = %d\n", dig);
        printf("Special characters    = %d\n", spechar);
        printf("Spaces                  = %d\n", space);

getch();
}
```

OUTPUT:



≡ File Edit Search Run Compile Debug Project Options Window Help
[■] Output 3-[↑]
1:1
Message 2
F1 Help ↑↓↔ Scroll

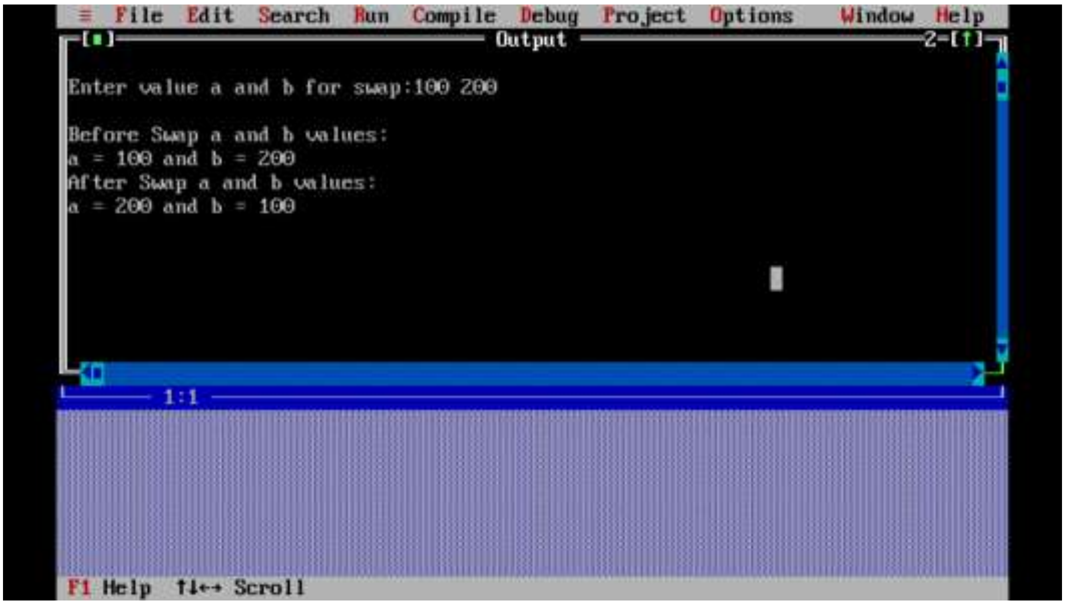
```
Enter a line of text :
i am rajesh rao age 23 *** ((( ))) ???

i am rajesh rao age 23 *** ((( ))) ???

Total number of :
Vowels                  = 8
Constants               = 7
Numerical digits        = 2
Special characters      = 12
Spaces                  = 9
```

```
•Linking ..\SOURCE\PSTEX17.EXE:
```

18. Write, and execute C program to Swap Two Numbers using Pointers

```
#include<stdio.h>
#include<conio.h>
void exchange(int*,int*);
void main()
{
   int a, b;
   clrscr();

   printf("\nEnter value a and b for swap:");
   scanf("%d %d", &a, &b);
   printf("\nBefore Swap a and b values:");
   printf("\na = %d and b = %d", a, b);
   exchange(&a,&b);
   printf("\nAfter Swap a and b values:");
   printf("\na = %d and b = %d", a, b);
   getch();
}
void exchange(int *x, int *y)
{
          int temp;
          temp = *x;
          *x = *y;
          *y = temp;
}
```

OUTPUT:

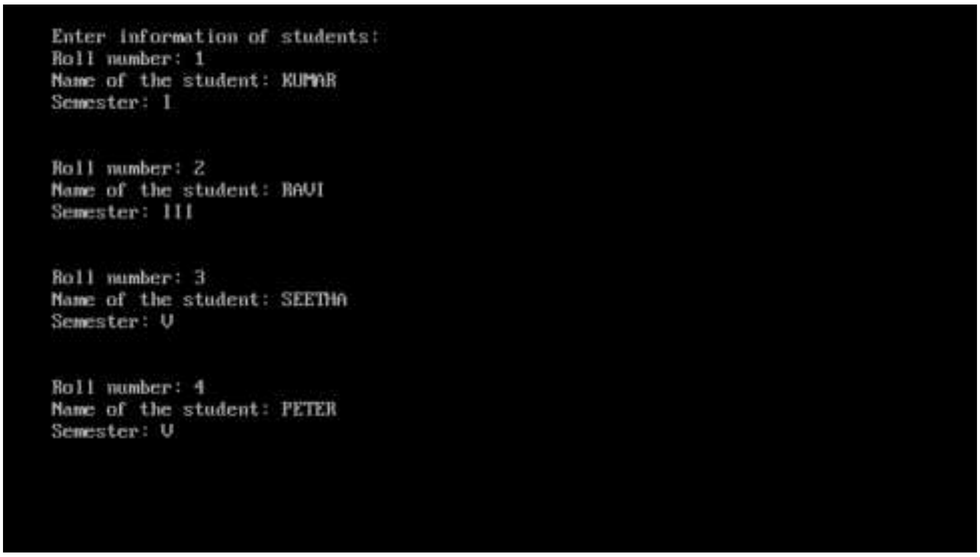

≡ File Edit Search Run Compile Debug Project Options Window Help
Output
2
1:1
F1 Help ↑↓←→ Scroll

```
Enter value a and b for swap:100 200

Before Swap a and b values:
a = 100 and b = 200
After Swap a and b values:
a = 200 and b = 100
```

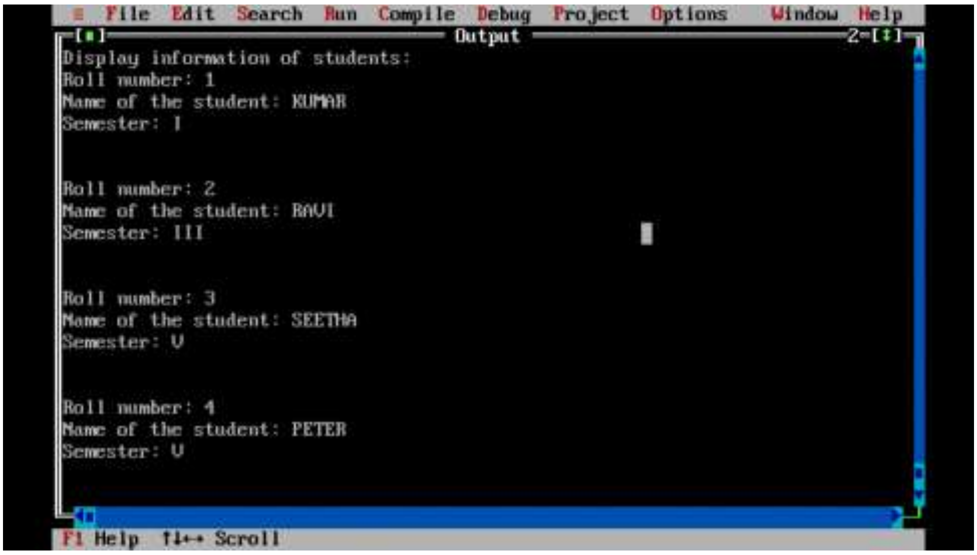
19. Write, and execute C program to demonstrate student structure to read & display records of n students

```
#include<stdio.h>
#include<conio.h>
struct student {
  int roll;
  char name[50];
  char semester[20];
} s[10];
void main()
{
   int i;
   clrscr();
   printf("\nEnter information of students:");
   for(i=0; i < 5; i++)
   {
   s[i].roll = i + 1;
   printf("\nRoll number: %d \n", s[i].roll);
   printf("Name of the student: ");
   scanf("%s", s[i].name);
   printf("Semester: ");
   scanf("%s",s[i].semester);
   printf("\n");
   }
   printf("Display information of students:");
   for(i=0; i < 5; i++)
   {
   printf("\nRoll number: %d \n", i+1);
   printf("Name of the student: ");
   puts(s[i].name);
   printf("Semester: ");
   puts(s[i].semester);
   printf("\n");
   }
   getch();
}
```

OUTPUT:



```
Enter information of students:
Roll number: 1
Name of the student: KUMAR
Semester: I


Roll number: 2
Name of the student: RAVI
Semester: III


Roll number: 3
Name of the student: SEETHA
Semester: V


Roll number: 4
Name of the student: PETER
Semester: V
```

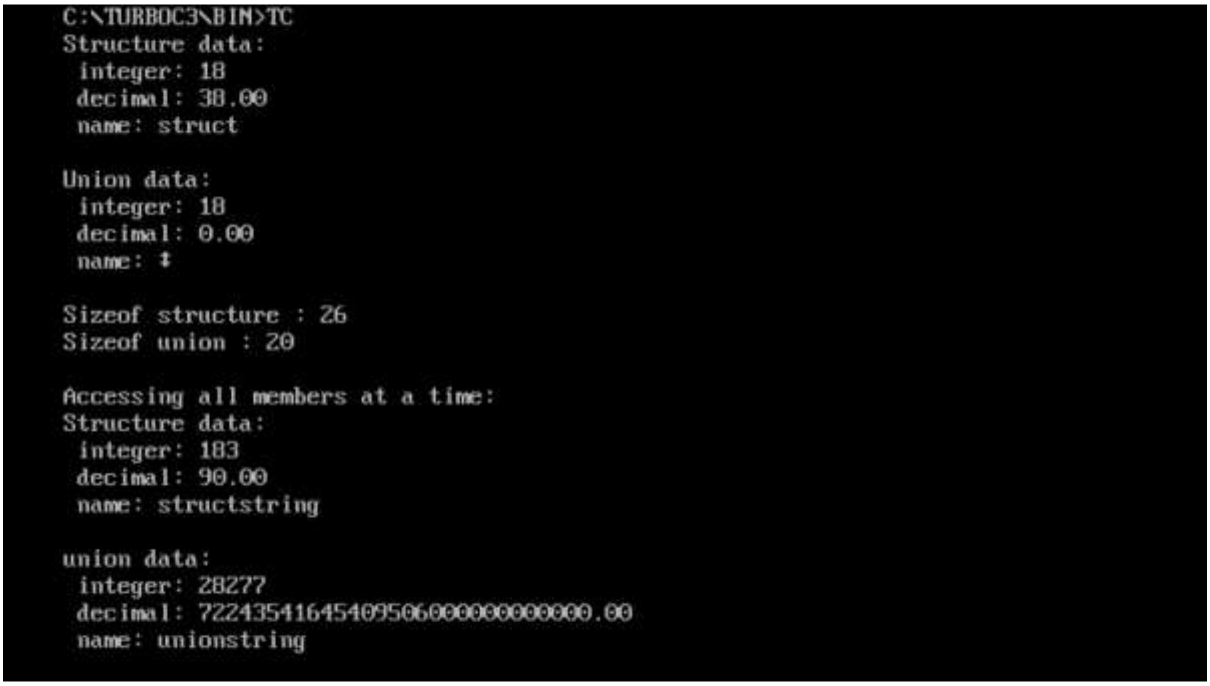

≡ File Edit Search Run Compile Debug Project Options Window Help
[■]
Output
2=[↕]
F1 Help ↑↓←→ Scroll

```
Display information of students:
Roll number: 1
Name of the student: KUMAR
Semester: I


Roll number: 2
Name of the student: RAVI
Semester: III


Roll number: 3
Name of the student: SEETHA
Semester: V


Roll number: 4
Name of the student: PETER
Semester: V
```

20. Write, and execute C program to demonstrate the difference between structure & union

```
#include<stdio.h>
#include<string.h>
struct struct_example
{
   int integer;
   float decimal;
   char name[20];
};
union union_example
{
   int integer;
   float decimal;
   char name[20];
};
void main()
{
   struct struct_example s={18,38,"struct"};
   union union_example u={18};

   printf("Structure data:\n integer: %d\n decimal: %.2f\n name: %s\n",
                  s.integer, s.decimal, s.name);
   printf("\nUnion data:\n integer: %d\n decimal: %.2f\n name: %s\n",
                  u.integer, u.decimal, u.name);

   // difference two and three
   printf("\nSizeof structure : %d\n", sizeof(s));
   printf("Sizeof union : %d\n", sizeof(u));
   // difference five
   printf("\nAccessing all members at a time:");
   s.integer = 183;
   s.decimal = 90;
   strcpy(s.name, "structstring");

   printf("\nStructure data:\n integer: %d\n decimal: %.2f\n name: %s\n",
            s.integer, s.decimal, s.name);

   u.integer = 200;
   u.decimal = 66;
   strcpy(u.name, "unionstring");

   printf("\nunion data:\n integer: %d\n decimal: %.2f\n name: %s\n",
            u.integer, u.decimal, u.name);
            getch();

}
```

OUTPUT:



```
C:\TURBOC3\BIN>TC
Structure data:
 integer: 18
 decimal: 38.00
 name: struct

Union data:
 integer: 18
 decimal: 0.00
 name: ‡

Sizeof structure : 26
Sizeof union : 20

Accessing all members at a time:
Structure data:
 integer: 183
 decimal: 90.00
 name: structstring

union data:
 integer: 28277
 decimal: 722435416454095060000000000000.00
 name: unionstring
```