Chapter – 3 C – PROGRAMMING

LAB PROGRAM - 1

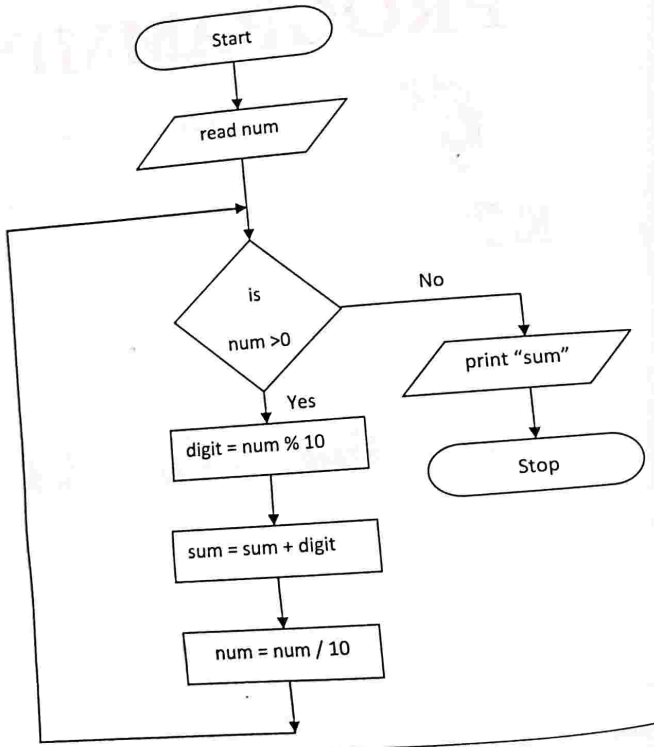
1. Write a C program to find the sum of individual digits of a number.

AIM: Write a C program to find the sum of individual digits of a number.

ALGORITHM

Step 1: read num
Step 2: initialize sum ← 0
Step 3: while num > 0
Step 4: digit ← num%10
Step 5: sum ← sum+digit
Step 6: num ← num/10
Step 7: print sum.

FLOW CHART



PROGRAM

```
/* Program to find sum of individual digits of a number */
/* Author : GDC(M)
version  : 1.0v  */
#include<stdio.h>              /* Standard input and output Header file */
#include<conio.h>              /* Console input and output Header file */
void main()                    /* main function */
{
   int num, sum,digit;         /* Declaration of Variables num, sum, digit*/
   clrscr();                   /* Clear Screen function */
   printf("Enter a number :");     /* Standard output function */
   scanf("%d", &num);          /* Standard input function, reading a number */
   sum=0;                      /* initialization of variable */
   while(num>0)                /* Conditional looping statement */
   {
        digit=num%10;
        sum=sum+digit;
        num=num/10;
   }
   printf("Sum of  individual digits of given number is %d",sum);
   getch();                    /* Input function,  reading a character */
}
```

Steps to execute C program

1. Save the program filename.c Example: first.c
2. Compile the program to rectify the errors.
   Press Alt + f 9 to compile
3. Run the program to see output
   Press Ctrl + f 9 to run

TEST DATA AND OUTPUT

Enter a number : 5252
Sum of individual digits of given number is : 14

LAB PROGRAM - 2

2. Write a C-Program to check whether the given number is prime or not.

AIM: Write a C-Program to check whether the given number is prime or not.

/* A number which has only two factors i.e. 1 and itself is called " Prime number " */

ALGORITHM

Step 1 : Read num

Step 2 : Initialize count ← 0

Step 3 : for i ← 1 to num

Step 4 : if num mod i is equal to 0

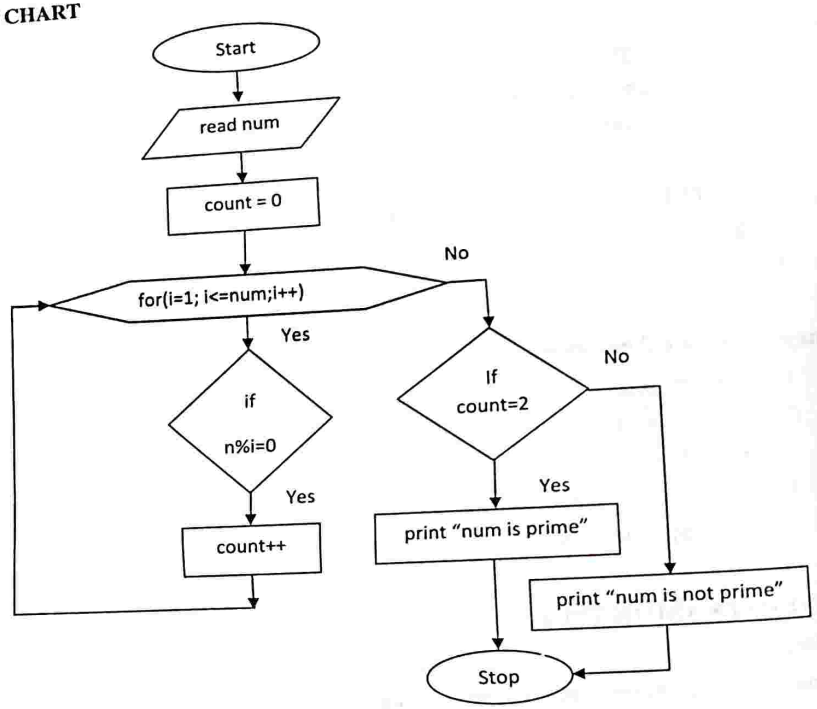
Step 5 : then increment count

Step 6 : if count is equal to 2

Step 7 : then print given number is prime

Step 8 : else print given number is not prime

FLOW CHART



PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
      int num,i,count;
      clrscr();
      printf("Enter a number  : ");
      scanf("%d",&num);
      count=0;
      for(i=1;i<=num;i++)        /* Conditional looping statement */
      {
            if(num%i==0)
            count++;
      }
      if(count==2)
      printf("Given number is prime");
      else
      printf("Given number is not prime");
      getch();
}
```

Test Data and Output:-

1). Enter a number : 6
Given number is not prime

2). Enter a number : 7
Given number is prime

LAB PROGRAM - 3

3) Write a C program to find sum of factors of a given number.

AIM: write a C program to find sum of factors of a given number.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
      int num,i,sum;
      clrscr();
      printf("Enter a number : ");
      scanf("%d",&num);
      sum=0;
      i=1;
      printf("Factors are : ");
                        /* Conditional looping statement */
      do
      {
            if(num%i==0)
            {
                  printf("\t%d",i);
                  sum=sum+i;
            }
            i++;
      }while(i<=num);
      printf("\n Sum of factors of given number is : %d",sum);
      getch();
}
```

TEST DATA AND OUTPUT

Enter a number : 5

Factors are : 1 5

Sum of factors of given number is : 6

LAB PROGRAM - 4

4) Write a C program to check whether given number is Palindrome or not.

AIM: Write a C program to check whether given number is Palindrome or not.

/* A "Palindrome number" is an n-digit number that is equal to it's reverse . */

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
      int num,rev,temp,rem;
      clrscr();
      printf("Enter a Number  : ");
      scanf("%d",&num);
      temp=num;
      rev=0;
      while(temp!=0)
      {
            rem=temp%10;
            temp=temp/10;
            rev=rev*10+rem;
      }
      if(num==rev)
      printf("Given number is Palindrome");
      else
      printf("Given number is not Palindrome");
      getch();
}
```

TEST DATA AND OUTPUT

1). Enter a number : 124

Given number is not Palindrome

2). Enter a number : 232

Given number is Palindrome

LAB PROGRAM - 5

5) Write a C program to check whether given number is Armstrong or not.

AIM: Write a C program to check whether given number is Armstrong or not.

/* An "Armstrong number" is an n-digit number that is equal to the sum of the n^{th} powers of its individual digits. */

PROGRAM:

```
#include <stdio.h>                    /* Mathematical header file */
#include<math.h>
#include<conio.h>
main()
{
     int num,temp,sum,digit,power,i,rem;
     clrscr();
     printf("Enter a Number : \n");
     scanf("%d",&num);
     sum=0;
     power=0;
     temp=num;
     while (num!=0)
     {
          power=power++;
          num=num/10;
     }
     num=temp;
     for(i=1;i<=power;i++)
     {
          rem=temp%10;
          sum=sum+pow(rem,power);          /* Calculating rem power value */
          temp=temp/10;
     }
     if (sum==num)
     {
          printf("%d is an Armstrong number", num);
     }
```



```
     else
     {
          printf("%d is not an Armstrong number", num);
     }
     getch();
}
```

TEST DATA AND OUTPUT

1). Enter a Number : 153
153 is an Armstrong number

2). Enter a Number : 248
248 is not an Armstrong number

LAB PROGRAM - 6

6) Write a C program to check whether given number is Perfect number or not.

AIM: Write a C program to check whether given number is Perfect number or not.

/* A ***perfect number*** is a number such that the sum of its factors including 1 and excluding itself is equal to the number. */

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
     int num,i=1,sum=0;
     clrscr();
     printf("Enter a number: ");
     scanf("%d",&num);
     while(i<num)
     {
          if(num%i==0)
          sum=sum+i;
          i++;
     }
     if(sum==num)
     printf("%d is a perfect number\n", num);
     else
     printf("%d is not a perfect number", num);
     getch();
}
```

TEST DATA AND OUTPUT

1). Enter a number: 28
28 is a perfect number

2). Enter a number: 153
153 is not a perfect number

LAB PROGRAM - 7

7. Write a C program to find the roots of a quadratic equation.

AIM: Write a C program to find the roots of a quadratic equation.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
     float a,b,c,d,r1,r2,imp,rp;
     clrscr();
     printf("Enter a,b,c:");
     scanf("%f%f%f",&a,&b,&c);
     d=b*b-4.0*a*c;
     if(d==0)
     {
          printf("roots are real and equal");
          r1= -b/2*a;
          r2=r1;
          printf("root1=%f",r1);
          printf("root2=%f",r2);
     }
     else if(d>0)
     {
          printf("roots are real and unequal");
          r1=(-b+sqrt(d))/2*a;
          r2=(-b-sqrt(d))/2*a;
          printf("root1=%f",r1);
          printf("root2=%f",r2);
     }
     else if(d<0)
     {
          d=-d;
          printf("roots are complex");
```

```
            rp= -b/2*a;
            imp=sqrt(d)/2*a;
            printf("root1=%f+i%f",rp,imp);
            printf("root2=%f-i%f",rp,imp);
        }
        getch();
}
```

TEST DATA AND OUTPUT

1). Enter a,b,c : 1 1 1
roots are complex
root1=-0.500000+i0.866025
root2=-0.500000-i0.866025

2). Enter a,b,c : 1 2 1
roots are real and equal
root1= -1.000000
root2= -2.000000

3). Enter a,b,c : 1 3 1
roots are real and unequal
root1= -0.381966
root2= -2.618034

LAB PROGRAM - 8

8). Write a C- program to find both the largest and smallest number in list of integers using arrays

AIM: Write a C- program to find both the largest and smallest number in list of integers using arrays

PROGRAM

```
#include <stdio.h>
#include <conio.h>
void main()
{
     int i,n,small=0,large=0;
     int a[30];
     clrscr();
     printf("\n Enter size of the array:");
     scanf("%d",&n);
     printf("\n Enter values in array elements:");
     for(i=0;i<n;i++)
     {
          scanf("%d",&a[i]);
     }
    small = a[0];
    for(i=0;i<n;i++)
    {
         if(small > a[i])
            small = a[i];
    }
    printf("\n The smallest element in given array is:%d",small);
    large=0;
    for(i=0;i<n;i++)
    {
        if(large < a[i])
           large = a[i];
    }
    printf("\n The largest element in given array is:%d",large);
```

```
    getch();
}
```

TEST DATA AND OUTPUT

Enter size of the array : 6
Enter values in array elements: 25 12 5 56 98 89
The smallest element in given array is : 5
The largest element in given array is : 98

LAB PROGRAM - 9

9). Write a C program to sort elements of an array.

AIM: Write a C program to sort elements of an array.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,a[30],i,j,temp;
clrscr();
printf("Enter size of the array : ");
scanf("%d",&n);
for(i=0;i<n;i++)
{
     printf("Enter value for a[%d] : ",i);
     scanf("%d",&a[i]);
}
for(i=0;i<n-1;i++)
{
     for(j=i+1;j<n;j++)
     {
          if(a[i]>a[j])
          {
               temp=a[j];
               a[j]=a[i];
               a[i]=temp;
          }
     }
}
printf("Sorted elements are \n");
for(i=0;i<n;i++)
printf("\na[%d]  :  %d",i,a[i]);
getch();
}
```

TEST DATA AND OUTPUT

Enter size of the array : 8
Enter value for a[0] : 25
Enter value for a[1] : 65
Enter value for a[2] : 45
Enter value for a[3] : 31
Enter value for a[4] : 10
Enter value for a[5] : 79
Enter value for a[6] : 1
Enter value for a[7] : 49

Sorted elements are

a[0] : 1
a[1] : 10
a[2] : 25
a[3] : 31
a[4] : 45
a[5] : 49
a[6] : 65
a[7] : 79

LAB PROGRAM - 10

10) Write a C program for Matrix Addition and Subtraction using Arrays.

AIM: Write a C program for Matrix Addition and Subtraction using Arrays.

PROGRAM

```
#include <stdio.h>
#include<conio.h>
void main()
{
     int a[10][10],
     b[10][10],c[10][10],d[10][10],m,n,i,j,k,p,q;
     /* a,b,c and d are Array variables */
     clrscr();
     printf(" Enter no. of Rows and Columns for Matrix A:\n");
     scanf("%d%d",&m,&n);
     printf(" Enter no. of Rows and Columns for Matrix B:\n");
     scanf("%d%d",&p,&q);
     if(m==p && n==q)
     {
          printf("Enter the Elements of Matrix A \n");
          for(i=0;i<m;i++)
          for(j=0;j<n;j++)
          {
               scanf("%d",&a[i][j]);     /* Dynamic initialization of Array a */
          }
          printf("Enter the Elements of Matrix B \n");
          for(i=0;i<p;i++)
          for(j=0;j<q;j++)
          {
               scanf("%d",&b[i][j]);
               c[i][j]=a[i][j]+b[i][j];     /* Addition of Matrix a and b */
               d[i][j]=a[i][j]-b[i][j];     /* Subtraction of Matrix a and b */
          }
          printf(" \nMatrix Addition is \n" );
          for (i=0;i<m;i++)
```

```
        {
            for (j=0;j<n;j++)
            {
                printf ("%d \t", c[i][j]);
            }
            printf("\n");
        }
        printf(" \nMatrix Subtraction is \n" );
        for (i=0;i<m;i++)
        {
            for (j=0;j<n;j++)
            {
                printf ("%d \t", d[i][j]);
            }
            printf("\n");
        }
    }
    else
    printf("Matrix Addition and Subtraction is not Possible");
    getch( );
}
```

TEST DATA AND OUTPUT

1). *Enter no. of Rows and Columns for Matrix A:*

3 3

Enter no. of Rows and Columns for Matrix B:

3 3

Enter the Elements of Matrix A

1 2 3

4 5 6

7 8 9

Enter the Elements of Matrix B

1 0 0

2 6 4

9 5 3

Matrix Addition is

2 2 3

6 11 10

16 13 12

Matrix Subtraction is

0 2 3

2 -1 2

-2 3 6

2). Enter no. of Rows and Columns for Matrix A:

3 3

Enter no. of Rows and Columns for Matrix B:

4 4

Matrix Addition and Subtraction is not Possible

LAB PROGRAM - 11

11) Write a C program for Matrix Multiplication using Arrays.

AIM: Write a C program for Matrix Multiplication using Arrays.

PROGRAM

```
#include <stdio.h>
#include<conio.h>
void main()
{
     int a[10][10], b[10][10],c[10][10], m,n,i,j,k,p,q;
     clrscr();
     printf(" Enter no. of Rows and Columns for Matrix A:\n");
     scanf("%d%d",&m,&n);
     printf(" Enter no. of Rows and Columns for Matrix B:\n");
     scanf("%d%d",&p,&q);
     if(n==p)
     {
          printf("Enter the Elements of Matrix A \n");
          for(i=0;i<m;i++)
          for(j=0;j<n;j++)
          {
               scanf("%d",&a[i][j]);
          }
          printf("Enter the Elements of Matrix B \n");
          for(i=0;i<p;i++)
          for(j=0;j<q;j++)
          {
               scanf("%d",&b[i][j]);
          }
          for (i=0;i<m;i++)
          for (j=0; j<q; j++)
          {
               c[i][j] =0;
               for (k=0;k<n;k++)
               c[i][j] = c[i][j]+ a[i][k] * b[k][j];
```



```
               /* Multiplication of  Matrix a and b */
          }
          printf(" Matrix Multiplication is \n" );
          for (i=0;i<m;i++)
          {
               for (j=0;j<q;j++)
               {
                    printf ("%d \t", c[i][j]);
               }
               printf("\n");
          }
     }
     else
     printf("Matrix Multiplication is not Possible");
     getch( );
}
```

TEST DATA AND OUTPUT

1). Enter no. of Rows and Columns for Matrix A:

3 3

Enter no. of Rows and Columns for Matrix B:

3 3

Enter the Elements of Matrix A

1 2 3

4 5 6

7 8 9

Enter the Elements of Matrix B

1 0 0

0 1 0

0 0 1

Matrix Multiplication is

1 2 3

4 5 6

7 8 9

2). Enter no. of Rows and Columns for Matrix A:

2 3

Enter no. of Rows and Columns for Matrix B:

2 3

Matrix Multiplication is not Possible

LAB PROGRAM - 12

12). Write a C- program to count the lines, words, characters in a given text.

AIM: Write a C- program to count the lines, words, characters in a given text.

PROGRAM

```
#include <conio.h>
#include <stdio.h>
void main()
{
    char text[200];
    int i,l,ch,w,sp;
    clrscr();
     i=0;
     printf("\n Enter lines of text and press ^Z\n");
     while((text[i]=getchar())!=EOF)
     {
          i++;
     }
     printf("\n The number of characters is %d",i);
     text[i]='\0';
     l=0;
     ch=w=sp=0;
     for(i=0;text[i]!='\0';i++)
    {
          ch++;
          if(text[i]==32 && text[i+1] != ' ')
          {
                    w++;
                    sp++;
          }
          if(text[i] == '\n')
          {
               l++;
               w++;
          }
```

```
     }
     printf("\n Total sizeof the text : %d",ch);
     printf("\n Number of words : %d",w+1);
     printf("\n Number of Lines : %d",l+1);
     printf("\n number of spaces : %d",sp);
     getch();
}
```

Test and output data

Enter lines and press ^Z.

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```
        }
        printf("\n Total size of the text : %d",ch);
        printf("\n Number of Words : %d",w+1);
        printf("\n Number of Lines : %d",l+1);
        printf("\n Number of Spaces : %d",sp);
        getch();
}
```

TEST DATA AND OUTPUT

Enter lines of text and press ^Z
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The number of characters is 55
Total size of the text : 55
Number of Words : 7
Number of Lines : 3
Number of Spaces : 4

LAB PROGRAM - 13

13) Write a C-Program for the comparison of two strings

AIM: Write a C-Program for the comparison of two strings

PROGRAM

```
#include<stdio.h>
#include<conio.h>
#include<string.h>
void main()
{
     char str1[20],str2[20];
     clrscr();
     printf("Enter first string:");
     gets(str1);                          /* Reading a string*/
     printf("Enter second string:");
     gets(str2);
     if(strcmp(str1,str2)<0)              /*Comparing two strings */
     printf("%s is less than %s",str1,str2);
     else if(strcmp(str1,str2)>0)
     printf("%s is greater than %s",str1,str2);
     else
     printf("%s is equal to %s",str1,str2);
     getch();
}
```

TEST DATA AND OUTPUT

1). Enter first string: HELLO
Enter second string: HAI
HELLO is greater than HAI

2). Enter first string: HELLO
Enter second string: HAI
HELLO is greater than HAI

3). Enter first string: HAI
Enter second string: HAI
HAI is equal to HAI

LAB PROGRAM - 14

14) Write a C-Program for sorting strings using pointers.

AIM: Write a C-Program for sorting strings using pointers.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<alloc.h>
void main()
{
     char *x[20],t[20];              /* Declaration of pointer variable x */
     int i,j,n;
     clrscr();
     printf("Enter number of Strings : ");
     scanf("%d",&n);
     printf("\n");
     printf("Enter the Strings : \n");
     for(i=0;i<n;i++)
     {
          x[i]=(char*)malloc(20*sizeof(char));
            /*Dynamic memory allocation for x */
          scanf("%s",x[i]);
     }
     for(i=0;i<n;i++)
    for(j=i+1;j<n;j++)
    if(strcmp(x[i],x[j])>0)
    {
          strcpy(t,x[j]);          /* Copying one string to another */
          strcpy(x[j],x[i]);
          strcpy(x[i],t);
    }
    printf("\n Sorted list is :\n  ");
    for(i=0;i<n;i++)
    {
```



```
          printf("\n%s",x[i]);
     }
     getch();
}
```

TEST DATA AND OUTPUT

Enter number of Strings : 5

Enter the Strings :

RAJ

KHAN

ROHAN

AMAL

BHANU

Sorted list is :

AMAL

BHANU

KHAN

RAJ

ROHAN

LAB PROGRAM - 15

15) Write a C-Program to calculate factorial of a given number by using recursion

AIM: Write a C-Program to calculate factorial of a given number by using recursion

PROGRAM

```
#include<stdio.h>
#include<conio.h>
 long int fact(long  int);       /* Function prototype*/
void main()
{
      long int  n,f;
      clrscr();
      printf("Enter a positive value:");
      scanf("%ld",&n);
      f=fact(n);                        /*Function call */
      printf("\nFactorial of %ld  is : %ld",n,f);
      getch();
}
long int fact(long int n)        /*Function definition */
{
     long int value=1;
     if(n==1)
      return(1);
     else
     {
          value=n*fact(n-1);    /* Function calling itself */
          return(value);
     }
}
```

TEST DATA AND OUTPUT

Enter a positive value:7

Factorial of 7 is : 5040

LAB PROGRAM - 16

16) Write a C-Program for swap two numbers using call by reference.

AIM: Write a C-Program for swap two numbers using call by reference.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void swap(int *num1,int *num2);
void main()
{
      int x,y;
      printf("\nEnter First number : ");
      scanf("%d",&x);
      printf("\nEnter Second number : ");
      scanf("%d",&y);
      printf("\n Before Swapping x = %d and y = %d",x,y);
      swap(&x,&y);          /* Function Call - by Reference */
      printf("\n After Swapping x = %d and y = %d",x,y);
      getch();
}
void swap(int *num1,int *num2)
{
      int temp;
      temp = *num1;
      *num1 = *num2;
      *num2 = temp;
}
```

TEST DATA AND OUTPUT

Enter First number : 45

Enter Second number : 10

Before Swapping x = 45 and y = 10

After Swapping x = 10 and y = 45

LAB PROGRAM - 17

17) Write a C-Program to create student details by using Structures.

AIM: Write a C-Program to create student details by using Structures.

PROGRAM

```
#include<stdio.h>
#include<conio.h>
#include<string.h>
struct student                          /*Structure definition */
{
     int sno,sub1,sub2,sub3,total;
     char sname[20],res[10],grade[20];
     float avg;
}s[10];                                 /* Declaration of Structure variable */
int i,j,n;
void read()
{
     printf("Enter how many number of students : ");
     scanf("%d",&n);
     for(i=0;i<n;i++)
     {
          printf("Enter student no:");
          scanf("%d",&s[i].sno);        /*Accessing structure elements */
          printf("Enter student name:");
          scanf("%s",&s[i].sname);
          printf("Enter 3 subjects marks:");
          scanf("%d%d%d",&s[i].sub1,&s[i].sub2,&s[i].sub3);
     }
}
void calculate()

     for(i=0;i<n;i++)
     {
          s[i].total=s[i].sub1+s[i].sub2+s[i].sub3;
          s[i].avg=(float)s[i].total/3;
```



```
          if(s[i].sub1>=35 && s[i].sub2>=35 && s[i].sub3>=35)
          {
             strcpy(s[i].res,"PASS");   /*Copying one string to another */
             if(s[i].avg>=75)
                    strcpy(s[i].grade,"A");
             else if(s[i].avg>=60)
                    strcpy(s[i].grade,"B");
             else if(s[i].avg>=50)
                    strcpy(s[i].grade,"C");
             else
                    strcpy(s[i].grade,"D");
          }
          else
          {
                 strcpy(s[i].res,"Fail");
                 strcpy(s[i].grade,"E");
          }
     }
}
void display()
{
     for(i=0;i<n;i++)
     {
          printf("\n\nStudent no : %d",s[i].sno);
          printf("\nStudent name : %s",s[i].sname);
          printf("\nSubject 1      : %d",s[i].sub1);
          printf("\nSubject 2      : %d",s[i].sub2);
          printf("\nSubject 3      : %d",s[i].sub3);
          printf("\nTotal          : %d",s[i].total);
          printf("\nAverage        : %f",s[i].avg);
          printf("\nResult         : %s",s[i].res);
          printf("\nGrade          : %s",s[i].grade);
     }
}
```

void main() {
clrscr();
read();
calculate();
display();
getch(); }

```
void main()
{
      clrscr();
      read();
      calculate();
      display();
      getch();
}
```

TEST DATA AND OUTPUT

```
Enter how many number of students : 2
Enter student no:101
Enter student name:RAJ
Enter 3 subjects marks:56      65    78
Enter student no:102
Enter student name:KHAN
Enter 3 subjects marks:65      45    25
Student no      : 101
Student name    : RAJ
Subject 1       : 56
Subject 2       : 65
Subject 3       : 78
Total           : 199
Average         : 66.33
Result          : PASS
Grade           : B
Student no      : 102
Student name    : KHAN
Subject 1       : 65
Subject 2       : 45
Subject 3       : 25
Total           : 135
Average         : 45.00
Result          : Fail
Grade           : E
```


LAB PROGRAM - 18

18) Write a C-Program to perform write and read file operations.

AIM: Write a C-Program to perform write and read file operations

PROGRAM

```
#include<stdio.h>
#include<conio.h>
void main()
{
      FILE *fp;
      char ch;
      printf("\n Write the data into a file, ctrl+z to stop writing\n");
      fp=fopen("hello.txt","w");
      while((ch=getchar())!=EOF)
      {
            putc(ch,fp);
      }
      printf("\n One file is created\n");
      fclose(fp);
      printf("\n Reading data from a file\n");
      fp=fopen("hello.txt","r");
      while((ch=getc(fp))!=EOF)
      {
            printf("%c",ch);
      }
      getch();
}
```

TEST DATA AND OUTPUT

```
Write the data into a file, ctrl+z to stop writing
c is powerful, flexible, portable and structured programming language ^Z
One file is created
Reading data from a file
c is powerful, flexible, portable and structured programming language.
```