INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

Lab Manual:

PROGRAMMING FOR PROBLEM SOLVING USING C LABORATORY (ACSC05)

Prepared by

Ms. J Alekhya
ASSISTENT PROFESSOR, CSE(Cyber Security)

Department of Computer Science and Engineering(CS)
Institute of Aeronautical Engineering

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Course Information

1 Introduction

The Student should become familiar with the Net Beans 8.0.2 , JDK 7.0 in the lab, the course requirements, and the teaching instructor.Student should also make sure that they have all the co requisites and pre-requisites for the course at this time.

1.1 Student Responsibilities

The student is expected to be prepared for each lab. Lab preparation includes reading the lab experiment and related textbook material. If you have questions or problems with the preparation, contact your Laboratory Teaching faculty, but in a timely manner. Do not wait until an hour or two before the lab and then expect the lab faculty to be immediately available. Active participation by each student in lab activities is expected. The student is expected to ask the laboratory faculty any questions they may have.

A large portion of the student's grade is determined in the comprehensive final exam, resulting in a requirement of understanding the concepts and procedure of each lab experiment for the successful completion of the lab class. The student should remain alert and use common sense while performing a lab experiment. They are also responsible for keeping a professional and accurate record of the lab experiments in the lab manual wherever tables are provided. Students should report any errors in the lab manual to the teaching assistant.

1.2 Laboratory Faculty Responsibilities

The laboratory faculty shall be completely familiar with each lab prior to class. The laboratory faculty shall provide the students with a syllabus and safety review during the first class. The syllabus shall include the laboratory faculty office hours, telephone number, and the name of the faculty coordinator. The laboratory faculty is responsible for ensuring that all the necessary equipment and/or preparations for the lab are available and in working condition. Lab experiments should be checked in advance to make sure everything is in working order. The laboratory faculty should fully answer any questions posed by the students and supervise the students performing the lab experiments. The laboratory faculty is expected to grade the lab notebooks and reports in a fair and timely manner. The reports should be returned to the students in the next lab period following submission. The laboratory faculty should report any errors in the lab manual to the faculty coordinator.

1.3 Faculty Co-ordinator Responsibilities

The faculty coordinator should ensure that the laboratory is properly equipped, i.e., that the teaching assistants receive any equipment necessary to perform the experiments. The coordinator is responsible for supervising the teaching assistants and resolving any questions or problems that are identified by the teaching assistants or the students. The coordinator may supervise the format of the final exam for the lab. They are also responsible for making any necessary corrections to this manual and ensuring that it is continually updated and available.

1.4 Lab Policy and Grading

The student should understand the following policy

Attendance

Attendance is mandatory and any absence must be for a valid excuse and must be documented.If the instructor is more than 15 minutes late, students may consider lab for the day cancelled.

Lab Records

The student must: 1. Perform the Pre Lab assignment before the beginning of each lab, 2. Keep all work in preparation of and obtained during lab; and 3. Prepare a lab report on experiments selected by the laboratory faculty.

Grading Policy

The final grade of this course is determined using the criterion detailed in the syllabus.

Instructions to Students

Before entering the lab the student should carry the following things (MANDATORY)

o Identity card issued by the college.

o Work Sheets

- Student must sign in and sign out in the register provided when attending the lab session without fail.
- Come to the laboratory in time. Students, who are late more than 15 min., will not be allowed to attend the lab.
- Students need to maintain 100% attendance in lab if not a strict action will be taken.
- All students must follow a Dress Code while in the laboratory
- Foods, drinks are NOT allowed.
- All bags must be left at the indicated place.
- Refer to the lab staff if you need any help in using the lab.
- Respect the laboratory and its other users.
- Workspace must be kept clean and tidy after experiment is completed.
- Read the Manual carefully before coming to the laboratory and be sure about what you are supposed to do.
- Do the experiments as per the instructions given in the manual.
- Copy all the programs to observation which are taught in class before attending the lab session.
- Students are not supposed to use floppy disks, pen drives without permission of lab- incharge.
- Lab records need to be submitted on or before the date of submission.
- Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
- Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.
- Students must take the permission of the faculty in case of any urgency to go out; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.
- Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

1.5 Course Goals and Objectives

Goal:
The goal of the laboratory course is to introduces students for writing computer programs. This course presents the principles of structured programming using the R language, one of the most increasingly preferred languages for data analysis today. Because of its ease of use, it is ideal as a first programming language and runs on both the PC and Macintosh platforms. However, the knowledge gained in the course can be extended for machine learning applications. The course uses RStudio to afford a more interactive experience. Topics include fundamentals of Basic Syntaxes of R, Central tendency

measures, dispersion measures, visualizations and linear models.

Objectives:

Students will try to learn:
- Acquire logical thinking and identify efficient ways of solving problems using C programming language.
- . Develop programs by using decision making, branching and looping constructs.
- . Implement real time applications using the concept of array, pointers, functions and structures.

2 Data Recording and Reports

2.1 The Laboratory Note book

Students must write their experimental outputs in the provided tables in this laboratory manual and reproduce them in the lab reports. Reports are integral to recording the methodology and results of an experiment. In engineering practice, the laboratory notebook serves as an invaluable reference to the technique used in the lab and is essential when trying to duplicate a result or write a report. Therefore, it is important to learn to keep accurate data. Make plots of data and sketches when these are appropriate in the recording and analysis of observations. Note that the data collected will be an accurate and permanent record of the data obtained during the experiment and the analysis of the results. You will need this record when you are ready to prepare a lab report.

2.2 The Lab Report

Reports are the primary means of communicating your experience and conclusions to other professionals. In this course you will use the lab report to inform your laboratory faculty about what you did and what youhave learned from the experience.Engineering results are meaningless unless they can be communicated to others. You will be directed by your laboratory faculty to prepare a lab report on a few selected lab experiments during the semester.Your assignment might be different from your lab partner's assignment.

Your laboratory report should be clear and concise.The lab report shall be typed on a word processor.As a guide,use the format on the next page.Use tables,diagrams, sketches, as necessary to show what you did, what was observed, and what conclusions you can draw from this. Even though you will work with one or more lab partners, your report will be the result of your individual effort in order to provide you with practice in technical communication.

Formatting and Style
- The lab report shall be typed in a word processor.
- All page margins must be 1.25 inches. All content (including text, figures, tables, etc.) must fit within the margins.
- Body text should be double-spaced.
- Basic text should be in 12-point size in a commonly used text font.
- Set your main text justified (with even left/right margins).
- The first line of each paragraph should have a left indent.
- All the tables should have titles and should be numbered. Tables should be labeled numerically as Table 1, Table 2, etc. Table captions appear above the table. The column headings should be labeled with the units specified.
- Use MS-Word equation (under Insert Equation menu), MathType, or a similar tool to type formulas.
- If you need to copy a schematic or figure from the lab manual to your report, use Copy and Paste function or take a screenshot by using Snipping Tool in MS-Windows.
- Do not place screenshots of your lab notebook in the report! Diagrams, tables, calculations, etc. must be generated using the existing tools in the word processor.

2.3 Order of Lab Report Components

Coverpage

Cover page must include lab name and number, your name and the date the lab was performed.

Objective

Clearly state the experiment objective in your own words.

Software Needed

Indicate which software was used in performing the experiment.

For Each Part of the Lab

- Write the lab's part number and title in bold font. Firstly, describe the problem that you studied in this part, give an introduction of the theory, and explain why you did this experiment.Do not lift the text from the lab manual; use your ownwords.
- Secondly,describe the experimental setup and procedures.Do not follow the lab manual in listing out individual pieces of equipment and assembly instructions.That is not relevant information in a lab report! Your description should take the form of a narrative, and include information not present in the manual,such as descriptions of what happened during intermediate steps of the experiment.
- Thirdly,explain your findings. This is the most important part of your report,because here,you show that you understand the experiment beyond the simple level of completing it. Explain(compare expected results with those obtained). Analyse (analyze experimental error). Interpret(explain your results in terms of theoretical issues and relate to your experimental objectives).All the results should be presented even if there is any inconsistency with the theory. It should be possible to understand what is going only just reading through the text paragraphs, without looking at the figures.
- Finally, provide a summary of what was learned from this part of the laboratory experiment.If the results seem unexpected or unreliable,discuss them and give possible explanations.

Conclusion

The conclusion section should provide a take-home message summing up what has been learned from the experiment:

- Briefly restate the purpose of the experiment (the question it was seeking to answer)
- Identify the main findings (answer to the research question)
- Note the main limitations that are relevant to the interpretation of the results
- Summarize what the experiment has contributed to your understanding of the problem.

Probing Further Experiments

Questions pertaining to this lab must be answered at the end of laboratory report.

Lab-Orientation

Introduction

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Objective

a) To debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

RESOURCES

Dev C++5.11.

Lab 1 - OPERATORS AND EVALUATION OF EXPRESSIONS

INTRODUCTION

The Student should become familiar with the Net Beans 8.0.2 , JDK 7.0 in the lab, the course requirements, and the teaching instructor.Student should also make sure that they have all the core requisites and pre-requisites for the course at this time.

OBJECTIVE:

e) Design and develop a flowchart and algorithm to read a number and implement using a C program to check whether the given number is even or odd using ternary operator.

PROGRAM LOGIC:

```
1.Start
2. Read n
3. (n%2==0 ? ”EVEN” : ”ODD”)
4. Display EVEN if n%2==0
5. Otherwise ODD
6. Stop
```

SOURCE CODE:

```
#include ≤ stdio.h ≥
intmain()
{
intnum; //TernaryOperators
printf(”Enterthevalueofnum : ”);
scanf(”%d”, &num)
(num%2 == 0)
printf(”EVEN”);
printf(”ODD”);
return0;
}
```

OUTPUT:

```
Enter the value of num:3
ODD
```

OBJECTIVE:

f) Design and develop a flowchart and algorithm to read two integers and implement using a C program to perform the addition of two numbers without using+operator.

PROGRAM LOGIC:

```
1.Start
2. Read a,b
3. sum = a -  b -1
4. Display the value of sum
5. Stop.
```

SOURCE CODE:

```
#include¡stdio.h¿
int main()
{
int a,b,i;
printf(”Enter the values of a and b”);
scanf(”%d%d”,&a,&b);
for(i=1;i¡=b;i++)
a++;
printf(”The sum of two numbers is %d”,a);
}
```

OUTPUT:

```
Enter the values of a and b:
10 20
The sum of two numbers is 30
```

VIVA QUESTIONS:

1. Who is the father of C language?
2. Which operator takes only integer operands?
3. C programs are converted into machine language with the help of

   (a) An editor

   (b) A compiler

   (c) An operating system

   (d) None

4. C was primarily developed as

   (A) System programming language

   (B) General purpose language

   (C) Data processing language

   (D) None

5. How many keywords are recognized by standard ANSI C?
6. Why variable names beginning with underscore is not encouraged?
7. In C programming language, which of the following types of operators will have highest precedence

a. Relational operators
b. Equality operators
c. Logical operators
d. Arithmetic operators

8. If i,j,k are integer variables with values 1,2 3 respectively, then what is the value of the expression !((j+k) ¿ (i+5)?
9. Arrange these operators ., — —, ¡, =, if arranged in ascending order of precedence?
10. The format identifier “%i” is used for which data type?

OBJECTIVE:

g) Develop a C program to evaluate the following arithmetic expressions by reading appropriate input from the standard input device. Understand the priority of operators while evaluating expressions.

i. 6*2/(2+1 * 2/3 +6) +8 * (8/4)

ii. 17 – 8 / 4 * 2 + 3 - ++2
iii. ! (x ¿ 10) && (y = = 2)

PROGRAM LOGIC:

1. Start the program
2. Create a class with the name Fibnon.
3. Declare the int variables n, n1.
4. Create an object for predefined class Random and generate a random using nextInt()
5. In main() create an object for fib1 class and call the method fibc() using the object

SOURCE CODE:

```
#include¡stdio.h¿ int main()
{
int x=2,y=2,exp_2;
float exp_1;//6*2/( 2+1 * 2/3 +6) +8 * (8/4)
float a=6*2;
float b=(2+1 * 2/3 +6);
float c= (8/4);
exp_1 = a/b+8*c;
//printf(”The value of a/b is :%f”,a/b);
exp_2 = ! ( x ¿ 10 ) && ( y == 2 );
printf(”The value of exp_1 is %f”,exp_1);
printf(”The value of b is %f”,b);
printf(”The value of exp_2 is %d”,exp_2);

}
```

OUTPUT:

```
The value of exp_1 is 17.500000
The value of b is 8.000000
The value of exp_2 is 1
```

OBJECTIVE:

h. Develop a C program to display the size of various built-in data types in C language.

SOURCE CODE:

```
#includestdio.h
main()
{
int a;
char ch;
float f;
double d;
long l;
short s;
printf(”Integer %d”,sizeof(a));
printf(”Character %d”,sizeof(ch));
printf(”Float %d”,sizeof(f));
printf(”Double %d”,sizeof(d));
printf(”Long %d”,sizeof(l));
printf(”Short %d”,sizeof(s));

}
```

OUTPUT:

```
Integer 4
Character 1
Float 4
Double 8
Long 8
Short 2
```

VIVA QUESTIONS:

1. Identify the operators whose meaning is contextdependent?
2. Evaluate the following expression 4 + 6 / 3 * 2 – 2 + 7 %3?
3. Which variables can be accessed by all modules in a program?
4. If integer needs 4 bytes of storage, then what is the maximum value of a signed integer?
5. If ASCII value of ’x’ is 120, then what is the value of the H, if H = (’x’ – ’w’) / 3;
6. What is the usage of goto statement in C language?
7. If switch feature is used, then
a. default case must be present
b. default case, if used, should be the last case
c. default case, if used, can be placed anywhere
d. none
8. The switch feature
a. Can always be replaced by a nested if then else clause
b. Enhances logical clarity
c. Can’t always be replaced by a nested if-then-else clause
9. Both (a) and (b) Which function is used to read character as you type? Which format specifier is used to print the values of double type variable?

Lab 2 - CONTROL STRUCTURES

OBJECTIVE:

a)Design and develop a flowchart and algorithm to read a year as an input and find whether it is leap year or not. Implement a C program for the same and execute for all possible inputs with appropriate messages. Also consider end of the centuries.

SOURCE CODE:

```
#include¡stdio.h¿
int main()
{
int year;
printf(”Enter the year:”);
scanf(”%d”,&year);
if((year%4==0) && (year%100!=0) ——(year%400==0))
printf(”It is a Leap year”);
else
printf(”It is not a leap Year”);
}
```

OUTPUT:

```
Enter the year:
2020
It is a Leap year
Enter the year:
2001
It is not a leap Year
```

OBJECTIVE:

b. Design and develop a flowchart and algorithm to find the square root of a given number N. Implement a C program for the same and execute for all possible inputs with appropriate messages. (Note: Dont use library function sqrt(n), Hint: Use Newton-Raphson method to find the square root)

SOURCE CODE:

```
#include¡stdio.h¿
int main()
{
int n,s,i;
printf(”Enter the value of n:”);
scanf(”%d”,&n);
if(n¿0)
{
s=n/2;
for(i=0;i¡n;i++)
{
s = (s+n/s)/2;
printf(”%d”,s);
}
printf(”The square root of %d is %d ”,n,s);
}
}
```

OUTPUT:

```
Enter the value of n:
```

```
10
3
3
3
3
3
3
3
3
3
3
The square root of 10 is 3
```

OBJECTIVE:

c. Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Implement a C program for the developed flowchart/algorithm and execute the same to generate the first N terms of the sequence.

SOURCE CODE:

```
#includestdio.h
int main()
{
int fib_a=0,fib_b=1,fib_c,n;
printf(”Enter the range:”);
scanf(”%d”,&n);
printf(”The Fibonacci Series is:”);
printf(”%d %d”,fib_a,fib_b);
while(n)
{
fib_c = fib_a+fib_b;
printf(”%d”,fib_c);
fib_a=fib_b;
fib_b=fib_c;
n–;
}
}
```

OUTPUT:

```
Enter the range:
5
The Fibonacci Series is:
0
1
1
2
3
5
8
```

OBJECTIVE:

d. Design and develop a flowchart and algorithm that takes three coefficients (a, b, and c) of a Quadratic equation (ax2+bx+c=0) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

SOURCE CODE:

```
#include¡stdio.h¿
#include¡math.h¿
int main()
{
float r1,r2,a,b,c,dis=0;
printf(”Enter the values of a,b and c:”);
scanf(”%f%f%f”,&a,&b,&c);
dis = sqrt(b*b-4*a*c);
if(dis==0)
{
r1 = -b/2*a;
r2 = -b/2*a;
printf(”The Roots are Equal”);
printf(”The Roots are %f and %f”,r1,r2);
}
else if(dis¿0)
{

r1 = (-b+dis)/2*a;
r2 = (-b-dis)/2*a;
printf(”The Roots are Real and Distinct”);
printf(”The Roots are %f and %f”,r1,r2);
}
else
printf(”The Roots are Imaginary”);
}
```

OUTPUT:

```
Enter the values of a,b and c:
10 20 30
The Roots are Imaginary
```

VIVA QUESTIONS:

What are the two types of flow control used?
2. What do you mean by looping?
3. What is the difference between while and do while loop?
4. Which loop is known as entry controlled loop?
5. Which loop is known as exit control loop?
6. What are the two commands to control the loop?
7. In which loop the test condition is tested at the end of the loop?
8. What is a prime number
9. Which decision making statement is used to check the determinant value of a quadratic equation?
10. Using which operator we can write multiple conditions in an if statement?

Lab 3 - CONTROL STRUCTURES

OBJECTIVE:

a. Design and develop an algorithm to find the reverse of an integer number N and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: N: 2020, Reverse: 0202, Not a Palindrome

SOURCE CODE:

```
#include ¡stdio.h¿
int main()
{
int n, reversed = 0, remainder, original;
printf(”Enter an integer: ”);
scanf(”%d”, &n);
original = n;

// reversed integer is stored in reversed variable
while (n != 0)
{
remainder = n % 10;
reversed = reversed * 10 + remainder;
n /= 10;
}

// palindrome if orignal and reversed are equal
if (original == reversed)
printf(”Reverse: %d is a palindrome.”, original);
else
printf(”Reverse: %d is not a palindrome.”, original);

return 0;
}
```

OUTPUT:

```
Enter an integer: 23
Reverse: 23 is not a palindrome.
Enter an integer: 1221
Reverse: 1221 is a palindrome.
```

OBJECTIVE:

d. Design and develop an algorithm for evaluating the polynomial f(x) = a4x 4+ a3x3+ a2x2+ a1x1+ a0, for a given value of x and its coefficients using Horners method. Implement a C program for the same and execute the program for different sets of values of coefficients and x.

SOURCE CODE:

```
#include¡stdio.h¿
#include¡math.h¿
int main()
{
int arr[5];
int x,i,s=0
printf(”Enter x value:”);
scanf(”%d”,&x);
printf(”Enter co-effecients a0 a1 a2 a3 a4 :”);
for (i=0;i¡=4;i++)
{
scanf(”%d”,&arr[i]);
}

for (i=0;i¡=4;i++)
{
s+=arr[i]*pow(x,i);
}
printf(”%d”,s);
return 0;
}
```

OUTPUT:

```
Enter x value:1
Enter co-effecients a0 a1 a2 a3 a4 :1 2 3 4 5
15
```

VIVA QUESTIONS:

What is a null statement?

2. How would you decide the use of one of the three loops in C for a given problem?
3. Give a typical example where we find the application of gotonecessary?
4. How can we use for loops when the number of iterations are not known?
5. Compare in terms of their functions, between while and do. . . while loops?
6. In an exit-controlled loop, if the body is executed n times, then the test condition isevaluated how many times?
7. Do you think in a for loop expression, the starting value of the control variable must be less than its ending value?
8. Do you think the use of continue statement is considered as unstructuredprogramming?
9. Write a for statement to print each of the sequences of integers 1, 2, 4, 8, 16,
10. Change the following for loop to while loop for(m = 1;m ¡ 10; m = m + 1) printf(m)

Lab 4 - ARRAYS

OBJECTIVE:

e. Develop, implement and execute a C program to read a list of integers and store it in a single dimensional array. Write a C program to print the second largest integer in a list of integers.

RESOURCES:

Dev C++ 5.02

PROGRAM LOGIC:

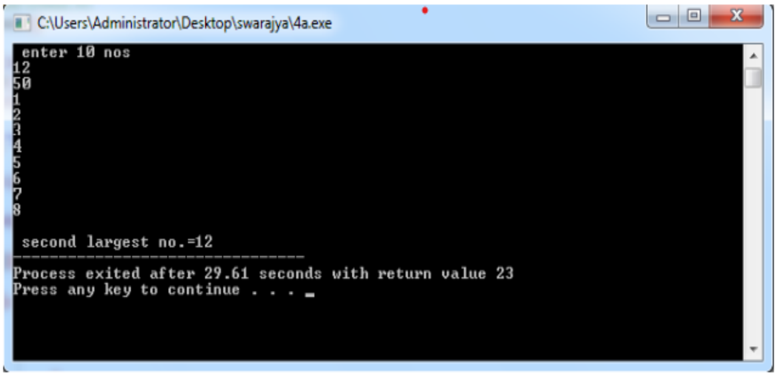
Find the second largest integer in a list of integers

1. Read an array of size n.
2. Read elements into the array a[n].
3. Assume big = a[0].
4. Compare each element of array a[i] with big and swap a[i]=big if any element is larger than big.
5. Repeat step 4 until all elements of array are compared with big.
6. Once the array is sorted, find secondbig = a[size-j-1].
7. Display the second largest element

SOURCE CODE:

```
#include¡stdio.h¿
void main()
{
int a[10],i,j,t;
printf(” enter 10 nos”);
for(i=0;i¡10;i++)
{
scanf(”%d”,&a[i]);
}
for(i=1;i¡10;i++) { for(j=0;j¡10;j++)
{
if(a[j]¿a[i])
{
t=a[i];
a[i]=a[j];
a[j]=t;
}
}
}
printf(” second largest no.=%d”,a[8]);
}
```

OUTPUT:



```
 enter 10 nos
12
50
1
2
3
4
5
6
7
8

 second largest no.=12
--------------------------------
Process exited after 29.61 seconds with return value 23
Press any key to continue . . .
```

OBJECTIVE:
f. Develop, implement and execute a C program to read a list of integers and store it in a single dimensional array. Write a C program to count and display positive, negative, odd and even numbers in an array

PROGRAM LOGIC:
Count and display of positive, negative, odd and even numbers in an array:
1. Declare and read variables n, i
2. Read elements into an array
3. If(a[i] ¿ 0) then display number is positive
4. If(a[i]%2==0) then display number is even
5. If(a[i] ¡ 0) then display number is negative
6. If(a[i]%2!=0) then display number is odd

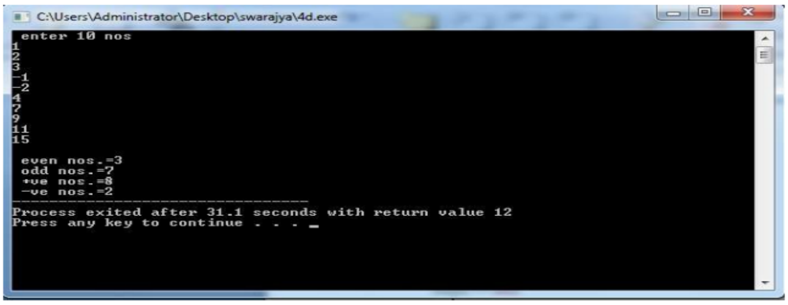
PROCEDURE:
1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: F9
3. Execute: F10

SOURCE CODE:

```
#include¡stdio.h¿
void main()
{
int a[10],i,o=0,p=0,e=0,n=0;
printf(” enter 10 nos”);
for(i=0;i¡10;i++)
{
scanf(”%d”,&a[i]);
}
for(i=0;i¡10;i++)
{
e++;
if(a[i]%2==0)
{
o++;
}
else
{
}
if(a[i]¿=0)
{
p++;
n++;
}
}
else
{
}
printf(”even nos.=%d”,e);
printf(” odd nos.=%d”,o);
printf(”+ve nos.=%d”,p);
printf(”-ve nos.=%d”,n);
}
}
```

OUTPUT:

Count and display of positive, negative, odd and even numbers in an array



```
 enter 10 nos
1
2
3
-1
-2
4
7
9
11
15

 even nos.=3
 odd nos.=7
 +ve nos.=8
 -ve nos.=2
--------------------------------
Process exited after 31.1 seconds with return value 12
Press any key to continue . . . _
```

OBJECTIVE:

g. Develop, implement and execute a C program to read a list of integers and store it in a single dimensional array. Write a C program to find the frequency of a particular number in a list of integers.

SOURCE CODE:

```
#include¡stdio.h¿
int main()
{
int a[50],i,srch,f=0,n;
printf(”Enter no.of elements:”);
scanf(”%d”,&n);
printf(”Enter %d elements:”,n);
for (i=0;i¡n;i++)
{
scanf(”%d”,&a[i]);
}
printf(”Enter search element:”);
scanf(”%d”,&srch);
for (i=0;i¡n;i++)
{
if (a[i]==srch)
f+=1;
}
printf(”Frequency of %d is %d”,srch,f);
return 0;
}
```

OUTPUT:

```
Enter no.of elements:10
Enter 10 elements:1 2 3 1 4 1 6 1 5 1
Enter search element:1
Frequency of 1 is 5
```

OBJECTIVE:

h. Develop, implement and execute a C program that reads two matrices A (m x n) and B (p x q) and Compute the product A and B. Read matrix A and matrix B in row major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.

SOURCE CODE:

```
#include¡stdio.h¿
int main()
{
int a[10][10],b[10][10],sum[10][10],i,j,r,c;
int x=0,y=0;
printf(”Enter no.of rows:”);
scanf(”%d”,&r);
printf(”Enter no.of columns:”);
scanf(”%d”,&c);
printf(”Enter elements into 1st matrix”);
for (i=0;i¡r;i++)
{
for (j=0;j¡c;j++)
{
printf(”Enter element a%d%d:”,i,j);
scanf(”%d”,&a[i][j]);
}
}
printf(”Enter elements into 2nd matrix”);
for (i=0;i¡r;i++)
{
for (j=0;j¡c;j++)
{
printf(”Enter element b%d%d:”,i,j);
scanf(”%d”,&b[i][j]); } } for (i=0;i¡r;i++) { for (j=0;j¡c;j++) { do { sum[i][y]+=a[i][y]*b[i][y]; y++; }
while (y¡c);
} } for (i=0;i¡r;i++) { for (j=0;j¡c;j++) { //sum[i][j]+=a[i][j]*b[j][i]; printf(”%5d”,sum[i][j]); } printf(”
”);
}
return 0;
}
```

OUTPUT:

PRE LAB VIVA QUESTIONS::

1. What will happen if in a C program you assign a value to an array element whose subscript exceeds the size of array?

2. What does the following declarationmean? int (*ptr)[10];

3. What is the output of the following program?

```
int a[6] = 2, 7, 3, 1, 5, 9;
printf(“%d”,a[5] + 6);
```

4. What will be the output of the following code ?

```
void main()
{
int a[5]=3,5,6,2,7;
int i=3;
if(a[i]==a[i+3])
printf(”true”);
else
printf(”false”);
}
```

5. What will be the output of the following code ?

```
void main()
{
int a[5] = 5,7,3,1,2;
a[2]=a[1];
a[1]=a[3];
a[2]=a[2]+a[3];
printf(”%d%d”, a[1],a[2]);
}
```

6. Distinguish Lvalue and Rvalue of an array element?

7. Write the output of the following code?

```
void main()
{
int a[3][2] = 10. 20, 30, 40, 50, 60;
printf(“%d”, a[0][4]);
}
```

8. Which of the following multi-dimensional array declaration is correct for realizing a 2x3 matrix?

a. int m[2][3]

b. int m[3][2]

c. int m[3],m[2]

9. Which of the following is the correct syntax for initialization of twodimensional array?

a. table[2][3]=0,0,0,1,1,1;

b. table[2][3]= 0,0,0}{1,1,1 ;

c. table[2][3]=0,1,0,1,0,1;

10. Write the output of the following code?

```
void main()
{
int x[10] = 5;
printf(“%3d%3d”, x[1], x[9]);
}
```

LAB ASSIGNMENT

1. Read a matrix and find the transpose of the matrix?.

2. Formulate a C-program that makes the following tasks:

i. Check whether matrix is magic square or not ?

ii. Print square of each element of 2D array matrix
iii. Add the elements of lower triangular matrix
iv. Calculate sum of upper triangular matrix elements
v. Addition of diagonal elements in matrix
vi. Addition of all elements in matrix
vii. Find the inverse of 3 x 3 matrix
3. Write a C program to reverse the contents of an array?
4. Given an array of n elements. Read n elements into array. Formulate a C-program forfinding smallest element in array using pointers.
5. Write a C program to find the determinant of a matrix.

POST LAB VIVA QUESTIONS

Find the output of the following code?

```
void main()
{
int a[2][3] = 1, 2, 3, 4, 5;
int i = 0, j = 0;
for (i = 0; i ¡ 2; i++)
for (j = 0; j ¡ 3; j++)
printf(”%d”, a[i][j]);
}
```

2. Find the output of the following code?

```
void main()
{
int a[2][2] = 2,3,1,6;
printf(”%d”, &a[0][1] - &a[0][0]);
}
```

3. What is the size of the array arr if it is declared as, float arr[3][2][2]?
4. Find the output of the following code?

```
void main()
{
char data[2][3][2]=0,1,2,3,4,5,6,7,8,9,10,11;
printf(”%o”,data[0][2][1]);
}
```

5. Find the output of the following code?

```
void main()
{
short num[3][2]=3,6,9,12,15,18;
printf(”%d %d”,*(num+1)[1],**(num+2));
}
```

6. Find the output of the following code?

```
void main()
{
char *ptr=”c programming”;
printf(”%c”,3[ptr]);
}
```

7. Find the output of the following code?

```
void main()
{
int array[2][3]=5,10,15,20,25,30;
int (*ptr)[2][3]=&array;
printf(”%d”,***ptr);
printf(”%d”,̑***(ptr+1));
printf(”%d”,̑**(*ptr+1));
printf(”%d”,̑*(*(*ptr+1)+2));
}
```

8. Find the output of the following code?

```
void main()
{
int arr[][3]=1,2,3,4,5,5;
printf(”%d %d %d”,sizeof(arr),arr[0][2],arr[1][2]);
}
```

9. Find the output of the following code?

```
void main()
{
char arr[20]=”Mahendra Singh Dhoni”;
printf(”%d”,sizeof(arr));
}
```

10. Find the output of the following code?

```
void main()
{
int a[5] = 5, 1, 15, 20, 25;
int i, j, m; i = ++a[1]; j = a[1]++;
m = a[i++]; printf(”%d, %d, %d”, i, j, m);
}
```

Lab 5 - STRINGS

OBJECTIVE:
a. Develop a user-defined function STRCOPY (str1, str2) to simulate the built-in library function strcpy (str1, str2) that copies a string str2 to another string str1. Write a C program that invokes this function to perform string copying. Also perform the same operation using built-in function

PROGRAM LOGIC:

```
Initialize l=0, Flag=0
2. While String[l] != NULL
3. Increment l
4. Initialize i=0, j =l-1
5. While i ¡ (l/2)+1
6. If String[i] equal to String[j]
7. Flag=0
8. else
9. Flag=1
10. Increment i , Decrement j
```

SOURCE CODE:

```
#include¡stdio.h¿
#include¡string.h¿
void STRCOPY(char a[],char b[]);
int main()
{
char s1[20],s2[20];
printf("Enter string:");
gets(s1);
STRCOPY(s1,s2);
return 0;
}
void STRCOPY(char s1[20],char s2[20])
{
strcpy(s2,s1);
printf("The copied string is:");
puts(s2);
return;
}
```

OUTPUT:

```
Enter string:hello
The copied string is:hello
```

OBJECTIVE:
b. Develop a user-defined function STRCONCT (str1, str2) to simulate the built-in library function strcat (str1, str2) that takes two arguments str1 and str2, concatenates str2 and str1 and stores the result in str1. Write a C program that invokes this function to perform string concatenation. Also perform the same operation using built-in function.

SOURCE CODE:

```
#include¡stdio.h¿
#include¡string.h¿
void STRCONCT(char s1[],char s2[]);
```

```
int main()
{
char s1[30],s2[30];
printf(”Enter string 1:”);
gets(s1);
printf(”Enter string 2:”);
gets(s2);
STRCONCT(s1,s2);
return 0;
}
void STRCONCT(char s1[30],char s2[30])
{
strcat(s1,s2);
printf(”Concatenated string is:”);
puts(s1);
}
```

OUTPUT:

```
Enter string 1:praneetha
Enter string 2:peniji
Concatenated string is:praneethapeniji
```

OBJECTIVE:

c. Develop a C program that returns a pointer to the first occurrence of the string in a given string using built-in library function strstr(). Example: strstr() function is used to locate first occurrence of the string “test” in the string “This is a test string for testing”. Pointer is returned at first occurrence of the string “test”

SOURCE CODE:

```
#include¡stdio.h¿
#include¡string.h¿
int main()
{
char s1[50],s2[20],*res;
printf(”Enter a string:”);
gets(s1);
printf(”Enter another string:”);
gets(s2);
res=strstr(s1,s2);
puts(res);
return 0;
}
```

OUTPUT:

```
Enter a string:This is a test string for testing
Enter another string:test
test string for testing
```

OBJECTIVE:

d. Develop a C program using the library function strcmp (str1, str2) that compares the string pointed to by str1 to the string pointed to by str2 and returns an integer. Display appropriate messages based on the return values of this function as follows if return value ¡ 0 then it indicates str1 is less than str2. if return value ¿ 0 then it indicates str2 is less than str1. if return value = 0 then it indicates str1 is equal to str2.

SOURCE CODE:

```
#include¡stdio.h¿
#include¡string.h¿
int main()
{
char s1[30],s2[30];
int res;
printf(”Enter string 1:”);
gets(s1);
printf(”Enter string 2:”);
gets(s2);
res=strcmp(s1,s2);
if (res¡0)
printf(”%s is less than %s”,s1,s2);
else if (res¿0)
printf(”%s is greater than %s”,s1,s2);
else
printf(”Both are equal”);
return 0;
}
```

OUTPUT:

```
Enter string 1:hyderabad
Enter string 2:secunderabad
hyderabad is less than secunderabad
```

PRE-LAB VIVA QUESTIONS:

1. Using which function a string “1234” can be converted to a number?
2. Name the different string handling functions?
3. Which command is used to combine the two strings?
4. Which command is used to copy the strings?
5. What is the difference between string copy strcpy() and memory copy memcpy()
6. How can you copy just a portion of a string?
7. Using which function you can find a substring from a string?
8. Which function is used to compare two strings?
9. How can you remove trailing spaces from a string?
10. How can you remove leading spaces from a string?

LAB ASSIGNMENT:

1. Code a program to convert the given string into lower case to upper case andvice-versa?
2. Read two strings and store them in variables str1, str2. Formulate a C program for finding whether the both strings are equal or not?
3. Program for finding the length of the given string “COMPUTER PROGRAMMING” withand without using string length function?
4. Read two strings and store them in variables str1, str2. Formulate a C program for copying 2 strings to a new variable str3?
5. Formulate a program for concatenating the following two strings with and without using strcat() function. Str1 is “COMPUTER”, str2 is “PROGRAMMING”.
6. Formulate a program for reversing the given string REVERSE with and without using stirng reverse function?
7. Formulate a program for determining whether the given string is palindrome or not?

8. Read two strings, str1 as “goodday” and str2 as “noontime”. By using these strings generate a new string str3 as “goodnoon“. Now compare str3 with str1 to find the greatest?
9. Accept two strings and compare one string with another string without using string handling functions and find two strings are equal or not.
10. Read a string and delete the duplicate character in the string.

POST-LAB VIVA QUESTIONS:

1. Find the output of the following code?

```
int main()
{
char *str = ”hello, world”;
char *str1 = ”hello, world”;
if (strcmp(str, str1))
printf(”equal”);
else
printf(”unequal”);
}
```

2. Find the output of the following code?

```
void main()
{
char *str = ”hello”;
char str1[5];
strcpy(str1, str);
printf(”%s”, str1);
}
```

3. Find the output of the following code?

```
void main()
{
char *str = ”hello, world”;
char str1[9];
strncpy(str1, str, 9);
printf(”%s %d”, str1, strlen(str1));
}
```

4. What is the return value of strcmp() function when two strings areidentical? 5. Which library function is used to find the last occurrence of a given string in anotherstrong?
6. Find the output of the following code?

```
int xstrlen(char *s)
{
int length=0;
while(*s!=’0’)
{
length++;
s++;
}
return (length);
}
```

7. Find the output of the following code?

```
int main()
{
char str1[20] = ”C ”, str2[20] = ”Programming”;
printf(”%s”, strcpy(str2, strcat(str1, str2)));
return 0;
}
```

8. Find the output of the following code?

```
int main()
{
char *names[] =  ”A”, ”B”, ”C”, ”D”, ”E”;
int i;
char *t;
t = names[3];
names[3] = names[4];
names[4] = t;
for(i=0; i¡=4; i++)
printf(”%s”͡, names[i]);
return 0;
}
```

9. Find the output of the following code?

```
int main()
{
static char str1[] = ”C”;
static char str2[20];
static char str3[] = ”Programming”;
int i;
i = strcmp(strcat(str3, strcpy(str2, str1)), ”Computers”);
printf(”%d”, i);
return 0;
}
```

10. Find the output of the following code?

```
int main()
{
static char s[] = ”Hello!”;
printf(”%d”, *(s+strlen(s)));
return 0;
}
```

Lab 6 - FUNCTIONS

OBJECTIVE:

a. Design and develop a recursive and non-recursive function FACT(num) to find the factorial of a number, n!, defined by FACT(n) = 1, if n = 0. Otherwise FACT(n) = n * FACT(n-1). Using this function, write a C program to compute the binomial coefficient. Tabulate the results for different values of n and r with suitable messages

RESOURCES:

Dev C++5.11

PROGRAM LOGIC:

Factorial of a given number by using Recursive function

```
1. Start
2. Read a number N
3. Call a function factorial(N) by passing the values of N
4. If N=1 then it returns 1 as the factorial
5. Otherwise it calculates the factorial f = N * factorial(N-1) by calling the same function again and again
6. Display the factorial of number N
7. Stop
```

Factorial of a given number by using Non-Recursive function

```
1. Start
2. Read a number N
3. Initialize fact =1
4. Calculate fact = fact * N using a loop and decrement N value till N =1
5. Display the factorial of number N
6. Stop
```

GCD of a given two integer by using Recursive Function

```
1. Start
2. Read two numbers a and b
3. Call a function gcd (a, b) by passing the value of a and b
4. Check a != b, then
5. Check a ¿ b then calculate gcd of two numbers by calling the function gcd(a-b,b)
6. Otherwise calculate gcd of two numbers by calling the function gcd(a, b-a)
7. Display the gcd of two numbers
8. Stop
```

GCD of a given two integer by using Non-Recursive Function

```
1. Start
2. Read two numbers a and b
3. Check if a != b then
4. Check if a ¿= b - 1 then set a = a – b otherwise se t b = b –a
5. Display the gcd as the value of a.
6. Stop
```

To print Fibonacci Series using Non-Recursive function

```
1. Start
2. initialize the a=0, b=1
```

3. read n
4. if n== 1 print a go to step 7. else goto step 5
5. if n== 2 print a, b go to step 7 else print a,b
6. initialize i=3
7. if i¡= n do as follows. If not goto step 7
8. c=a+b
9. print c
10. a=b
11. b=c
12. increment i value
13. goto step 6(i)
14. Stop

To reverse a given string using recursion

1. Start
2. Read a sentence
3. Use strrev() function to reverse a sentence
4. Display the reversed sentence
5. Stop

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: Alt F9
3. Execute: Ctrl F9

SOURCE CODE:

Factorial of a given number by using Recursive function

```
#include¡stdio.h¿
int fact(int n)
{
if(n==0)
return 1;
else
return n*fact(n-1);
}
void main()
{
int n,f;
printf(" enter a no: ");
scanf("%d",&n);
f=fact(n);
printf(" factorial of %d is %d",n,f);
}
```

Factorial of a given number by using Non-Recursive function

```
#include¡stdio.h¿
int fact(int n)
{
int f=1,i;
if((n==0)——(n==1))
return(1);
else
{
```

```
for(i=1;i¡=n;i++)
f=f*i;
}
return(f);
}
void main()
{
int n;
printf(”enter the number :”);
scanf(”%d”,&n);
printf(”factoria of number%d”,fact(n));
}
```

GCD of a given two integer by using Recursive Function

```
#include¡stdio.h¿
int gcd(int m,int n)
{
if(n==0)
return m;
else
gcd(n,m%n);
}
void main()
{
int a,b,g,l;
printf(”enter a: ”);
scanf(”%d”,&a);
printf(”enter b: ”);
scanf(”%d”,&b);
g=gcd(a,b);
l=(a*b)/g;
printf(” GCD of %d and %d : %d”,a,b,g);
printf(” LCM of %d and %d : %d”,a,b,l);
}
```

GCD of a given two integer by using Non-Recursive Function

```
#include¡stdio.h¿
int gcd(int,int);
void main()
{
int a,b,x;
printf(” enter a: ”);
scanf(”%d”,&a);
printf(”enter b: ”);
scanf(”%d”,&b);
x=gcd(a,b);
printf(”G.C.D of %d and %d is %d”,a,b,x);
}
int gcd(int a,int b)
{
int r;
while(b!=0)
{
a=b;
}
r=a%b;
b=r;
return a;
}
```

To print Fibonacci Series using Recursive function

```
#include¡stdio.h¿
void fib(int);
void main()
{
int n;
printf(” enter the limit of the series: ”);
scanf(”%d”,&n);
fib(n);
}
void fib(int n)
{
int x=0,y=1,z,i;
printf(”%5d%5d”,x,y);
for(i=2;i¡n;i++)
{
z=x+y;
printf(”%5d”,z);
x=y;
y=z;
}
}
```

Fibonacci Series using Non-Recursive function

```
#include¡stdio.h¿
int fibo(int,int);
void main()
{
int n,x,i;
printf(” enter the no. of terms: ”);
scanf(”%d”,&n);
printf(” the fibonacci sequence is: ”);
for(i=0;i¡=n;i++)
{
x=fib(i); printf(”%5d”,x);
}
}
int fib(int n)
{
if(n==0 —— n==1)
return n;
else
return fib(n-1)+fib(n- 2);
}
```

Write a C program that invokes this function to generate prime numbers between the given ranges.

```
include¡stdio.h¿
```

```
int ISPRIME(int);
int main()
{
int n1,n2,r,i;
printf(”Enter a range:”);
scanf(”%d %d”,&n1,&n2);
for (i=n1;i¡=n2;i++)
{
r=ISPRIME(i);
if (r==1)
printf(”%d”ˆ,i);
}
return 0;
}
int ISPRIME(int n)
{
int j,k=0;
for (j=2;j¡=n/2;j++)
{
if (n%j==0)
{
k++;
break;
}
}
if (k¿0)
return 0;
else
return 1;
```

OUTPUT:

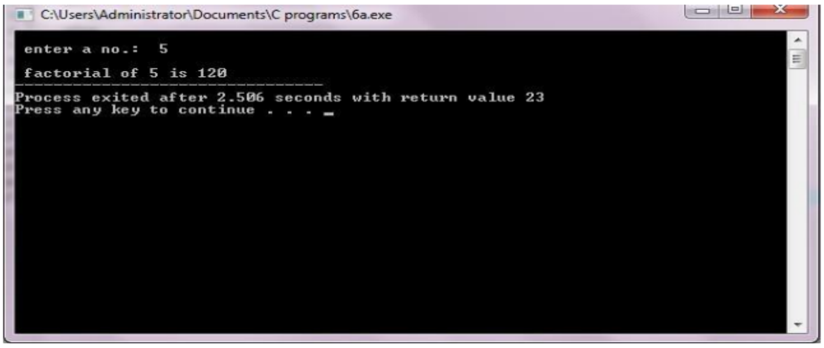
```
Enter a range:2 2 3 5 7 11 13 17 19
23 29 31 37 41 43 47
```

To reverse a given sentence by using recursion

```
#include¡stdio.h¿
#include¡string.h¿
void Reverse();
int main()
{
printf(”Enter a sentence: ”);
Reverse();
return 0;
}
void Reverse()
{
char c;
scanf(”%c”,&c);
if( c != ’ ’)
{
Reverse();
printf(”%c”,c);
}
}
```

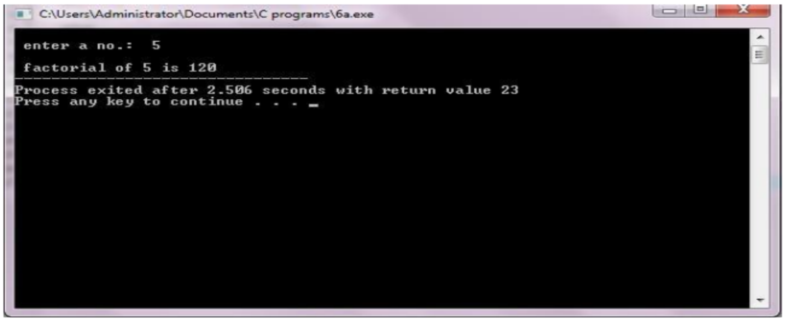
OUTPUT:

Factorial of a given number by using Recursive/Non Recursive function



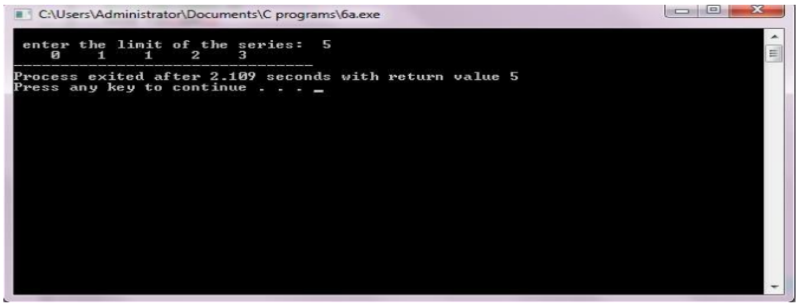
```
 enter a no.:  5

 factorial of 5 is 120
--------------------------------
Process exited after 2.506 seconds with return value 23
Press any key to continue . . . _
```

GCD of a given two integer by using Recursive / Non Recursive Function



```
 enter a no.:  5

 factorial of 5 is 120
--------------------------------
Process exited after 2.506 seconds with return value 23
Press any key to continue . . . _
```

To print Fibonacci Series using Recursive/Non-Recursive function



```
 enter the limit of the series:  5
     0     1     1     2     3
--------------------------------
Process exited after 2.109 seconds with return value 5
Press any key to continue . . . _
```

rev.png

rev1.png

PRE-LAB VIVA QUESTIONS:

1. What do you mean by formal and actual parameters in a function?
2. What is upward and downward communication in functions?
3. Can you pass an entire structure into a function?
4. Can you pass an array to a function?
5. What do you mean by function prototype and why it is used?
6. Can you write a function without any parameters?
7. Can you return multiple values from a function using return statement?
8. Is it mandatory to write a return statement in a function?
9. What are the various ways of writing return statement in a function?
10. Is it possible convert all iterative programs into recursion?

LAB ASSIGNMENT:

1. Generate the prime numbers between 1 to N using recursion?
2. Compute the x to the power y usingrecursion?
3. Check whether a string is palindrome or not using recursion?
4. Compute the sum of digits of a number using recursion?
5. Compute the sum of n natural numbers usingrecursion?
6. Convert a decimal number into its equivalent binary using recursion?
7. Compute the multiplication of two matrices using recursion? 8. Perform binary search using recursion?
9. Write a program to convert decimal number to hexadecimal number?
10. Write a program to convert decimal number to binary number?

POST-LAB VIVAQUESTIONS:

1. What is recursion?
2. What is the necessity of creating a user defined function in C?
3. What are the types of functions according to return values and number ofarguments?
4. Can you pass a parameter to a function? If yes, then what are the parameter passing techniques?
5. Which data structure is used in recursion?
6. Give any two differences between recursion and iteration?
7. What do mean by base / stopping criteria in recursion? What is its importance?
8. Differentiate between standard functions & user-defined functions ?
9. How does the function definition differ from function declaration ?
10. In C, if you pass an array as an argument to a function, what actually gets passed?
11. What is output of the following code ?

```
#include¡stdio.h¿
int main()
{
int arr[]=0,10,20,30,40;
char *ptr=arr;
ptr=ptr+2;
printf(”%d”,*ptr);
return 0;
}
```

12. What is the output of the following code ?

```
#include¡stdio.h¿
int main()
{
int a=5,b=8,c=2;
int *arr[]=&a,&b,&c;
b=a+c;
printf(”%d”,*arr[1]);
return 0;
}
```

13. What is the output of the following code ?

```
#include¡stdio.h¿
int main()
{
int a[5]=100,200,300;
int *p1=a;
char *p2=(char *)a;
printf(”%d %d”,*(p1+2),*(p2+3));
return 0;
}
```

Lab 7 - POINTERS

OBJECTIVE:

a. Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.

b. Develop a C program to read a list of integers and store it in an array. Then read the array elements using a pointer and print the value along with the memory addresses.

c. Design and develop non-recursive functions input_matrix(matrix, rows, cols) and print_matrix(matrix, rows, cols) that stores integers into a two-dimensional array and displays the integers in matrix form. Write a C program to input and print elements of a two dimensional array using pointers and functions.

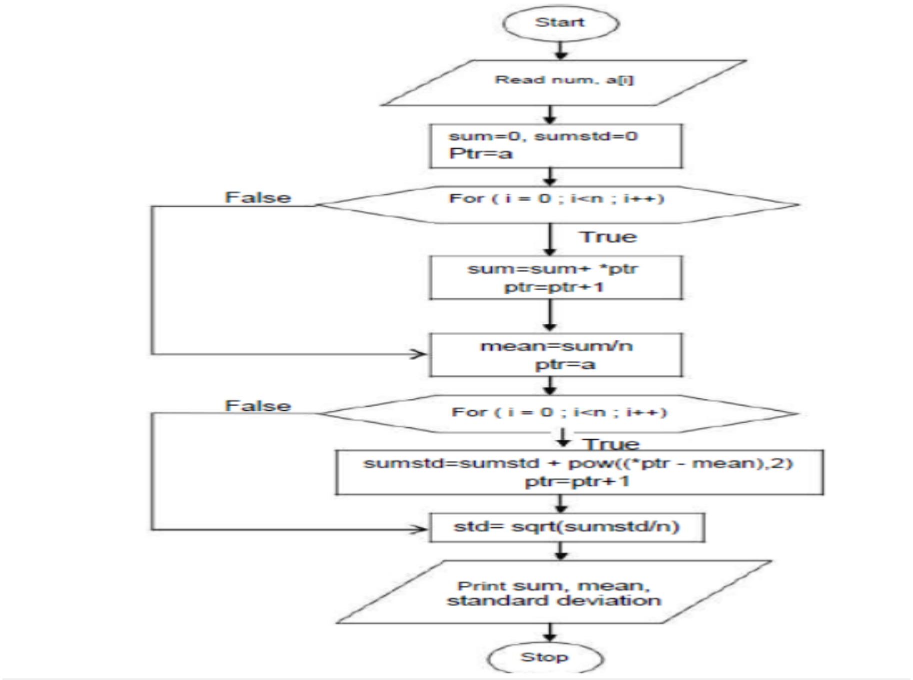
d. Develop a C program to a store a list of integers in a single dimensional array using dynamic memory allocation (limit will be at run time) using malloc() function. Write a C program to read the elements and print the sum of all elements along with the entered elements. Also use free() function to release the memory

Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.

PROGRAM LOGIC

```
Step 1: [Start]
Step 2: [Input the elements]
Read n, a[i]
Step 3: [Initialize] sum=0,sumstd=0
Step 4: [Compute sum, mean, standard deviation]
Ptr=a
For i = 0 thru n in steps of 1
Sum=sum+*ptr
Ptr++
Mean=sum/n
Ptr=a
For i 0 thru n in steps of 1
Sumstd=sumstd+pow((*ptr-mean),2)
Ptr++
std=sqrt(sumstd/n)
Step 5: [Output]
Print sum, mean, standard deviation
Step 6: [Stop]
```

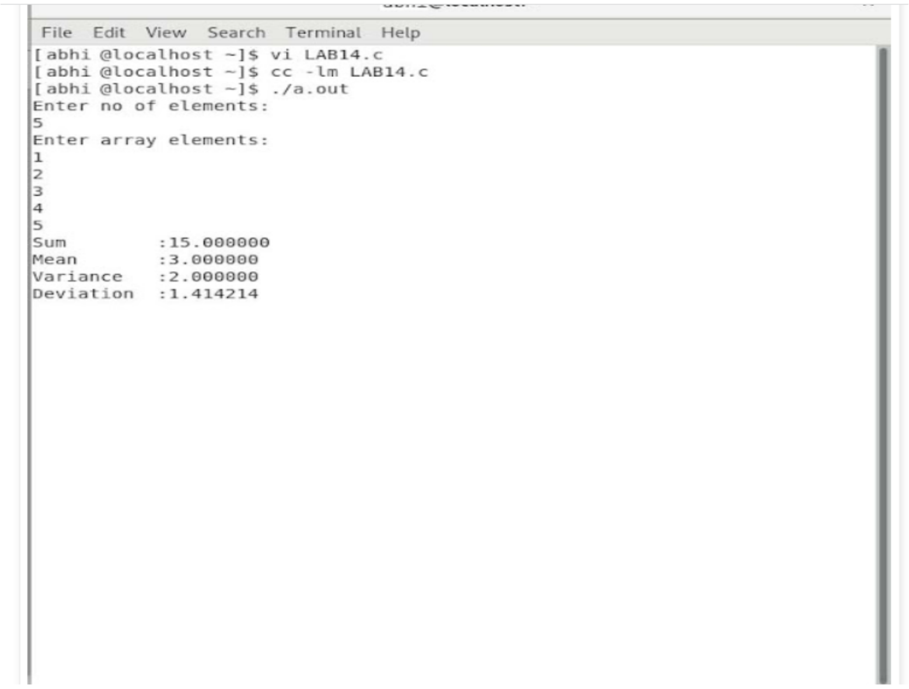
FLOWCHART:



SOURCE CODE

```
#include¡stdio.h¿
#include¡math.h¿
void main ()
{
float a[20], sum1 = 0, sum2 = 0, mean, var, dev;
int i, n;
printf (”Enter no of elements:”);
scanf (”%d”, &n);
printf (”Enter array elements:”);
for (i = 0; i ¡ n; i++)
{
scanf (”%f”, a + i);
sum1 = sum1 + * (a + i);
}
mean = sum1 / n;
for (i = 0; i ¡ n; i++)
{
sum2 = sum2 + pow ((*(a + i) - mean), 2);
}
var = sum2 / n;
dev = sqrt (var);
printf (”Sum :%f”, sum1);
printf (”Mean :%f”, mean);
printf (”Variance :%f”, var);
printf (”Deviation :%f”, dev);
}
```

OUTPUT:



```
[abhi @localhost ~]$ vi LAB14.c
[abhi @localhost ~]$ cc -lm LAB14.c
[abhi @localhost ~]$ ./a.out
Enter no of elements:
5
Enter array elements:
1
2
3
4
5
Sum        :15.000000
Mean       :3.000000
Variance   :2.000000
Deviation  :1.414214
```

Program to print the elements of array using pointers

SOURCE CODE

```
#include¡stdio.h¿
int main()
{
int a[5]=5,4,6,8,9;
int *p=&a[0];
int i;
for(i=0;i¡5;i++)
{
printf(”Integer: %d”,*(p+i));
printf(”Address: %u”,(p+i));
}
return 0;
}
```

OUTPUT:

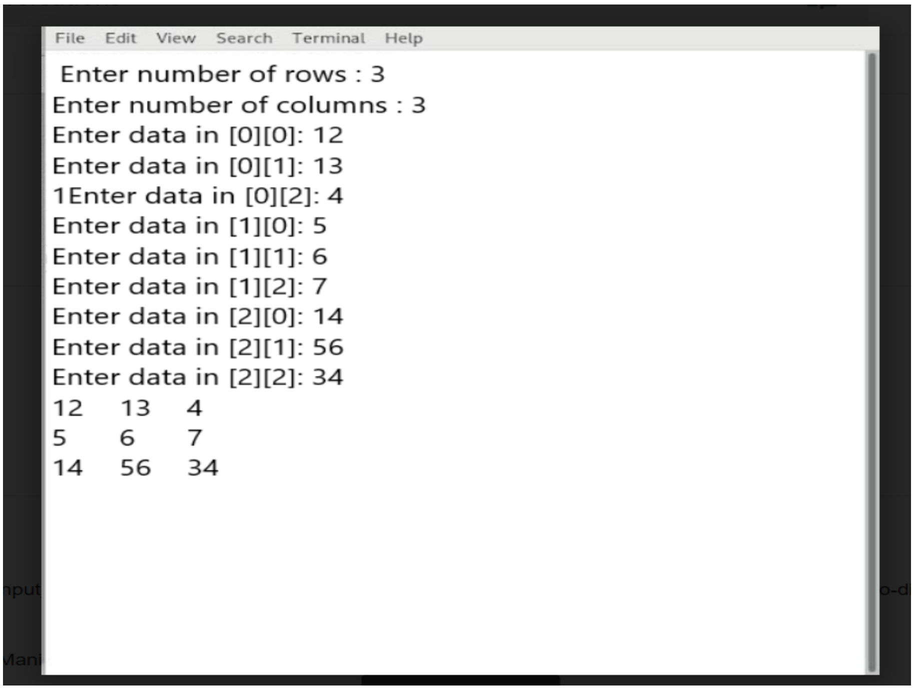
p1.png

Design and develop non-recursive functions input_matrix(matrix, rows, cols) and print_matrix(matri rows, cols) that stores integers into a two-dimensional array and displays the integers in matrix form

SOURCE CODE

```
#include ¡stdio.h¿
int main()
{
int i, j, m, n;
int matrix[10][20];
printf(”Enter number of rows : ”);
scanf(”%d”, &m);
printf(”Enter number of columns : ”);
scanf(”%d”, &n);
/* Input data in matrix */
for (i = 0; i ¡ m; i++)
{
for (j = 0; j ¡ n; j++)
{
printf(”Enter data in [%d][%d]: ”, i, j);
scanf(”%d”, &matrix[i][j]);
}
}
/* Display the matrix *
for (i = 0; i ¡ m; i++)
{
for (j = 0; j ¡ n; j++)
{
printf(”%d”̂, matrix[i][j]);
}
printf(” ”);
}
return 0;
}
```

OUTPUT:



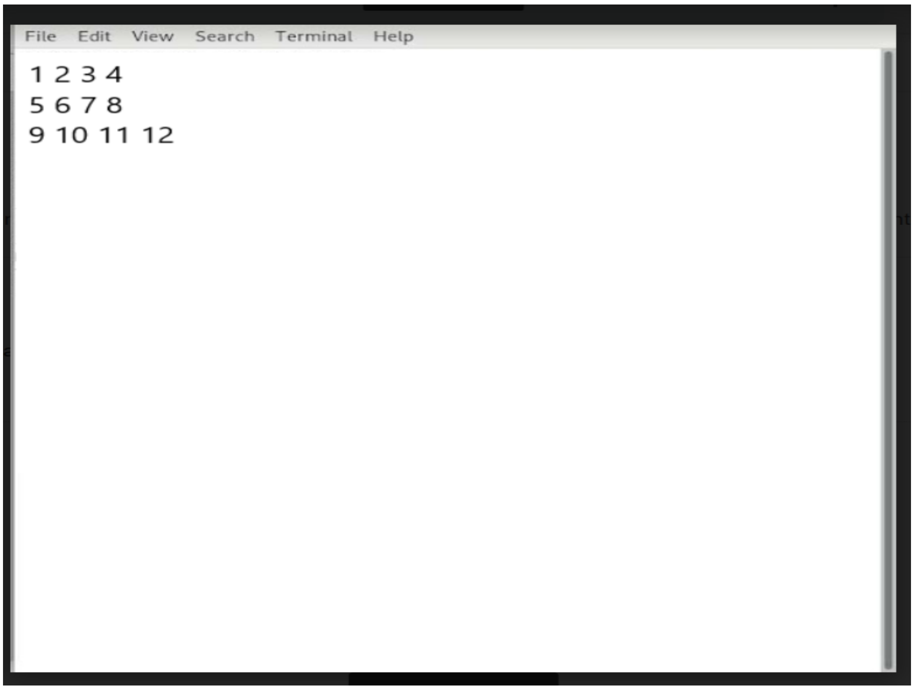
```
 Enter number of rows : 3
Enter number of columns : 3
Enter data in [0][0]: 12
Enter data in [0][1]: 13
1Enter data in [0][2]: 4
Enter data in [1][0]: 5
Enter data in [1][1]: 6
Enter data in [1][2]: 7
Enter data in [2][0]: 14
Enter data in [2][1]: 56
Enter data in [2][2]: 34
12    13    4
5     6     7
14    56    34
```

Write a C program to input and print elements of a two dimensional array using pointers.

SOURCE CODE

```
#include ¡stdio.h¿
int main(void)
{
// 2d array
int num[3][4] =  1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 ;
int
ROWS = 3,
COLS = 4,
i, j
// pointer
int *ptr = &num[0][0];
// print the element of the array via pointer ptr
for (i = 0; i ¡ ROWS; i++)
{
for (j = 0; j ¡ COLS; j++)
{
printf(”%d ”, *(ptr + i * COLS + j));
}
printf(” ”);
}
return 0;
}
```

OUTPUT:

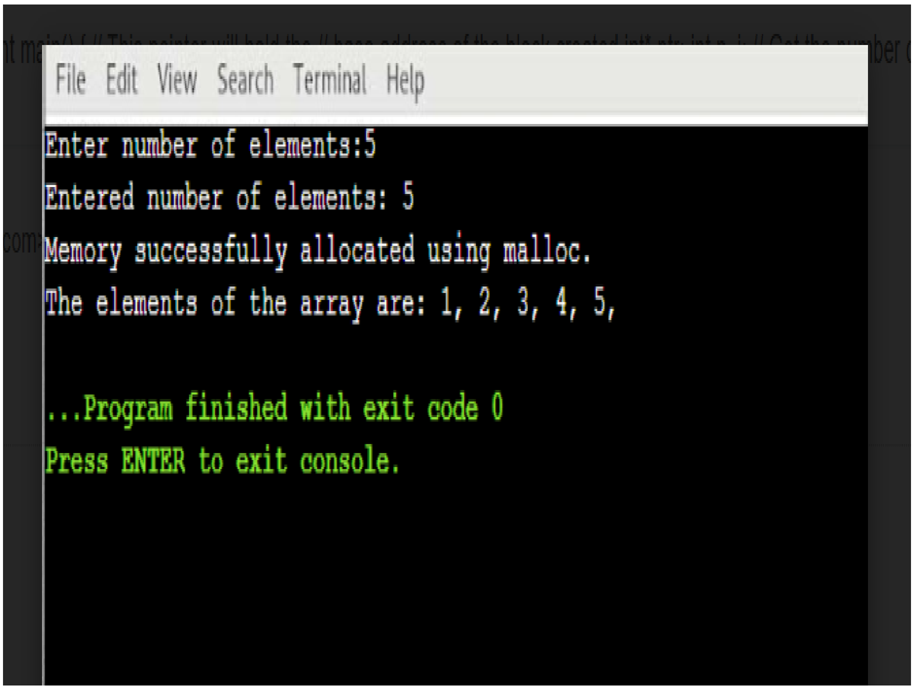


```
1 2 3 4
5 6 7 8
9 10 11 12
```

SOURCE CODE

```
#include ¡stdio.h¿
#include ¡stdlib.h¿
int main()
{

// This pointer will hold the
// base address of the block created
int* ptr;
int n, i;

// Get the number of elements for the array
printf("Enter number of elements:");
scanf("%d",&n);
printf("Entered number of elements: %d", n);

// Dynamically allocate memory using malloc()
ptr = (int*)malloc(n * sizeof(int));

// Check if the memory has been successfully
// allocated by malloc or not
if (ptr == NULL)
{
printf("Memory not allocated.");
exit(0);
}
else
{

// Memory has been successfully allocated
printf(”Memory successfully allocated using malloc.”);

// Get the elements of the array
for (i = 0; i ¡ n; ++i)
{
ptr[i] = i + 1;
}

// Print the elements of the array
printf(”The elements of the array are: ”);
for (i = 0; i ¡ n; ++i)
{
printf(”%d, ”, ptr[i]);
}
}
return 0;
}
```

OUTPUT:

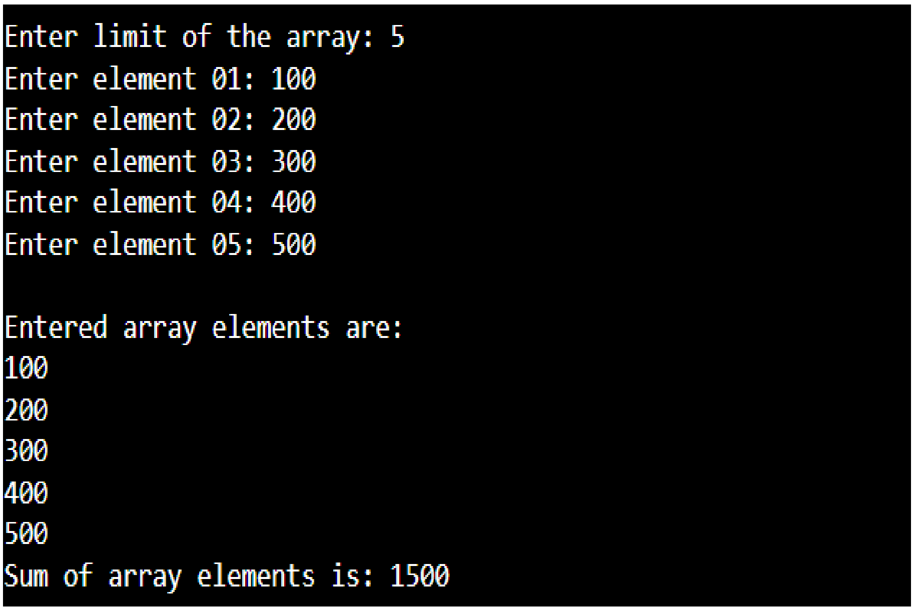


```
Enter number of elements:5
Entered number of elements: 5
Memory successfully allocated using malloc.
The elements of the array are: 1, 2, 3, 4, 5,

...Program finished with exit code 0
Press ENTER to exit console.
```

To read the elements and print the sum all elements also use free function

```
#include ¡stdio.h¿
#include ¡stdlib.h¿
int main()
{
int* ptr; //declaration of integer pointer
int limit; //to store array limit
int i; //loop counter
int sum; //to store sum of all elements
printf(”Enter limit of the array: ”);
scanf(”%d”, &limit);
//declare memory dynamically
ptr = (int*)malloc(limit * sizeof(int));

//read array elements
for (i = 0; i ¡ limit; i++)
{
printf(”Enter element %02d: ”, i + 1);
scanf(”%d”, (ptr + i));
}

//print array elements
printf(”Entered array elements are:”);
for (i = 0; i ¡ limit; i++)
{
printf(”%d”, *(ptr + i));
}

//calculate sum of all elements
sum = 0; //assign 0 to replace garbage value
for (i = 0; i ¡ limit; i++)
{
sum += *(ptr + i)
}
printf(”Sum of array elements is: %d”, sum);

//free memory
free(ptr); //hey, don’t forget to free dynamically allocated memory.

return 0;
}
```

OUTPUT:



```
Enter limit of the array: 5
Enter element 01: 100
Enter element 02: 200
Enter element 03: 300
Enter element 04: 400
Enter element 05: 500

Entered array elements are:
100
200
300
400
500
Sum of array elements is: 1500
```

PRE-LAB VIVA QUESTIONS:

1. What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used ?
2. How can I remove the trailing spaces from a string?
3. How can I remove the leading spaces from a string?
4. How to represent a string?
5. What is a null character in strings?
6. How Strlen() works?

LAB ASSIGNMENT:

1. Develop a C program that displays the position or index in the string S where the string T begins, or -1 if S does not contain T.
2. Read a string and delete the duplicate character in the string.
3. Find the count of occurrence of the character in the given string.
4. Accept two strings and compare one String with another String without usingString Handling functions and find two strings are equal or not.
5. Write a program to count the lines, words and characters in a given text.
6. Read two strings, str1 as “goodday” and str2 as “no ontime”. By using these strings
generate a new string str3 as “goodnoon“. Now compare str3 with st r1to find the greatest ?

POST-LAB VIVA QUESTIONS:

1. What is the difference between printf() and puts() ? 2. Define pointer variable ? 3. What is use of the strcmp() function ? 4. What is the use of strcat() function ?

Lab 8 - STRUCTURES AND UNIONS

OBJECTIVE:

e. Write a C program that uses functions to perform the following operations:
i. Reading a complex number
ii. Writing a complex number
iii. Addition and subtraction of two complex numbers Note: represent complex number using a structure.
f. Write a C program to compute the monthly pay of 100 employees using each employee_s name, basic pay. The DA is computed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.
g. Create a Book structure containing book_id, title, author name and price. Write a C program to pass a structure as a function argument and print the book details.
h. Create a union containing 6 strings: name, home_address, hostel_address, city, state and zip. Write a C program to display your present address

RESOURCES:

Dev C++5.11

PROGRAM LOGIC:

To perform the Addition, Substraction, operations between complex numbers

1. Start
2. Declare structure for complex numbers
3. Read the complex number
4. Read choice
5. If choice = 1 then addition operation will perform and it contains followingsteps
w.realpart = w1.realpart + w2.realpart;
w.imgpart = w1.imgpart + w2.imgpart; goto step 4
6. If choice = 2 then multiplication operation will perform and itcontains following steps
w.realpart = (w1.realpart * w2.realpart)-(w1.imgpart * w2.imgpart)
w.imgpart = (w1.realpart * w2.imgpart)+(w1.imgpart * w2.realpart); goto step 4
7. If choice = 0 then exit operation will perform
8. If w.imgpart ¿ 0 then print realpart+imgpart else Print realpart.
9. Stop

Print the employees name and gross salary

1. Start
2. Declare structure for employee details
3. Read 100 employee details
4. Repeat loop 100 employees and calculate gross salary of each employee
5. Print each employee name and gross salary
6. Stop

To pass a structure as a function argument and print the book details

1. Start
2. Declare structure for book details
3. Assign a book details to structure
4. Pass a structure as argument in function
5. Print the book details from the function
6. Stop

To display your present address using union

1. Start
2. Declare union for address details

3. Assign address to union
4. Print union details
5. Stop

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: F9
3. Execute: F10

SOURCE CODE:

To perform the Addition, Subtraction operations between complex numbers

```
#include¡stdio.h¿
#include¡string.h¿
struct complex1
{ int r;
inti;
} c1,c2,c3;
void add(struct complex1 c1,struct complex1 c2);
void sub(struct complex1 c1,struct complex1 c2);
void multi(struct complex1 c1,struct complex1 c2);
void main()
{
printf(” enter first complex no: ”);
scanf(”%d%d”,&c1.r,&c1.i);
printf(” enter second complex no: ”);
scanf(”%d%d”,&c2.r,&c2.i);
printf(” enter first complex no:%d+i%d”,c1.r,c1.i);
printf(” enter second complexno:%d+i%d”,c2.r,c2.i);
add(c1,c2);
sub(c1,c2);
multi(c1,c2);
}
void add(struct complex1 c1,struct complex1 c2)
{
c3.r=c1.r+c2.r;
c3.i=c1.i+c2.i;
printf(” addition of two complex numbers is %d+i%d”,c3.r,c3.i);
}
void sub(struct complex1 c1,struct complex1 c2)
{
c3.r=c1.r-c2.r;
c3.i=c1.i-c2.i;
printf(” subtraction of two complex numbers is %d+i%d”,c3.r,c3.i);
}
void multi(struct complex1 c1,struct complex1 c2)
{
c3.r=(c1.r*c2.r)-(c1.i*c2.i);
c3.i=(c1.r*c2.i)+(c1.i*c2.r);
printf(” multiplication of two complex numbers is %d+i%d”,c3.r,c3.i);
}
```

Print the employees name and gross salary

```
#include¡stdio.h¿
```

```
struct employee
{
char name[20];
float basic;
float da;
float gross;
}
e[5];
void main()
{
inti;
for(i=0;i¡5;i++)
scanf(”%s%f”,e[i].name,&e[i].basic);
for(i=0;i¡5;i++)
{
e[i].da=52.0/100*e[i].basic;
e[i].gross=e[i].da+e[i].basic;
printf(” name=%s gross=%f”,e[i].name,e[i].gross);
}
```

To pass a structure as a function argument and print the book details

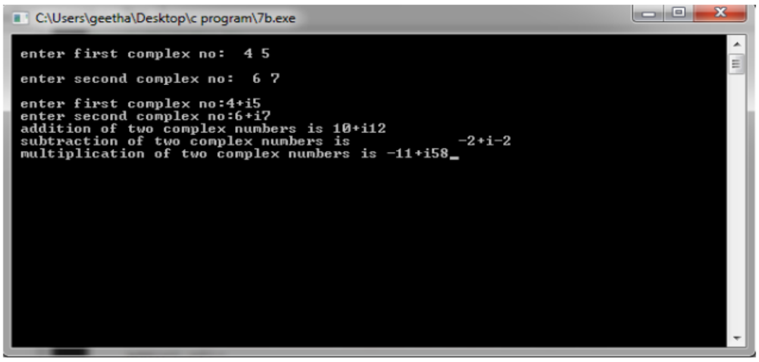
```
#include¡stdio.h¿
#include¡string.h¿
struct book
{
intbookid;
char title[30];
char author[20];
float price;
};
voidprint_book(struct book b1);
void main()
{
struct book b1;
printf(” enter book details: ”);
scanf(”%d%s%s%f”,&b1.bookid,b1.title,b1.author,&b1.price);
print_book(b1);
}
voidprint_book(struct book b1)
{
printf(” book details:%d%s%s%f”,b1.bookid,b1.title,b1.author,b1.price);
}
```

To display your present address using union

```
#include¡stdio.h¿
#include¡string.h¿
union details
{
}a;
char name[20];
char home_add[30];
char hostel_add[30];
char city[10];
char state[10];
int pincode;
void main()
{
strcpy(a.name,”rama”);
printf(” %s”,a.name);
strcpy(a.home_add,”1-83/10,jublie hills”);
printf(”%s”,a.home_add);
strcpy(a.hostel_add,”iare college”);
printf(” %s”,a.hostel_add);
strcpy(a.city,”hyderabad”);
printf(” %s”,a.city);
strcpy(a.state,”telangana”);
printf(” %s”,a.state);
a.pincode=500043;
printf(” %d”,a.pincode);
getch();
}
```

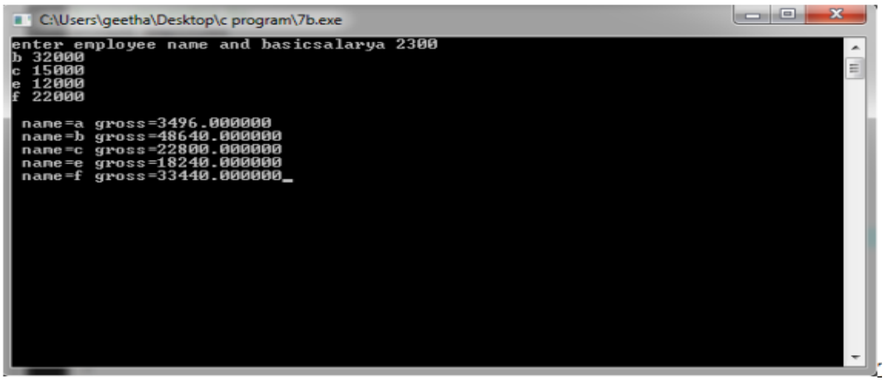
OUTPUT:

To perform the Addition, Subtraction operations between complex numbers



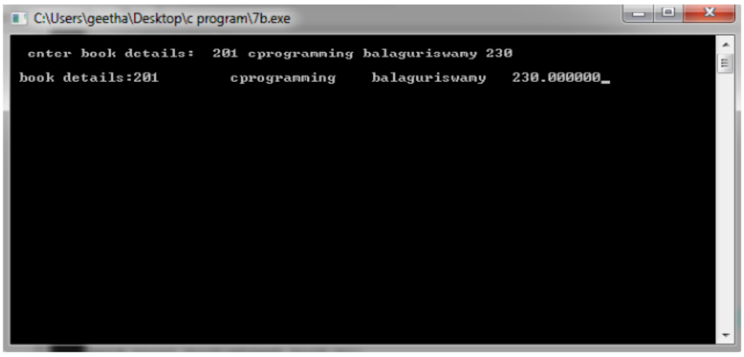
```
enter first complex no:  4 5

enter second complex no:  6 7

enter first complex no:4+i5
enter second complex no:6+i7
addition of two complex numbers is 10+i12
subtraction of two complex numbers is           -2+i-2
multiplication of two complex numbers is -11+i58_
```

Print the employees name and gross salary



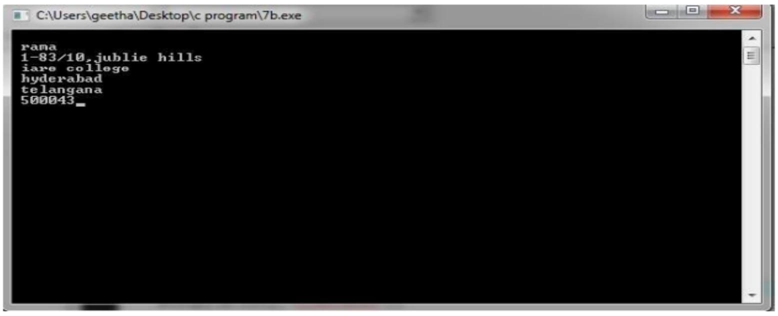
```
enter employee name and basicsalarya 2300
b 32000
c 15000
e 12000
f 22000

 name=a gross=3496.000000
 name=b gross=48640.000000
 name=c gross=22800.000000
 name=e gross=18240.000000
 name=f gross=33440.000000_
```

Pass a structure as a function argument and print the book details



```
 enter book details:  201 cprogramming balaguriswamy 230
book details:201        cprogramming    balaguriswamy   230.000000_
```

To display your present address using union



```
rama
1-83/10,jublie hills
iare college
hyderabad
telangana
500043_
```

PRE-LAB VIVA QUESTIONS:

1. What is a structure ?
2. Differentiate between array and structure ?
3. How do you access the member of a structure ?
4. What is the difference between structure and union?
5. How to access structure?
6. What is the role of structure?

LAB ASSIGNMENT:

1. Write a C Program to Store Information(name, roll and marks) of a Student Using Structure.
2. Write a C Program to Add Two Distances (in inch-feet) System UsingStructures.
3. Write a C Program to Calculate Difference Between Two Time Period usingstructure.
4. Read 100 students details from the input using structure and sort the records basedstudent name.
5. Read 100 students marks and find total and percentage of each student and display the details.

POST-LAB VIVA QUESTIONS:

1. What is nested structure ?
2. What is the use of dot operator in structures ?
3. Define union ?
4. What are embedded structures ?
5. Differentiate between address operator and dereferencing operator

Lab 9 - ADDITIONAL PROGRAMS

OBJECTIVE:

a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+. . . ..+xn For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n¡0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

b. Develop a C program to find the 2s complement of a given binary number. 2s complement is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2s complement of 11100 is 00100. Write a C program to find the 2s complement of a binary number.

c. Develop a C program to convert a Roman numeral to its decimal equivalent. E.g. check for the inputs - Roman number IX is equivalent to 9 and Roman number XI is equivalent to 11.

RESOURCES:

Dev C++5.11

PROGRAM LOGIC:

To read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+. . . . .+xn

```
1. Start
2. read values of x and n, sum - 1, i = 1
3. check for n & X
4. if n ¡= 0 —— x ¡=0
5. print values are not valid
6. read values of x and n
7. perform the loop operation
8. for(i = 1; i ¡= n; i++) then follows
9. sum=sum+pow(x, i)
10. print sum
11. Stop
```

To find the 2's complement of a binary number

```
1. Start
2. declare the subprogram "complement(char *a)"
3. initialize the variable i
4. read the binary number
5. perform the loop operation. if it is true then follows. if not goto step7
6. for(i = 0; a[i]! =  ; i )
7. if(a[i] != 0 && a[i]! = 1) then displayed the number is not valid. enter the correct number.
8. Exit the loop
9. call sub program complemt(a)
10. Stop
```

To convert a Roman numeral to its decimal equivalent

```
1. Start
2. Read roman numbers
3. Repeat loop for all given roman letters and convert each letter into digit and add tovariable
4. Print the result
5. Stop
```

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: F9
3. Execute: F10

SOURCE CODE:

To read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+.............+xn

```
#include¡stdio.h¿
#include¡math.h¿
void main()
{
int x,n,sum=0,i;
L:printf(”enter the value of x and n: ”);
scanf(”%d%d”,&x,&n);
if(x¡0 —— n¡0)
{
printf(” enter only positive values for x and n”);
goto L;
}
for(i=0;i¡=n;i++)
{
sum=sum+pow(x,i);
}
printf(”x=%d,n=%d,sum of G.P=%d”,x,n,sum);
getch();
}
```

To find the 2’s complement of a binary number

```
#include¡stdio.h¿
void twoscomplement(int a[10],int);
void main()
{
int n,i,a[10];
printf(” enter number of bits in the binary number: ”);
scanf(”%d”,&n);
printf(” enter the binary number into the array: ”);
for(i=0;i¡n;i++)
scanf(”%d”,&a[i]);
twoscomplement(a,n);
getch();
}
void twoscomplement(int a[10],int n)
{
int i,c=1;
for(i=0;i¡n;i++)
{
if(a[i]==0)
a[i]=1;
else
a[i]=0;
}
printf(” one’s complement of the binary number is: ”);
for(i=0;i¡n;i++)
printf(”%5d”,a[i]);
for(i=n-1;i¿=0;i–)
{
a[i]=a[i]+c;
if(a[i]==1)
{
c=0;
break;
}
else
{
a[i]=a[i]-2;
c=1
}
}
printf(”2’s complement of the binary number is: ”);
if(c==1)
printf(”%5d”,c);
for(i=0;i¡n;i++)
printf(”%5d”,a[i]);
}
```

To convert a Roman numeral to its decimal equivalent

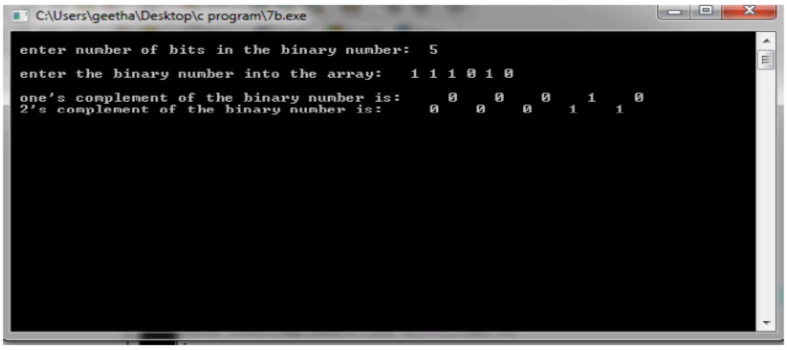
```
#include¡stdio.h¿
#include¡string.h¿
void main()
{
char a[10];
int total[10],sum=0,i,l;
printf(”enter a roman number: ”);
gets(a);
l=strlen(a);
for(i=0;i¡l;i++)
{
switch(a[i])
{
case ’M’:total[i]=1000;
break;
case ’D’:total[i]=500;
break;
case ’C’:total[i]=100;
break;
case ’L’:total[i]=50;
break;
case ’X’:total[i]=10;
break;
case ’I’:total[i]=1;
break;
}
sum=sum+total[i];
}
for(i=0;i¡l-1;i++)
{
if(total[i]¡total[i+1])
{
sum=sum-2*total[i];
}
printf(" the decimal equivalent is %d",sum);
}
}
```

OUTPUT:

To read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+. . . . .+xn

sum.png

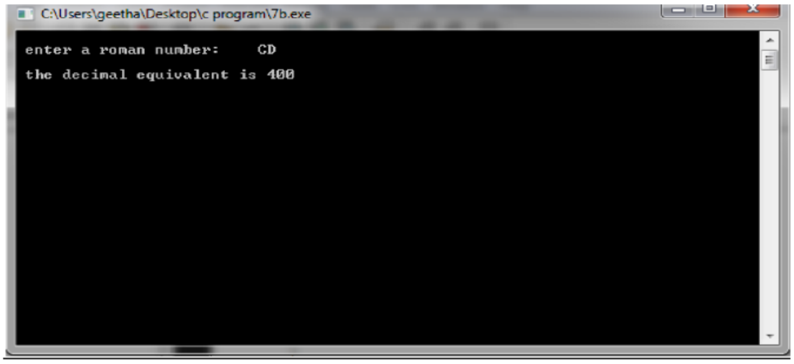
To find the 2's complement of a binary number



C:\Users\geetha\Desktop\c program\7b.exe

```
enter number of bits in the binary number:  5

enter the binary number into the array:   1 1 1 0 1 0

one's complement of the binary number is:     0    0    0    1    0
2's complement of the binary number is:     0    0    0    1    1
```

To convert a Roman numeral to its decimal equivalent



```
enter a roman number:    CD
the decimal equivalent is 400
```

PRE-LAB VIVA QUESTIONS:
1. What is a pointer ?
2. How do you declare a pointer variable
3. How do you use a pointer to a function ?
4. Difference between array and pointers ?
5. What is void pointer?
6. What is the difference between malloc and realloc functions?
7. How you can free the allocated memory¿
8. How pointers are different from normal variables?

LAB ASSIGNMENT:
1. The first few numbers of the Lucas sequence which is a variation on the Fibonaccisequence are:
1 3 4 7 11 18 29
Formulate a program to generate the Lucas sequence. 2. Given a= 0, b = 1, and c = 1 are the first three numbers of some sequence. All other numbers in the sequence are generated from the sum of their three most recent
predecessors. Compose a Cprogram to generate thissequence. 3. Write a C-program to evaluate the function sin(x) as defined by
4. Write a C-program to evaluate the function cos(x) as defined by the infinite series expansion the acceptable error from the computation is 10 6

POST-LAB VIVA QUESTIONS:
1. How structure name is different from a structure variable?
2. How can putchar() can be used to print a string?
3. List out the rules for naming a variable?
4. How is an array represented inmemory?
5. Define function? Why are they needed?

Lab 10 - PREPROCESSOR DIRECTIVES

OBJECTIVE:

a. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15meters.

b. Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.

c. Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a C program to illustrate the use of these symbolic constants.

RESOURCES:

Den C++ 5.11

PROGRAM LOGIC:

To compute the volume for spheres of radius 5, 10 and 15 meters

```
1. Start
2. Define PI constant value 3.14
3. Define macro function to pass a radius value as a argument
4. Call the macro function
5. Print the result
6. Stop
```

To print the elements of the array

```
1. Start
2. Define macro function that receive array and number of elements
3. Repeat until all elements in the array complete and print element
4. Call the macro function
5. Stop
```

To illustrate the use of these symbolic constants

```
1. Start
2. Define + as ADD
3. Define – as SUB
4. Define * as MUL 5. Define / as DIV
6. Perform addition operation using ADD and print the result
7. Perform subtraction operation using SUB and print the result
8. Perform Multiplication operation using MUL and print theresult
9. Perform Division operation using DIV and print the result
10. Stop
```

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: F9
3. Execute: F10

SOURCE CODE:

To compute the volume for spheres of radius 5, 10 and 15 meters

```
#include¡stdio.h¿
#include¡math.h¿
#define PI 3.142
#define volume(r) ((4/3.0)*PI*pow(r,3))
void main()
{
int r;
float v;
scanf(”%d”,&r);
v=volume(r);
printf(” volume of the sphere v=%.3f”,v);
}
```

To print the elements of the array

```
#include¡stdio.h¿
#define PRINTARRAY(a,l)
int i=0;
while(i¡l)
{
printf(”%5d”,a[i]);
i++;
}
void main()
{
int a[10]=10,25,47,56,89,34,68,45,28,03;
PRINTARRAY(a,10);
}
```

To illustrate the use of these symbolic constants

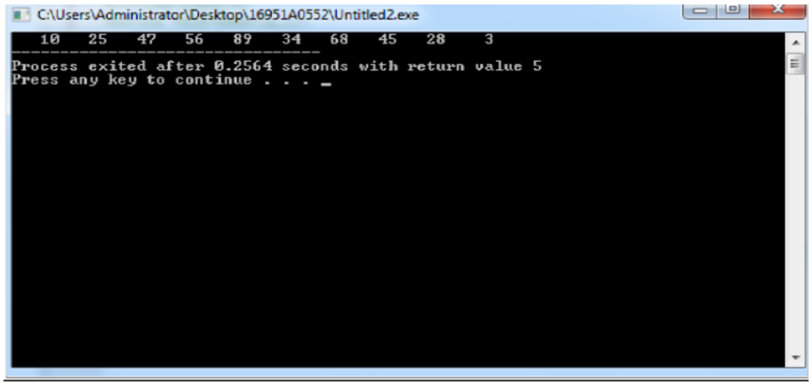
```
#include¡stdio.h¿
#define PLUS +
#define MINUS -
#define MUL *
#define DIV /
#define MOD %
void main()
{
int a=20,b=30;
printf(”addition=%d”,a PLUS b);
printf(” subtraction=%d”,a MINUS b);
printf(”multiplication=%d”,a MUL b);
printf(”division=%d”,a DIV b);
printf(” modulous=%d”,a MOD b);
}
```

OUTPUT:

To compute the volume for spheres of radius 5, 10 and 15 meters
To print the elements of the array

sphere.png

To illustrate the use of these symbolic constants



```
   10    25    47    56    89    34    68    45    28     3
--------------------------------
Process exited after 0.2564 seconds with return value 5
Press any key to continue . . . _
```

PRE-LAB VIVA QUESTIONS:

symbo.png

What is the preprocessor in C ?
1. What is a symbolic constant??
2. What is a macro in C programming??
3. How can you avoid including a header more than once?
4. Can a file other than a .h file be included with #include?
5. What is the benefit of using #define to declare a constant?
6. What is the benefit of using an enum rather than a #define constant?

LAB ASSIGNMENT:
1. Compute area and volume of a cube.
2. Find square root of given number.
3. Convert uppercase character to lower case character and vice versa.
4. Convert the Roman numeral to its decimal equivalent usingmacros.
5. Use pre-processor statements to replace the following constants 0.312,W and 37

POST-LAB VIVA QUESTIONS:
1. Is it better to use a macro or a function?
2. What is the best way to comment out a section of code that contains comments?
3. What is the difference between #include and #include ”file”?
4. Can you define which header file to include at compile time?
5. How do you override a defined macro?
6. How can you check to see whether a symbol is defined?

Lab 11 - FILES

OBJECTIVE:

a. Create an employee file employee.txt and write 5 records having employee name, designation, salary, branch and city. Develop a C program to display the contents of employee.txt file.

b. Create a studentolddata.txt file containing student name, roll no, branch, section, address. Develop a C program to copy the contents of studentolddata.txt file toanother file studentnewdata.txt.

c. Develop a C program to create a text file info.txt to store the information given below. Implement using a C program to count the number of words and characters in the file info.txt. Test Data:

Input the file name to be opened : info.txt

Expected Output:

```
The content of the file info.txt are :
Welcome to IARE
Welcome to Computer Programming
The number of words in the file info.txt are : 7
The number of characters in the file info.txt are : 46
```

d. Given two university information files

"studentname.txt" and "roll_number.txt" that contains students Name

and Roll numbers respectively. Write a C program to create a new file called "output.txt" and copy the content of files "studentname.txt" and "roll_number.txt" into output file. Display the contents of output file "output.txt" on to the screen.

studname.txt	roll_number.txt
Asha	20951A1201
Bharath	20951A0502
Uma	20951A0456
Shilpa	20951A0305

RESOURCES:

Dev C++5.11

PROGRAM LOGIC:

To display the contents of a file on screen:

1. Start
2. Read file name
3. Open file in read mode
4. Repeat until end of the file and print the contents if the file
5. Close the file
6. Stop

Copy the contents from one file to another

1. Start
2. read command line arguments
3. check if no of arguments =3 or not. If not print invalid no of arguments
4. open source file in read mode
5. if NULL pointer, then print source file cannot be open
6. open destination file in write mode
7. if NULL pointer, then print destination file cannot be open
8. read a character from source file and write to destination file untilEOF
9. Close source file and destination file
10. Stop

PROCEDURE:

To display the contents of a file on screen

1. Start

2. Read file name
3. Open file in read mode
4. Repeat until end of the file and print the contents if the file
5. Close the file
6. Stop

Copy the contents from one file to another

1. Start
2. read command line arguments
3. check if no of arguments =3 or not. If not print invalid no of arguments
4. open source file in read mode
5. if NULL pointer, then print source file cannot be open
6. open destination file in write mode
7. if NULL pointer, then print destination file cannot be open
8. read a character from source file and write to destination file untilEOF
9. Close source file and destination file
10. Stop

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
2. Compile: F9
3. Execute: F10

SOURCE CODE:

To display the contents of a file on screen

```
#include¡stdio.h¿
typedef struct
{
char name[30];
char designation[30];
int salary;
char branch[30];
char city[20];
}
employee;
int main()
{
int n,i,j;
FILE *fptr;
employee e[10], temp;
/* Reading file in binary read mode */
fptr = fopen(”employee.txt”,”rb”);
if(fptr == NULL)
{
printf(”File error!”);
exit(1);
}
printf(”Enter how many records:”);
scanf(”%d”,&n);
/* Reading from file and storing them in structure array */
for(i=0;i ¡ n;i++)
{
fread(&e[i],sizeof(e[i]),1, fptr);
}
/* Sorting */
for(i=0;i¡ n-1;i++)
{
for(j=i+1;j¡ n;j++)
{
if(e[i].salary¿e[j].salary)
{
temp = e[i];
e[i] = e[j];
e[j] = temp;
}
}
}
/* Displaying sorted list */
for(i=0;i¡ n;i++)
{
printf(”Name = %sdesignation = %sSalary = %dBranch = %sCity = %s”,e[i].name, e[i].designation,
e[i].salary, e[i].branch, e[i].city);
}
fclose(fptr);
return 0;
}
```

OUTPUT:

Copy the contents from one file to another

```
#include ¡stdio.h¿
void main()
{
FILE *fptr, *fptr2;
char name[20];
int rollno;
char branch[20];
char section[20];
char address[30];
char filename[100], c;

/* open for writing */
fptr = fopen(”studentolddata.rec”, ”w”);
if (fptr == NULL)
{
printf(”File does not exists ”);
return;
}
printf(”Enter the name ”);
scanf(”%s”, name);
fprintf(fptr, ”Name = %s”, name);
printf(”Enter the Roll No.”); scanf(”%d”, &rollno);
fprintf(fptr, ”Roll No = %d”, rollno);
printf(”Enter the Branch”);
scanf(”%s”, branch);
fprintf(fptr, ”Branch = %s”, branch);
printf(”Enter the section”);
scanf(”%s”, section);
fprintf(fptr, ”Section = %s”, section);
printf(”Enter the Address”);
scanf(”%s”, address);
fprintf(fptr, ”Address = %s”, address);
printf(”Enter the filename to open for writing ”);
scanf(”%s”, filename);
// Open another file for writing
fptr2 = fopen(filename, ”w”);
if (fptr2 == NULL)
{
printf(”Cannot open file %s ”, filename);
//exit(0);
}
// Read contents from file
c = fgetc(fptr);
while (c != EOF)
{
fputc(c, fptr2);
c = fgetc(fptr);
}
printf(”Contents copied to %s”, filename);
fclose(fptr);
fclose(fptr2);
}
```

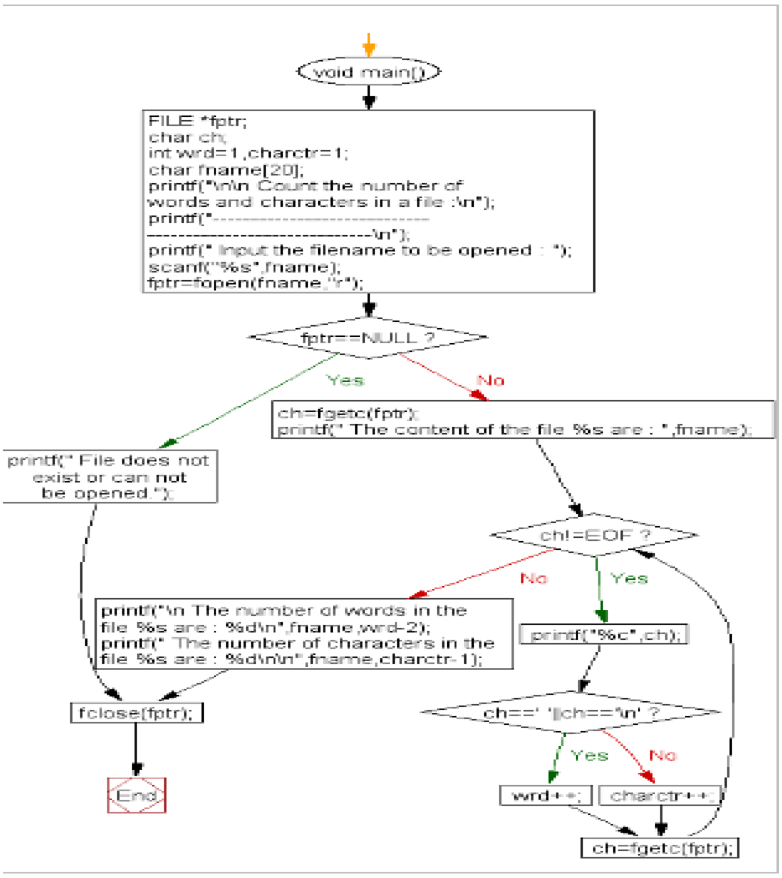
OUTPUT

stu.png

Flowchart:

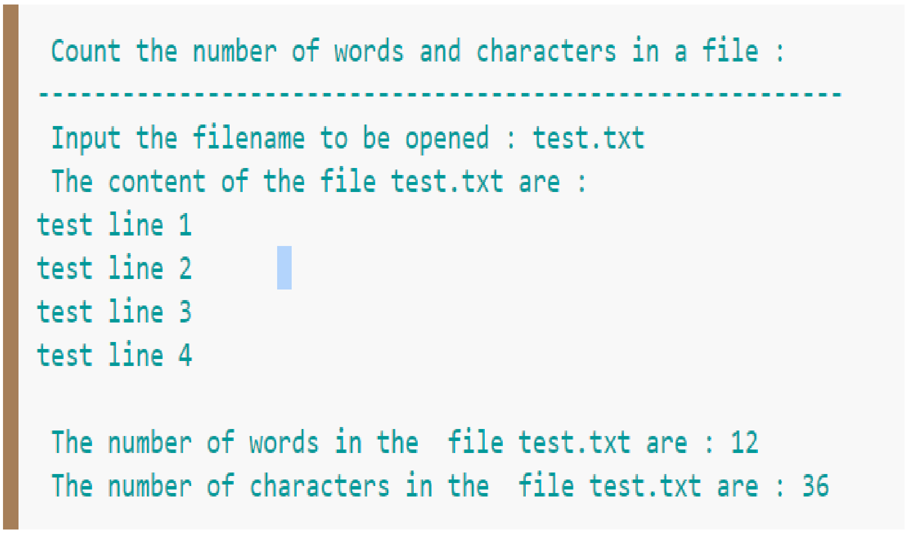
Write a program in C to count number of words and characters in a file

```
#include ¡stdio.h¿
#include ¡stdlib.h¿
void main()
```


void main()
FILE *fptr;
char ch;
int wrd=1,charctr=1;
char fname[20];
printf("\n\n Count the number of words and characters in a file :\n");
printf("---\n");
printf(" Input the filename to be opened : ");
scanf("%s",fname);
fptr=fopen(fname,"r");
fptr==NULL ?
Yes
No
ch=fgetc(fptr);
printf(" The content of the file %s are : ",fname);
printf(" File does not exist or can not be opened.");
ch!=EOF ?
No
Yes
printf("\n The number of words in the file %s are : %d\n",fname,wrd-2);
printf(" The number of characters in the file %s are : %d\n\n",fname,charctr-1);
printf("%c",ch);
fclose(fptr);
ch==' '||ch=='\n' ?
Yes
No
End
wrd++;
charctr++;
ch=fgetc(fptr);

```
{
FILE *fptr;
char ch;
int wrd=1,charctr=1;
char fname[20];
printf(”Count the number of words and characters in a file :”);
printf(”——————————————————————”);
printf(” Input the filename to be opened : ”);
scanf(”%s”,fname);
fptr=fopen(fname,”r”);
if(fptr==NULL)
{
printf(” File does not exist or can not be opened.”);
}
else
{
ch=fgetc(fptr);
printf(” The content of the file %s are : ”,fname);
while(ch!=EOF)
{
printf(”%c”,ch);
if(ch==’ ’——ch==’ ’)
{
wrd++;
}
else
{
charctr++;
}
ch=fgetc(fptr);
}
printf(” The number of words in the file %s are : %d”,fname,wrd-2);
printf(” The number of characters in the file %s are : %d”,fname,charctr-1);
}
fclose(fptr);
}
```

OUTPUT

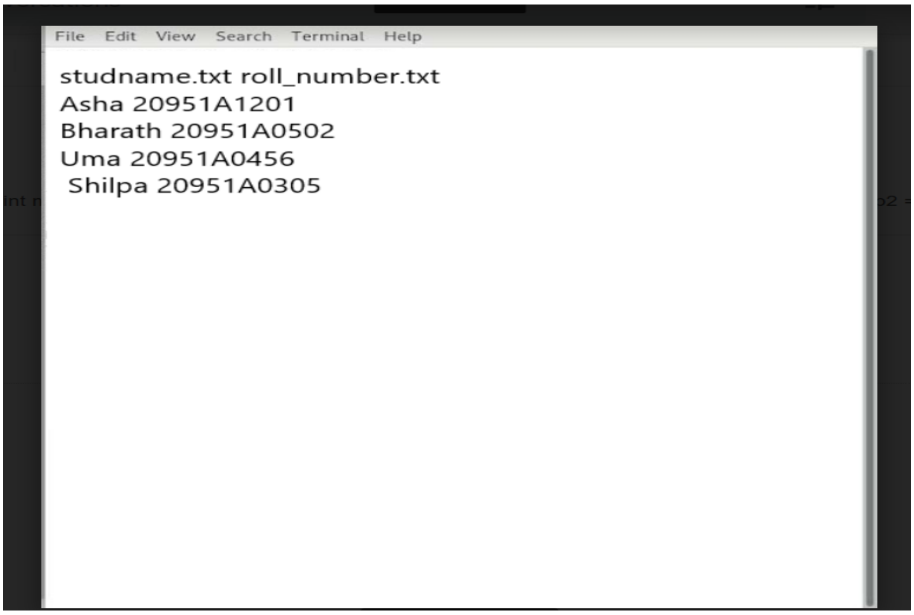


```
 Count the number of words and characters in a file :
---------------------------------------------------------
 Input the filename to be opened : test.txt
 The content of the file test.txt are :
test line 1
test line 2
test line 3
test line 4

 The number of words in the  file test.txt are : 12
 The number of characters in the  file test.txt are : 36
```

To create to text file and copy into third file

```
#include ¡stdio.h¿
#include ¡stdlib.h¿
int main()
{
// Open two files to be merged
FILE *fp1 = fopen(”“studentname.txt”, ”r”);
FILE *fp2 = fopen(”“roll_number.txt”, ”r”);
// Open file to store the result
FILE *fp3 = fopen(”output.txt”, ”w”);
char c;
if (fp1 == NULL —— fp2 == NULL —— fp3 == NULL)
{
puts(”Could not open files”);
exit(0);
}
// Copy contents of first file to file3.txt
while ((c = fgetc(fp1)) != EOF)
fputc(c, fp3);
// Copy contents of second file to file3.
while ((c = fgetc(fp2)) != EOF)
fputc(c, fp3);
printf(”Merged file1.txt and file2.txt into file3.txt”);
fclose(fp1);
fclose(fp2);
fclose(fp3)
return 0;
}
```

OUTPUT:



```
studname.txt roll_number.txt
Asha 20951A1201
Bharath 20951A0502
Uma 20951A0456
 Shilpa 20951A0305
```

PRE-LAB VIVA QUESTIONS:

1. What do you understand by EOF ?
2. Define the term stream?
3. Explain the difference between a NULL pointer and Void pointer ?
4. Differentiate between ptr++ and *ptr++ ?

LAB ASSIGNMENT:

1. C Program to Delete a specific Line from a Text File
2. C Program to Append the Content of File at the end of Another
3. C Program to Capitalize First Letter of every Word in a File
4. C Program to Convert the Content of File to LowerCase
5. C Program to Join Lines of Two given Files and Store them in a Newfile.

POST-LAB VIVA QUESTIONS:

1. What is use of ¡math.h¿ header file ?
2. Describe the file opening mode “w+”
3. Is FILE a built-in data type?
4. How can we determine whether a file is successfully opened or not using fopen() function?
5. How can we know read/write permission any given file?
6. How can we know size and drive where file has stored of any givenfile?
7. What is buffer?
8. What is FILE pointer?
9. What is stream?

Lab 12 - COMMAND LINE ARGUMENTS

OBJECTIVE:

a. Develop a C program to read a set of arguments and display all arguments given through command line.

b. Develop a C program to read a file at command line argument and display the contents of the file.

c. Develop a C program to read N integers and find the sum of N integer numbers using command line arguments.

d. Develop a C program to read three integers and find the largest integer among three using command line argument

RESOURCES:

Dev C++5.11

PROGRAM LOGIC:

To read arguments at the command line and display it

1. Start
2. Pass a to arguments argc and argv in main function
3. Check the condition argc equal to 2 then printf the argv[1] value
4. Else if argc is greter than 2 the print Too many argumentssupplied
5. Else One argument expected
6. Stop

To read a file name at the command line and display its contents

1. Start
2. Read command line arguments
3. Check if no of arguments =2 or not. If not print invalid no of arguments
4. Open file in read mode
5. Repeat until end of the file and print the contents if the file
6. Close the file
7. Stop

PROCEDURE:

1. Create: open Dev C++ 5.11 write a program after that save the program with .Cextension.
123
2. Compile: Alt F9
3. Execute: Ctrl F9

SOURCE CODE:

To read arguments at the command line and display it

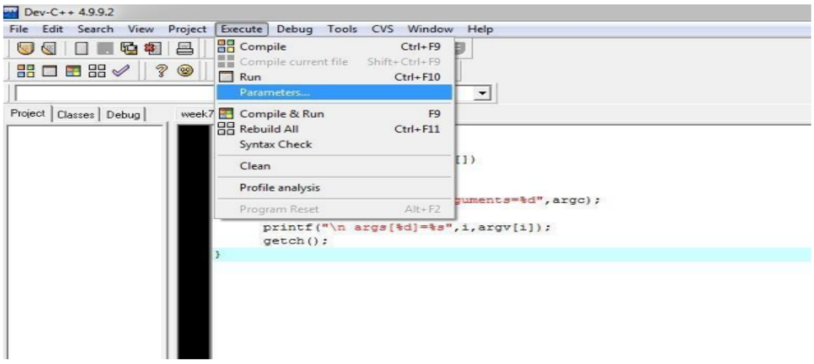
```
#include¡stdio.h¿
#include¡string.h¿
void main(int argc,char *argv[])
{
int i;
printf(”total no of arguments=%d”,argc);
for(i=0;i¡argc;i++)
printf(” args[%d]=%s”,i,argv[i]);
}
```

To read a file name at the command line and display its contents

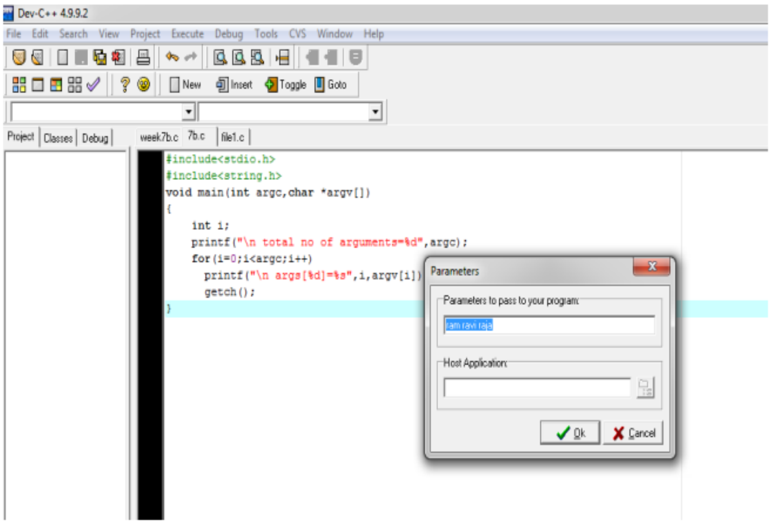
```
#include¡stdio.h¿
void main(int argc,char * argv[])
{
```

```
FILE *fp;
char ch;
fp=fopen(argv[1],”r”);
if(fp==NULL)
{
printf(” opening problem”);
return;
}
while(!feof(fp))
{
ch=getc(fp);
printf(”%c”,ch);
}
fclose(fp);
}
```

OUTPUT:
To read arguments at the command line and display it



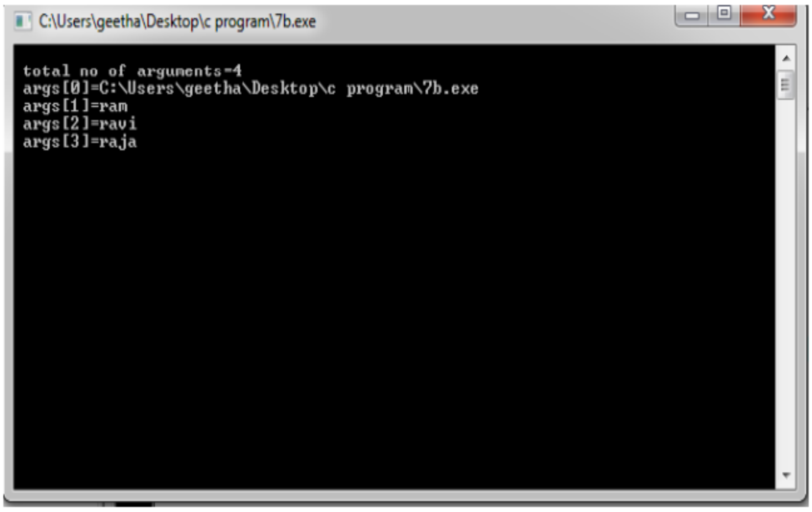
```
[])
guments=%d",argc);
    printf("\n args[%d]=%s",i,argv[i]);
    getch();
}
```



```
#include<stdio.h>
#include<string.h>
void main(int argc,char *argv[])
{
    int i;
    printf("\n total no of arguments=%d",argc);
    for(i=0;i<argc;i++)
      printf("\n args[%d]=%s",i,argv[i])
      getch();
}
```

Parameters to pass to your program: ram ravi raja

Host Application:



```
total no of arguments=4
args[0]=C:\Users\geetha\Desktop\c program\7b.exe
args[1]=ram
args[2]=ravi
args[3]=raja
```

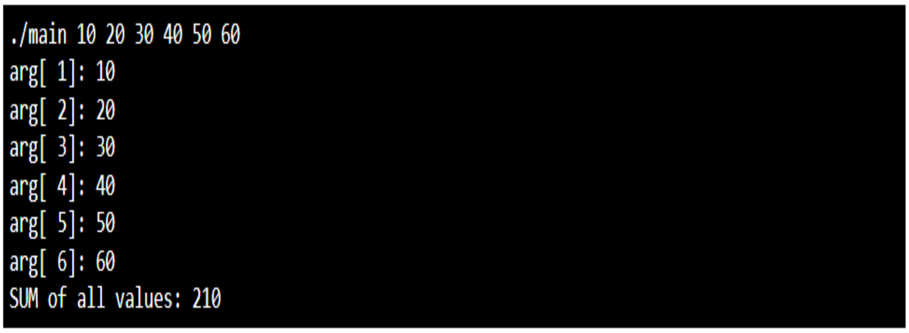
To read arguments at the command line and display it

#include ¡stdio.h¿
int main(int argc, char *argv[])
{
int a,b,sum;
int i; //for loop counter
if(argc¡2)
{
printf(”please use p̈rg_name value1 value2 ... ””);
return -1;
}

sum=0;
for(i=1; i¡argc; i++)
{
printf(”arg[%2d]: %d”,i,atoi(argv[i]));
sum += atoi(argv[i]);

```
}
printf(”SUM of all values: %d”,sum);
return 0;
}
```

OUTPUT:



```
./main 10 20 30 40 50 60
arg[ 1]: 10
arg[ 2]: 20
arg[ 3]: 30
arg[ 4]: 40
arg[ 5]: 50
arg[ 6]: 60
SUM of all values: 210
```

To read arguments at the command line and display it

```
#include ¡stdio.h¿
int main()
{
int A, B, C;
printf(”Enter the numbers A, B and C: ”);
scanf(”%d %d %d”, &A, &B, &C);
if (A ¿= B && A ¿= C)
printf(”%d is the largest number.”, A);
if (B ¿= A && B ¿= C)
printf(”%d is the largest number.”, B);
if (C ¿= A && C ¿= B)
printf(”%d is the largest number.”, C);
return 0;
}
```

OUTPUT:

```
Enter the numbers A, B and C: 2 8 1
8 is the largest number.
```

PRE-LAB VIVA QUESTIONS:

1. What does argv and argc indicate in command-line arguments?
2. In linux, argv[0] by command-line argument can be occupied by
3. What type of array is generally generated in Command-line argument?
4. What is the benfit of command line arguments?
5. What is the use of fseek () function?

LAB ASSIGNMENT:

1. C Program to find factorial of number using Command Line Arguments.
2. C Program to find given number is prime number or not using Command Line Arguments
3. C Program to arrange given strings in ascending order using Command LineArguments
4. Read the text file containing some paragraph. Use fseek () and read the text after skipping n characters from beginning of the file using command line?
5. Write a program to find GCD of given two numbers using command linearguments.

6. C Program to Find Sum of Numbers given in Command Line ArgumentsRecursively.

POST-LAB VIVA QUESTIONS:

1. What are the applications of command line arguments ?
2. What is the value of argv[0]?
3. How to execute command line arguments?
4. What are the arguments passed in main function if use command line arguments?
5. What is the role of argc argument