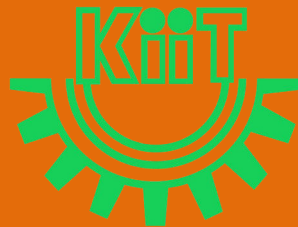# LAB. MANUAL

Programming Lab. in C

(CS-1091) Complete

FOR B.TECH/DUAL-M.TECH/DUAL-MBA THIRD SEMESTER STUDENTS

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INTRODUCTION

- Programming cannot be learned by watching others do it. Students must spend numerous hours working on programs themselves.
- This laboratory manual is a tool that will allow students to experiment with computer science & this is the beginning. As students progress through each laboratory, they may wonder how or why something works. The best way to discover the answer is to try things out.
- The purpose of this lab. manual is to acquaint the students to know the programming language as well as developing programming skills using C language.

STRUCTURE OF THIS LAB. MANUAL

- This lab. manual provides study aids from programming assignments to scheduled exercises using prepared materials.
- This lab manual is divided into 10 laboratory classes. Each laboratory class consists of the following:
  a) **Sample Answers (SA):** These are the complete program samples that students will go through in detail before coming to the laboratory class, may refer during solving lab assignments.
  b) **Lab Assignments (LA):** These are the assignments that ask each student to independently create small programs during the lab time.
  c) **Home Assignments (HA):** These are the assignments to be done during lab time if lab. assignments are completed before lab. time or may be assigned as post-lab homework and submitted in the next lab class.

The approach of each Lab: **SA-LA-HA**

INSTRUCTIONS FOR STUDENTS

To make laboratory experiments effective, each student must obey the following rules:

1. **General instructions**
   - Once you create a directory named as your rollno_section under the home directory of UBUNTU OS system using command-line or by GUI.
   - In Each lab, store programs within appropriate folders named as LAB01, LAB02, LAB03...etc. which are the sub folders under your rollno_section folder.
   - Always save programs files with the meaningful name preceded by lab assignment no within specified folders. If you want solve a lab assignment no. HA3.5 (3.5 means 5th assignment of 3rd lab) which is to find roots of a quadratic equation, then name the program as HA35_quadratic.c or HA35_quadeq.c etc.

2. **Attendance:** Attendance is required at all labs without exception. There are no make-up labs in this course. Performance will be judged based on the experiments conducted, quality and punctual submission of the labs reports for each experiment. Faculty/Instructor will take attendance. Failure to be present for an experiment will result in loosing entire marks for the corresponding lab. However, genuine cases may be considered for repeat lab. If a student misses a lab session due to unavoidable circumstances can provide a legitimate proof as soon as possible, he/she may be then be allowed by the lab instructor, to make-it-up.

3. **Laboratory Report:** At the end of every lab student will be assigned to write-up one of the experiment's problem. Your report must present a clear and accurate account, results you obtained. Student should develop habit to submit the laboratory report/assignments continuously and progressively on the scheduled dates and should get the assessment done.

4. Read the write up of each experiment to be performed, a day in advance. Understand the purpose of experiment and its practical implications.

5. Student should not hesitate to ask any difficulty faced during conduct of practical / exercise.

6. The student shall study all the questions given in the laboratory manual and practice to write the answers to these questions.

7. Student shall develop the habit of evolving more ideas, innovations, skills etc. those included in the scope of the manual.

8. Student should develop the habit of not to depend totally on teachers but to develop self learning techniques.

9. While entering into the LAB students should wear their ID cards.

10. Shut down your system after you have finished with your experiment.

PROCEDURE FOR EVALUATION

The entire lab course consists of 100 marks. The marking scheme is as follows

Continuous Evaluation marks	60
End Sem. Lab Examination	40
Total	**100**

Scheme for continuous evaluation

Students will be evaluated bi-weekly. Minimum 6 evaluations should be conducted for each student. Each evaluation carries 10 marks. The scheme is as follows:

Program & Execution	5
Observation	3
Viva-Voce	2
Total	**10**

Scheme for end sem lab examination

End sem. lab exam will be conducted after the completion of all the weekly exercises. The student will not be allowed for exam if he/she is found short of attendance and has not completed all the experiments. The marking scheme for end sem lab exam is as follows:

Write-up of program	15
Program execution & Checking Results for all inputs	15
Final Viva-Voce	10
Total	**40**

CONTENTS

LAB - 1
Linux/Unix Commands
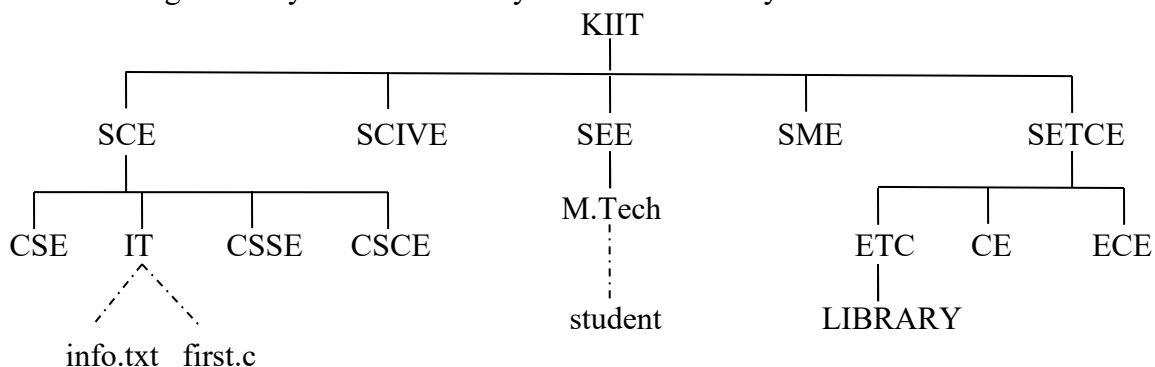## Compilation, Execution of a program in GCC Compiler
CONTENTS

Experiment No-1

Sample Answers

SA1.1 To get familiar with LINUX/UNIX (UBUNTU) Operating System and practice some frequently used commands on terminal (Command Prompt).

SA1.2 To get familiar with **gedit** editor to create a new file, read the contents of a file, write into a file or modify the contents of a file.

SA1.3 To learn how to compile and execute a C file that displays "Welcome to C Programming Laboratory" in **gcc** compiler on terminal (Command Prompt).

SA1.4 WAP to display "IIT" using the character '*'.

SA1.5 WAP to display the following message by using multiple printf statement.

          A Good End
          Can Only Be Achieved
          Only By Good Means.

SA1.6 WAP to display the above message by using a single printf statement.

Lab. Assignments

LA1.1 First create a sub-directory named as your roll number under your home directory. Then create the following directory structure under your rollno directory.

KIIT

SCE   SCIVE   SEE   SME   SETCE

CSE   IT   CSSE   CSCE   M.Tech   ETC   CE   ECE

info.txt   first.c   student   LIBRARY

    N.B. The names under solid lines are assumed as directories and dotted lines as file names.

    Do the following operations

    a) Create the file names under the directories as mentioned in the figure and write some relevant data into the files.

    b) Rename the file info.txt as itstudentsdata.txt.

    c) Copy the file first.c into the directory CE with the same name.

    d) Copy the file first.c into the directory SME with a new name as hello.c.

    e) Transfer the file student into the directory SCIVE and check whether transferred or not.

LA1.2 WAP to display "KIMS" using the character '#'.

LA1.3 WAP to display the following message by using multiple printf statement.

> If The End Is Good,
>   Then It Is Good,
> Whatever Be The Means.

LA1.4 WAP to display the message of LA 1.3 by using single printf statement.

Home Assignments

HA1.1 WAP to print your BIO-DATA (Name, Regd.no", Branch, JEE Rank, Gender, Phone no., Address etc.) using printf statement.

PROGRAM NO. SA1.1

To get familiar with LINUX/UNIX (UBUNTU) Operating System and practice some frequently used commands on terminal (command prompt).

LINUX/UNIX COMMANDS

$ _ Command Prompt

Anything written within [ ] is optional.

Sl. No.	Command	Description	Example
1.	man	**Manual** **Syntax** **man commandName** It displays an on-line manual page for a command that it gives detailed information of a command how to use it.	**$ man ls** It gives the manual page of ls command **$ man pwd** You will see the manual for the pwd command.
2.	ls	**List** **Syntax** **ls [option(s)] [file(s)]** It lists the contents of a directory, and can be used to obtain information on the files and directories within it.	**$ ls** It lists the files & subdirectories available in the current directory. **$ ls -l** Same as above except it lists the files 'long format', which contains lots of useful information, e.g. the exact size of the file, who owns the file and who has the right to look at it, and when it was last modified. **$ ls dir1** It lists the files & subdirectories available in dir1.
3.	pwd	**Print Working Directory** **Syntax** **pwd**	**$ pwd** It tells you where you currently are, in which directory.

		It Shows the current location in the directory tree. In other words, the command gives the full pathname of your current directory.	
4.	cd	**Change Directory** **Syntax** **cd [options(s)] [directory]** It changes the current directory to other directory depending on the options and/or name of the directory.	**$ cd** It changes to the user's home directory. **$ cd ~** Same as above. **$ cd dir1** It changes to the directory dir1 if dir1 is a sub directory of your current working directory. **$ cd /home/user1/kiit/csit** It changes to csit directory as mentioned in the full path from your current working directory. **$ cd ..** It simply move up one directory. For example, if you are in /home/user1/kiit/csit and you type "cd ..", you will end up in /home/user1/kiit After applying cd .. yoi can verifywith pwd command.
5.	mkdir	**Make Directory** **Syntax** **mkdir [option(s)] directoryName** It creates a new directory.	**$ mkdir sce** It creates a new directory named as sce under your current directory. After executing this command, check through ls whether sce directory is created or not. If you want to create a new directory under other than your current directory, then mention the full path name before the new directory name. As for example, if your current working directory is /home/user1/kiit, but you want to create a new directory named as ece under /home/user1/kiit/setce, then ececute the following command: **$ mkdir** /home/user1/kiit/setce/ece
6.	cp	**Copy** **Syntax**	**$ cp file1 file2** It copies the contents of the file file1 into

		cp [option(s)] sourcefile targetfile Copies sourcefile to targetfile. Both file will be present.	a new file called file2. If you apply ls command, it will show you both the files. **$ cp ak.txt bk.txt dir1** It creates copies of files ak.txt and bk.txt (with the same names), within the directory dir1. dir1 must already exist for the copying to succeed. **$ cp file1 /home/user1/kiit/scive** It copies the contents of the file file1 into the directory scive with the same name. **$ cp -r dir1 dir2** It recursively copies the directory dir1, together with its contents and subdirectories, to the directory dir2. **$ cp -i quard.c quradeq.c** It waits for confirmation, if necessary, before an existing targetfile quardeq.c is overwritten. quard.c is copied as quradeq.c. Now If you apply ls command Then it will show you both the files quard.c and quradeq.c.

7.	**mv**	<u>Move</u>
		Syntax
		
		mv [option(s)] sourcefile targetfile
		
		It moves a file to a new location, or renames it. Source file name will be deleted.
			$ mv info.txt itstudentsdata.txt
			It simply renames the file **info.txt as itstudentsdata.txt** . info.txt is deleted and only file available in current directory is itstudentsdta.txt.
			
			$ mv -b info.txt itstudentsdata.txt
			It ceates a backup copy of the sourcefile info.txt before moving it to itstudentsdata.txt. It is similar to cp command.
			
			$ mv /home/user1/kiit/sce/it/first.c
			   home/user1/kiit/sme
			It simply move or transfer the file first.c into sme directory, no matter where is your current directory as both source and destination paths are mentioned.
			
			$ mv /home/user1/kiit/sce/it/first.c
			   home/user1/kiit/sme/firstcprog.c

			It simply move or transfer the file first.c into sme directory with a new name firstcprog.c **$ mv -i quard.c quradeq.c** It waits for confirmation, if necessary, before an existing targetfile quardeq.c is overwritten. quard.c is renamed as quradeq.c. Now If you apply ls command Then it will show you only quradeq.c.
8.	rm	**Remove** **Syntax** **rm [option(s)] file(s)** It removes the specified files from the file system. Directories are not removed by rm unless the option -r is used.	**$ rm quard.c** It deleted the file quard.c available in the current directory. **$ rm –i quard.c** It waits for confirmation before deleting quard.c
9.	rmdir	**Remove Directory** **Syntax** **rmdir [option(s)] directoryName** It deletes the specified directory, provided it is already empty.	**$ rmdir dir1** If dir1 is empty, then it deletes the directory dir1 present under current directory.
10.	whereis	**Syntax** **whereis file** `It shows possible locations of file.`	**$ whereis quard.c** It shows you the location of the quard.c file.

Other LINUX/UNIX Commands (to know the detail about the following command use man)
date, cat, tail, which, locate, find, ps, id, du, clear, echo, grep, sot, su, ln, kill, chmod, ssh, tar, gzip, ping etc.

PROGRAM NO. SA1.2

To get familiar with **gedit** editor to create a new file, read the contents of a file, write into a file or modify the contents of a file.

gedit:
Text Editor (gedit) is the default GUI text editor in the Ubuntu operating system
1. To create a new file in c (first.c), run the following in command prompt.
   $ gedit first.c
   It will open the gedit editor window with the name first.c where you can write anything (program code for first.c).

Then save the contents of this file by choosing the appropriate options from gedit menu as follows:

File → Save

Now quit from gedit window and return to command prompt, do the following:

File → Exit

2. To open an existing file (say first.c) for editing do the following:
   $ gedit first.c
   After editing will be over, save the file and quit from gedit window.

PROGRAM NO. SA1.3

To learn how to compile and execute a C file that displays "Welcome to C Programming Laboratory" in **gcc** compiler on terminal (Command Prompt).

PROCEDURE

Step-1: Create a file named as **sa13_first.c** in gedit editor and write the following program code in it, then save the file and quit from gedit window.

Step-2: Compile the C Program file named as sa13_first.c
   $ gcc sa13_first.c
   It compiles the file sa13_first.c, if it is error free, then go for execution to get output. Else open the file again in gedit to correct the errors, again compile it till it does not show any errors.

Step-3: To get the output do the following
   $ ./a.out

PROGRAM CODE

```c
#include <stdio.h>
int main()
{
   printf("\n Welcome to C Programming Laboratory \n");
   return 0;
}
```

INPUT/OUTPUT

RUN-1
Welcome to C Programming Laboratory

PROGRAM NO. SA1.4

WAP to display "IIT" using the character '*'.
PROGRAM CODE

```
#include <stdio.h>
int main()
{
    printf("\n\n");
    printf("*****   *****   ******* \n");
    printf("  *       *         *     \n");
    printf("  *       *         *    \n");
    printf("  *       *         *    \n");
    printf("  *       *         *    \n");
    printf("  *       *         *    \n");
    printf("*****   *****       *    \n");
    return 0;
}
```
INPUT/OUTPUT

RUN-1

```
*****   *****   *******
  *       *        *
  *       *        *
  *       *        *
  *       *        *
  *       *        *
*****   *****      *
```

PROGRAM NO. SA 1.5

WAP to display the following message by using multiple printf statement.
           A Good End
           Can Only Be Achieved
           Only By Good Means.
PROGRAM CODE

```
#include <stdio.h>
int main()
{
    printf("\n A Good End ");
    printf("\n Can Only Be Achieved ");
    printf("\n Only By Good Means.");
    return 0;
}
```

INPUT/OUTPUT

RUN-1
A Good End
Can Only Be Achieved
Only By Good Means.

PROGRAM NO. SA 1.6

WAP to display the following message by using multiple printf statement.

                A Good End
                Can Only Be Achieved
                Only By Good Means.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
    printf("\n A Good End\nCan Only Be Achieved\nOnly By Good Means.");
    return 0;
}
```

INPUT/OUTPUT

RUN-1
A Good End
Can Only Be Achieved
Only By Good Means.

LAB - 2
Operators & Expressions,
Simple Input/Output Statemets
CONTENTS

Experiment No-2

Sample Answers

SA2.1 WAP to perform the addition of two integers and display the result.
SA2.2 WAP to find centigrade for a given Fahrenheit temperature.
SA2.3 WAP to calculate area of a circle.
SA2.4 WAP to calculate area of a triangle whose base and height is given.
SA2.5 WAP to swap two integer numbers using third variable.
SA2.6 WAP to convert given paisa into its equivalent rupee and paisa as per the following format.
Example. 550 paisa = 5 Rupee and 50 paisa
SA2.7 WAP to convert given second into its equivalent hour, minute and second as per the following format. Example. 7560 second = 2 Hour, 27 Minute and 40 Second

Lab. Assignments

LA2.1 WAP to subtract a number from another number and display the result.
LA2.2 WAP to convert temperature from centigrade to Fahrenheit scale.
LA2.3 WAP to calculate perimeter of a circle.
LA2.4 WAP to calculate area of a triangle whose three sides are given.
LA2.5 WAP to swap two integer numbers without using third variable.
LA2.6 WAP to convert a quantity in meter entered through keyboard into its equivalent kilometer and meter as per the following format. Example. 2430 meter = 2 Km and 430 meter.

Home Assignments

HA2.1 WAP to find the average mark of 5 subjects of a student and find the percentage. Assume full mark of each subject is 100.
HA2.2 WAP swap the contents of two variables by using a single statement for swap in C.
HA2.3 WAP to add two times in hour, minitue & second format entered through the keyboard in the format hh:mm:ss

PROGRAM NO. SA 2.1

WAP to perform the addition of two integers & display the result.

PROGRAM CODE
```c
#include<stdio.h>
int main()
{
  int a, b, c;
  printf("\nEnter two numbers to add :");
  scanf("%d%d",&a,&b);
  c = a + b;
  printf("\nThe addition of  %d  and  %d  is  %d", a,b,c);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter two numbers to add: 4 6
The addition of 4 and 6 is 10

RUN-2
Enter two numbers to add: 5 7
The addition of 5 and 7 is 12

PROGRAM NO. SA 2.2

WAP to find centigrade for a given fahrenheit temperature.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
  float f,c;
  clrscr();
  printf("\nEnter a temperature in Fahrenheit scale=>");
  scanf("%f",&f);
  c=(f-32.0)/1.8;
  printf("\nThe equivalent temperature in celcious is %0.2f",c);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a temperature in Fahrenheit scale=>100
The equivalent temperature in celcious is 37.78

RUN-2
Enter a temperature in Fahrenheit scale=>32
The equivalent temperature in celcious is 0.00

PROGRAM NO. SA 2.3

WAP to calculate area of a circle.

PROGRAM CODE
```
#include <stdio.h>
int main()
{
    float radius,area;
    printf("\nEnter the radius of  a circle : ");
    scanf("%f",&radius);
    area = 3.14 * radius * radius;
    printf("\nArea of Circle : %f",area);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter the radius of a circle: 2
Area of Circle: 12.560000

RUN-2
Enter the radius of a circle: 4
Area of Circle: 50.24000

PROGRAM NO. SA 2.4

WAP to calculate area of a triangle whose base and height are given.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
    float b, h, a;
    printf("\nEnter the values of base and height : ");
    scanf("%f %f",&b,&h);
    a = 0.5 * b * h;
    printf("\nArea of Triangle : %f", a);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter the values of base and height: 2 3
Area of Triangle : 3.000000

RUN-2
Enter the values of base and height: 3 4
Area of Triangle : 6.000000

PROGRAM NO. SA2.5

WAP to swap two integer numbers using third variable.

PROGRAM CODE
```c
#include<stdio.h>
int main()
{
        int a,b,temp;
        printf("\nEnter two integers a and b : ");
        scanf("%d%d", &a,&b);
        temp=a;
        a=b;
        b=temp;
        printf("\nAfter swapping a=%d and b=%d",a,b);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter two integers a and b : 2 3

After swapping a=3 and b=2

RUN-2
Enter two integers a and b : 10 20

After swapping a=20 and b=10

PROGRAM NO. SA 2.6

WAP to convert given paisa into its equivalent rupee and paisa as per the following format.
Ex. 550 paisa = 5 Rupee and 50 paisa

PROGRAM CODE

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

{
        int p,p1,r;
        printf("\nEnter paisa = ");
        scanf("%d",&p);
        r=p/100;
        p1=p%100;
        printf("\n%d paisa = %d rupees and %d paisa",p,r,p1);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter paisa = 2550

2550 paisa = 25 rupees and 50 paisa

RUN-1
Enter paisa = 245

2550 paisa = 2 rupees and 45 paisa

PROGRAM NO. SA 2.7

WAP to convert given second into its equivalent hour, minute and second as per the following format.
Ex. 7560 second = 2 Hour, 27 Minute and 40 Second

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
    long sec1, sec2, hr, min, t;
    printf("\nEnter time in seconds: ");
    scanf("%ld", &sec1);
    hr = sec1/3600;
    t = sec1%3600;
    min = t/60;
    sec2 = t%60;
    printf("\n\n %ld second= %ld Hour %ld Minute and %ld  Second",sec1, hr, min,sec2);
    return 0;
}
```

INPUT/OUTPUT

RUN-1

Enter time in seconds: 3750

3750 second=1 Hour 2 Minute 30 Second

RUN-2

Enter time in seconds: 4000

4000 second=1 Hour 6 Minute 40 Second

LAB - 3
Branching Statements
(if..esle, switch..case)
CONTENTS

Experiment No-3

Sample Answers

SA3.1 WAP to find the largest between two numbers.

SA3.2 WAP to read an alphabet from the user and convert it into uppercase if the entered alphabet is in lowercase, otherwise display an appropriate message.

SA3.3 WAP to read a character from the user and test it whether it a vowel or consonant or not an alphabet.

SA3.4 WAP to determine whether a year entered through the keyboard is a leap year or not.

SA3.5 WAP to find the roots of a quadratic equation $ax^2+bx+c=0$ using if-else statement.

SA3.6 WAP to display the grade system of KIIT University based on total marks secured by a student in a semester. Use switch-case statement.

Lab. Assignments

LA3.1 WAP to input any two integers distinct and display the greater of two integers.

LA3.2 WAP to input any three integers distinct and display the greater of three integers.

LA3.3 WAP to test whether a number entered through keyboard is ODD or EVEN.

LA3.4 WAP to read an alphabet from from the user and convert it into lowercase if the entered alphabet is in uppercase, otherwise display an appropriate message.

LA3.5 WAP to input any two integers, and provide a menu to the user to select any of the options as add, subtract, multiply, divide and display the result accordingly.

LA3.6 WAP to display the grade system of KIIT University based on total marks secured by a student in a semester. Use else..if ladder statement.

Home Assignments

HA3.1 WAP to check whether a character entered through keyboard is a digit, letter, special character etc or not.

HA3.2 WAP which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % etc). Use switch cse.

HA3.3 WAP to find the roots of a quadratic equation $ax^2+bx+c=0$ using switch-case statement.

PROGRAM NO. SA 3.1

WAP to find the largest between two numbers.

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
        int a,b;
        printf("\nEnter two numbers: ");
        scanf("%d %d",&a,&b);
        if(a>b)
            printf("\nLargest number is %d",a);
        else
             printf("\nLargest number is %d",b);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter two numbers: 5 3

Largest number is 5

RUN-2
Enter two numbers: 10 30

Largest number is 30

PROGRAM NO. SA 3.2

WAP to read an alphabet from the user and convert it into uppercase if the entered alphabet is in lowercase, otherwise display an appropriate message.

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
  char ch;
  printf("\n Enter an alphabet: ");
  scanf("%d", &ch);
  if (ch>='a' && ch<='z')
  {
      ch=ch-32;
      printf("\nThe uppercase of the entered alphabet  is %c", ch);
```

```
    }
    else
        printf("\nThe entered character is not a lower case alphabet");

    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter an alphabet: g

The uppercase of the entered alphabet is G

RUN-2
Enter an alphabet: G

The entered character is not a lower case alphabet

PROGRAM NO. SA 3.3

WAP to read a character from the user and test it whether it a vowel or consonant or not an alphabet.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
    char ch;
    printf("\n Enter an alphabet: ");
    scanf("%d", &ch);
    if ((ch>='a' && ch<='z') || (ch>='A' && ch<='Z'))
    {
        if (ch=='a' || ch=='A' || ch=='e' || ch=='E' || ch=='i' || ch=='I' || ch=='o' || ch=='O' || ch=='u' ||
ch=='U');
                printf("\nThe entered character %c is a vowel", ch);
        else
                printf("\nThe entered character %c is a consonat", ch);

    }
    else
        printf("\nThe entered character %c is not an alphabet",ch);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter an alphabet: B

The entered character B is a consonant

RUN-2
Enter an alphabet: i

The entered character i is a vowel

RUN-3
Enter an alphabet: %

The entered character % is not an alphabet

PROGRAM NO. SA 3.4

WAP to determine whether a year entered through the keyboard is a leap year or not.

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
  int year;
  clrscr();
  printf("\nEnter the year:");
  scanf("%d",&year);
  if((year%4==0 && year%100!=0)||(year %400==0))
    printf("\n%d is a leap year.",year);
  else
        printf("\n%d is not a leap year.",year);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter the year:2005

2005 is not a leap year.
RUN-2
Enter the year:1996

1996 is a leap year.

<mark>PROGRAM NO. SA 3.5</mark>

WAP to find the roots of a quadratic equation $ax^2+bx+c=0$ using if-else statement.

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
  float a,b,c,real,imag, dis,i1,i2,r1,r2;
  clrscr();
  printf("\nInput values for a, b and c=>");
  scanf("%f%f%f",&a,&b,&c);
  dis=b*b-4*a*c;
  if(dis==0)
   {
    printf("\nThe Roots are Equal");
    r1=r2=-b/(2.0*a);
    printf("\nRoots are %.2f and %.2f",r1,r2);
   }
  else if(dis>0)
   {
    printf("\nThe Roots are real & unequal.");
    r1=(-b+sqrt(dis))/(2.0*a);
    r2=(-b-sqrt(dis))/(2.0*a);
    printf("\nRoots are %.2f and %.2f",r1,r2);
   }
  else
   {
    printf("\nThe Roots are inaginary");
    real=-1/(2.0*a);
    dis=-dis;
    imag=sqrt(dis)/(2.0*a);
    printf("\nRoot1=%5.2f+i%5.2f",real, imag);
    printf("\nRoot2=%5.2f-i%5.2f",real, imag);
   }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Input values for a, b and c=>1
2
1

The Roots are Equal

Roots are -1.00 and -1.00

RUN-2
Input values for a, b and c=>1 8 3

The Roots are real & unequal.

Roots are -0.39 and -7.61

RUN-3
Input values for a, b and c=>3 5 7

The Roots are imaginary

Root1=-0.17+i1.28

Root2=-0.17-i1.28

PROGRAM NO. SA 3.6

WAP to display the grade system of KIIT University based on total marks secured by a student in a semester. Assume marks are integer values. Use switch-case statement.

The grade is calculated is as follows:

Marks	Grade
90 to 100	O
80 to 89	E
70 to 79	A
60 to 69	B
50 to 59	C
40 to 49	D
< 40	F

PROGRAM CODE
```
#include<stdio.h>
int  main()
{
    int total_mark,tm;
    printf("\nEnter total mark secured by a student: ");
    scanf("%d",&total_mark);
    tm=total_mark/10;
    switch(tm)
    {
        case 9:  printf("\nSecured grade is  O");
                break;
        case 8:  printf("\nSecured grade is  E");
                break;
        case 7:  printf("\nSecured grade is  A");
                break;
```

```
        case 6:  printf("\nSecured grade is  B");
                 break;
        case 5:  printf("\nSecured grade is  C");
                 break;
        case 4:  printf("\nSecured grade is  D");
                 break;
        default: printf("FAIL");
    }
    return 0;
}
```

INPUT/OUTPUT

RUN-1

Enter total mark secured by a student: 55
Secured grade is C

RUN-2

Enter total mark secured by a student: 95
Secured grade is O

LAB - 4
Looping (while, do..while and for)
CONTENTS

Experiment No-4

<u>**Sample Answers**</u>

SA4.1 WAP to print the natural numbers from 1 to 20.

SA4.2 WAP to print all numbers within a given range. The range is given by user.

SA4.3 WAP to calculate the factorial of a given number.

SA4.4 WAP to calculate the sum of digits of a given number.

SA4.5 WAP to find the GCD/HCF of two numbers .

SA4.6 WAP to check whether a number n is prime number or not.

SA4.7 WAP to check whether an input integer is perfect number or not.

SA4.8 WAP to find the first n numbers of a Fibonacci sequence.

SA4.9 WAP to evaluate the equation $y=x^n$ where n is a non-negative integer.

SA4.10 WAP to sum the following series   S=1+(1+2)+(1+2+3)+...+(1+2+3+...+n)

SA4.11 WAP to print the following pattern for n rows. Ex. for n=5 rows

```
    *
   *  *
   *   *   *
   *   *   *   *
   *   *   *   *   *
```

SA4.12 WAP to print the following pattern for n rows. Ex. for n=5 rows

```
        *
      *  *
     *   *   *
    *  *   *   *
   *   *   *   *   *
```

SA4.13 WAP to print the following pattern for n rows. Ex. for n=5 rows

```
   A
   A  B
   A   B  C
   A   B   C  D
   A   B   C   D   E
```

SA4.14 WAP to form a pyramid of numbers for a given number. Ex. for number 4

```
       1
     1 2 1
   1 2 3 2 1
 1 2 3 4 3 2 1
```

SA4.15 WAP to print the following pattern for n rows. Ex. for n=6 rows

```
1
0 1
1 0 1
0 1 0 1
1 0 1 0 1
0 1 0 1 0 1
```

Lab. Assignments

LA4.1 WAP to print your name 5 times using while loop.

LA4.2 WAP to input any integer and print your name that many times.

LA4.3 WAP to print the series as 1 2 3 4 5 6 7 ....100.

LA4.4 WAP to print the series as 1 2 7 15 31 ....n, where n is given by user.

LA4.5 WAP to print the series as 1 1 2 3 5 8 13 ....n, where n is given by user.

LA4.6 WAP to print the series as 3 5 7 11 13 17..........n, where n is given by user.

LA4.7 WAP to print all odd and even numbers separately within a given range. The range is input through user.

LA4.8 WAP to display the reverse of a number entered through keyboard.

LA4.9 WAP to check whether an integer number is a Armstrong number or not!.

LA4.10 WAP to print the following pattern for n rows. Ex. for n=5 rows

```
A
B  A
C  B  A
D  C  B  A
E  D C  B  A
```

LA4.11 WAP to print the following pattern for n rows. Ex. for n=5 rows

```
1
2 1
1 2 3
4 3 2 1
1 2 3  4 5
```

Home Assignments

HA4.1 WAP to check whether an input integer is strong number or not.
(Hint: If the sum of factorials of all digits of a number are equal to the number are equal to the number, it is called a strong number)

HA4.2 WAP to find out the prime factors of a number entered through keyboard (distinct).
/*Hints: A prime number is any number with no divisors other than itself and 1, such as 2 and 5. Any number can be written as a product of prime numbers in a unique way (except for the order). These are called prime factors of a number. In other words, In number theory, the prime factors of a positive integer are the prime numbers that divide that integer exactly, without leaving a remainder. The process of finding these numbers is called integer factorization, or prime factorization.

- Enter a number : 100
- The prime factors of 100 are 2(2) and 5(2)
- That is, 100 = 2 x 2 x 5 x 5, and those numbers are primes. */

HA4.3 WAP to form reverse pyramid of numbers for a given number. Ex. for number 4

```
1 2 3 4 3 2 1
  1 2 3 2 1
    1 2 1
      1
```

HA4.4 WAP to print the following pattern for n rows. Ex. for n=6 rows

```
          0
        1 0
      0 1 0
    1 0 1 0
  0 1 0 1 0
1 0 1 0 1 0
```

HA4.5 WAP to generate the pascal triangle pyramid of numbers for a given number.
Ex. for number 4

```
      1
    1   1
  1   2   1
1   3   3   1
1   4   6   4   1
```

HA4.6 WAP to display the following style o/p for a given string input through keyboard.(Ex.for a string "KIITCSIT")

```
KIITCSITTISCTIIK
KIITCSI    ISCTIIK
KIITCS      SCTIIK
KIITC        CTIIK
KIIT          TIIK
KII            IIK
KI              IK
K                K
KI              IK
KII            IIK
KIIT          TIIK
KIITC        CTIIK
KIITCS      SCTIIK
KIITCSI    ISCTIIK
KIITCSITTISCTIIK
```

HA4.7 WAP to convert a decimal number into its equivalent binary number.

PROGRAM NO. SA 4.1

WAP to print the natural numbers from 1 to 20.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
    int i;
    printf("\nThe natural number's are: ");
    for(i=1;i<=10;i++)
       printf("%d   ",i);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
The natural number's are: 1   2   3   4   5   6   7   8   9   10

PROGRAM NO. SA 4.2

WAP to print all numbers within a given range. The range is given by user.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
  int min,max,i;
  printf("\nEnter minimum and maximum range:");
  scanf("%d%d",&min,&max);
  printf("\nThe  number's are::\n");
  for(i=min;i<=max;i++)
  {
    printf("%d\t",i);
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter minimum and maximum range: 20   45

The number's are::

| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
| 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | | |

RUN-2
Enter minimum and maximum range: 2   14

The number's are::

| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

PROGRAM NO. SA 4.3

WAP to calculate the factorial of a given number.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
    int n,i;
    long int fact=1;
    printf("\nEnter A Number To Find Out Its Factorial=>");
    scanf("%d",&n);
    for (i=n;i>0;i--)
        fact=fact*i;
    printf("\n%d!=%ld\n",n,fact);
    return 0;
}
```
INPUT/OUTPUT
RUN-1
Enter A Number To Find Out Its Factorial=>6

6!=720
RUN-2
Enter A Number To Find Out Its Factorial=>12

12!=479001600

PROGRAM NO. SA 4.4

WAP to calculate the sum of digits of a given number.

PROGRAM CODE

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

```
int main()
{
        int n,i,sum=0,d,num;
        printf("\nEnter a number: ");
        scanf("%d",&n);
        num=n;
        while(n!=0)
        {
                d=n%10;
                sum=sum+d;
                n=n/10;
        }
        printf("\nSum of digits of the number %d is = %d",num,sum);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a number : 234
Sum of digits of the number 234 is = 9

RUN-2
Enter a number : 389
Sum of digits of the number 389 is = 20

PROGRAM NO. SA 4.5

WAP to find the GCD/HCF of two numbers .

PROGRAM CODE

```
#include <stdio.h>
int main()
{
    int a,b,m,n,gcd;

    printf("\nEnter two numbers=>");
    scanf("%d%d",&a,&b);
    m=a;n=b;
    while(a!=b)
    {
      if(a>b)
            a=a-b;
      else
            b=b-a;
    }
    gcd=b;
```

```
        printf("\nThe GCD of %d and %d is %d\n",m,n,gcd);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter two numbers=>15 20

The GCD of 15 and 20 is 5

RUN-2
Enter two numbers=>34 88

The GCD of 34 and 88 is 2

PROGRAM NO. SA 4.6

WAP to check whether a number n is prime number or not.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
        int n,i,test=1;

        printf("\nEnter A Number :");
        scanf("%d",&n);
        for(i=2;i<=n/2;i++)
        {
            if(n%i==0)
            {
                test=0;
                break;
            }
        }
 }
 if(test==1)
        printf("\nThe Number %d is a prime",n);
 else
        printf("\nThe Number %d is not a prime",n);
 return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter A Number :45

The Number 45 is not prime

RUN-2
Enter A Number :13

The Number 13 is prime

OR
<mark>**PROGRAM NO. SA 4.6**</mark>

WAP to check whether a number is prime number or not.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
  int a,c=0,i,n;
  printf("\nEnter a number to be checked: ");
  scanf("%d",&n);
  for(i=1;i<=n;i++)
  {
    if(n%i==0)
    {
      c=c+1;
    }
  }
  if (c==2)
    printf("\n%d is a  prime number.");
  else
    printf("\n%n is not a prime number.");
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a number to be checked: 12

12 is not a prime number.

RUN-2
Enter a number to be checked: 13

13 is a prime number.

PROGRAM NO. SA4.7

WAP to check whether an input integer is perfect number or not.
/*(Hints: In mathematics, a perfect number is a positive integer that is the sum of its proper positive divisors, that is, the sum of the positive divisors excluding the number itself. The first perfect number is 6, because 1, 2, and 3 are its proper positive divisors, and 1 + 2 + 3 = 6. The next perfect number is 28 = 1 + 2 + 4 + 7 + 14. This is followed by the perfect numbers 496 and 8128)*/

PROGRAM CODE

```
#include <stdio.h>
int main()
{
  int n,i,sum=0;
  printf("\nEnter Any Number=>");
  scanf("%d",&n);
  for(i=1;i<n;i++)
  {
    if(n%i==0)
      sum+=i;
  }
  if(n==sum)
      printf("\n%d is a perfect number",n);
  else
      printf("\n%d is not a perfect number",n);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter Any Number=>371

371 is not a perfect number

RUN-2
Enter Any Number=>6

6 is a perfect number

PROGRAM NO. SA4.8

WAP to find the first n numbers of a Fibonacci sequence.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
  int n,i,f1=0,f2=1,f;

  printf("\nEnter the number of terms  :");
  scanf("%d",&n);
  printf("\nThe fibbonacci series generated is :\n");
  printf("%d %d ",f1,f2);
  for(i=1;i<=n-2;i++)
  {
     f=f1+f2;
     printf("%d   ",f);
     f1=f2;
     f2=f;
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter the number of terms :10

The fibbonacci series generated is :

0 1 1 2 3 5 8 13 21 34

RUN-2
Enter the number of terms :15

The fibbonacci series generated is :

0 1 1 2 3 5 8 13 21 34 55 89 144 233 377

PROGRAM NO. SA4.9

WAP to evaluate the equation $y=x^n$ where n is a non-negative integer.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
  int n,i;float x,y=1.0;
  printf("\nEnter values for x and n =>");
  scanf("%f%d",&x,&n);
  for(i=1;i<=n;i++)
  {
      y=y*x;
  }
  printf("\n%0.2f to the power %d is %0.2f",x,n,y);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter values for x and n =>3.5   2

3.50 to the power 2 is 12.25

RUN-2
Enter values for x and n =>2   4

2.00 to the power 4 is 16.00

PROGRAM NO. SA4.10

WAP to sum the following series $S=1+(1+2)+(1+2+3)+...+(1+2+3+...+n)$

```
#include <stdio.h>
int main()
{
 int n,i,j,sum,totalsum=0;
 printf("\n Enter tbe value of n :");
 scanf("%d",&n);
 for(i=1;i<=n;i++)
 {
  sum=0;
  for(j=1;j<=i;j++)
    sum=sum+j;
  totalsum=totalsum+sum;
 }
 printf("\nThe sum of the given series is %d",totalsum);
```

```
 return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter tbe value of n :7

The sum of the given series is 84

RUN-2
Enter tbe value of n :10

The sum of the given series is 220

PROGRAM NO. SA4.11

WAP to print the following pattern for n rows. Ex. for n=5 rows
```
    *
  *   *
  *   *   *
  *   *   *   *
  *   *   *   *   *
```

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
 int n,i,j,k;

 printf("\nEnter how many rows =>");
 scanf("%d",&n);
 printf("\n");
 for(i=1;i<=n;i++)
 {
   for(k=1;k<=i;k++)
     printf("* ");
   printf("\n");
 }
 return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter how many rows =>4
```
*
* *
* * *
* * * *
```

RUN-2
Enter how many rows =>7
```
*
* *
* * *
* * * *
* * * * *
* * * * * *
* * * * * * *
```

PROGRAM NO. SA4.12

WAP to print the following pattern for n rows. Ex. for n=5 rows
```
        *
      *   *
    *   *   *
  *   *   *   *
*   *   *   *   *
```
PROGRAM CODE

```c
#include<stdio.h>
int main()
{
 int n,i,j,k;
 printf("\nEnter how many rows =>");
 scanf("%d",&n);
 printf("\n");
 for(i=1;i<=n;i++)
 {
   for(j=1;j<=n-i;j++)
     printf(" ");
   for(k=1;k<=i;k++)
     printf("* ");
   printf("\n");
 }
 return 0;
}
```

INPUT/OUTPUT
RUN-1
Enter how many rows =>4

```
   *
  * *
 * * *
* * * *
```

RUN-2
Enter how many rows =>7

```
    *
   * *
  * * *
 * * * *
* * * * *
* * * * * *
* * * * * * *
```

PROGRAM NO. SA4.13

WAP to print the following pattern for n rows. Ex. for n=5 rows
```
A
A  B
A   B  C
A   B  C  D
A   B  C  D  E
```
PROGRAM CODE
```c
#include<stdio.h>
int main()
{
int i,j,n;
char ch;

printf("\nHow many rows=>");
scanf("%d",&n);
for(i=1;i<=n;i++)
  {
    ch='A';
    for(j=1;j<=i;j++)
     {
       printf("%c ",ch);
       ch=ch+1;
     }
    printf("\n");
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
How many rows=>4
A
A B
A B C
A B C D

RUN-2
How many rows=>6
A
A B
A B C
A B C D
A B C D E
A B C D E F

PROGRAM NO. SA4.14
WAP to form a pyramid of numbers for a given number. Ex. for number 4
```
       1
      1 2 1
     1 2 3 2 1
    1 2 3 4 3 2 1
```

PROGRAM CODE

```c
#include <stdio.h>
int main()
{
  int n,i,j,k;
  printf("\nEnter a number to form a pyramid=>");
  scanf("%d",&n);
  for(i=1;i<=n;i++)
  {
      for(j=1;j<=n-i;j++)
          printf("  ");
      for(k=1;k<=i;k++)
          printf("%d ",k);
      for(k=i-1;k>0;k--)
          printf("%d ",k);
      printf("\n");
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a number to form a pyramid=>5
```
      1
    1 2 1
   1 2 3 2 1
  1 2 3 4 3 2 1
 1 2 3 4 5 4 3 2 1
```

RUN-2
Enter a number to form a pyramid=>7
```
       1
     1 2 1
    1 2 3 2 1
   1 2 3 4 3 2 1
  1 2 3 4 5 4 3 2 1
 1 2 3 4 5 6 5 4 3 2 1
1 2 3 4 5 6 7 6 5 4 3 2 1
```

PROGRAM NO. SA4.15

WAP to print the following pattern for n rows. Ex. for n=6 rows
```
         1
         0  1
         1  0  1
         0  1  0  1
         1  0  1  0  1
         0  1  0  1  0  1
```

PROGRAM CODE

```c
#include <stdio.h>
int main()
{
 int i,j,n;
 printf("\nEnter The Number Of Rows =>");
 scanf("%d",&n);
 for(i=1;i<=n;i++)
  {
    for(j=1;j<=i;j++)
     printf("%4d",(i+j+1)%2);
    printf("\n");
  }
 return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter The Number Of Rows =>4
```
  1
  0  1
  1  0  1
  0  1  0  1
```

RUN-2
Enter The Number Of Rows =>7
```
  1
  0  1
  1  0  1
  0  1  0  1
  1  0  1  0  1
  0  1  0  1  0  1
  1  0  1  0  1  0  1
```

LAB - 5
1-D Array & Matrix
CONTENTS

Experiment No-5

Sample Answers

SA6.1 WAP to create an array that can store max. 50 integers and display the contents of the array

SA6.2 WAP to find out the sum of the numbers stored in an array of integers.

SA6.3 WAP to find largest element stored in an array.

SA6.4 WAP to display the array elements in ascending order.

SA6.5 WAP to add two matrices and display it.

SA6.6 WAP to multiply two matrices and display it.

SA6.7 WAP to find the Trace(sum of the diagonal element) of a given mxn matrix .

Lab. Assignments

LA5.1 WAP to input 10 integers into an array of size 10. Print all elements.

LA5.2 WAP to store max. 100 numbers into an array. Print all the elements that are three digit even integers.

LA5.3 WAP to find out the largest even integer stored in the array of n integers. n is the user input.

LA5.4 WAP to swap the pair of elements starting from beginning.

LA5.5 WAP to arrange the numbers stored in the array so that it will display first all odd numbers, then even numbers.

LA5.6 WAP to display the array elements in reverse order.

LA5.7 WAP to find out the sum of the elements stored in a matrix.

LA5.8 WAP to find out the transpose of a given matrix.

Home Assignments

HA5.1 WAP to swap first element with last, second element with second last and so on, stored in an array.

HA5.2 WAP to find out the second largest element stored in an array of 20 integers.

HA5.3 WAP to find the median of a list of numbers.

HA5.4 WAP to find the standard deviation of a list of numbers.

HA5.5 WAP to sort 3 elements stored in an array without using any sorting algorithm.

HA5.6 WAP to find out the sum of the diagonal elements of a matrix.

HA5.7 WAP to check whether a given matrix is symmetric or not.

HA5.8 WAP to check whether a given matrix is orthogonal or not.

PROGRAM NO. SA 5.1

WAP to create an array that can store max. 50 integers and display the contents of the array.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
        int a[50],i,n;
        printf("\nEnter  how many numbers :");
        scanf("%d",&n);

        printf("\nEnter values for the array: ");
        for(i=0; i<n; i++)  /* Stores number entered by user. */
            scanf("%d",&a[i]);

         printf("\nThe elements are:");
        for(i=1; i<n; i++)  /* Loop to print the numbers */
             printf("%d \t",a[i]);
        return 0;
 }
```

INPUT/OUTPUT

RUN-1
Enter how many numbers: 6
Enter values for the array:
23
34
45
56
67
78

The elements are
23   34   45   56   67   78

RUN-2
Enter how many numbers : 5
Enter values for the array:
11
22
83
44
55

The elements are
11   22   83   44   55

PROGRAM NO. SA5.2

WAP to find out the sum of the numbers stored in an array of integers.

PROGRAM CODE

```c
#include <stdio.h>
int main()
{
        int a[50],i,n, sum=0;
        printf("\nEnter  how many numbers :");
        scanf("%d",&n);

        printf("\nEnter values for the array: ");
        for(i=0; i<n; i++)  /* Stores number entered by user. */
            scanf("%d",&a[i]);

        /*code to find out sum of element in an array*/
        for(i=1; i<n; i++)
        {
            Sum=sum+a[i];
        }
        printf("\nThe sum of the elements stored in  array a is %d", sum);
        return 0;
 }
```

INPUT/OUTPUT
RUN-1
Enter how many numbers: 6
Enter values for the array:
23
34
45
56
67
78

The sum of the elements stored in array a is 303

RUN-2
Enter how many numbers : 5
Enter values for the array:
11
22
83
44
55

The sum of the elements stored in array a is 215

PROGRAM NO. SA5.3

Write a program to find largest element stored in an array.

PROGRAM CODE

```
#include <stdio.h>
int main()
{
        int a[50],i,n, large;
        printf("\nEnter  how many numbers :");
        scanf("%d",&n);

        printf("\nEnter values for the array: ");
        for(i=0; i<n; i++)  /* Stores number entered by user. */
            scanf("%d",&a[i]);

        /*code to find largest element in an array*/
        large=a[0];
        for(i=1; i<n; i++)
        {
           if(a[i]>large)
               large=a[i];
        }

        printf("\nThe largest element stored in  array a is %d", large);
        return 0;
 }
```

INPUT/OUTPUT
RUN-1
Enter how many numbers: 6
Enter values for the array:
23
34
45
56
67
78

The largest element stored in array a is 78

RUN-2
Enter how many numbers : 5
Enter values for the array:
11
22
83
44

55

The largest element stored in array a is 83

PROGRAM NO. SA5.4

Write a program to display the array elements in ascending order.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
        int a[100],n,i,temp;
      printf("\nEnter how many numbers :");
       scanf("%d",&n);
       printf("\nEnter the value of %d Numbers",n);
       for(i=0;i<n;i++)
           scanf("%d",&a[i]);
      /*BUBBLE SORT technique*/
       for(i=1;i<=n-1;i++)
       {
           for(j=0;j<n-i;j++)
           {
               if(a[j]>a[j+1])
               {
                   temp=a[j];
                   a[j]=a[j+1];
                   a[j+1]=temp;
               }
           }
       }
       printf("\nThe Numbers in ascending order are\n");
       for(i=0;i<n;i++)
             printf("%d   ",a[i]);
        return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter how many numbers :7

Enter the value of 7 Numbers:-
7 6 4 5 2 4 8

The Numbers in ascending order are
2 4 4 5 6 7 8

RUN-2

Enter how many numbers :10

Enter the value of 10 Numbers:-
12 34 56 78 90 34 56 799 122 56

The Numbers in ascending order are
12 34 34 56 56 56 78 90 122 799

PROGRAM NO. SA5.5

Write a program to add two matrices and display it.

PROGRAM CODE

```
#include<stdio.h>
int main()
{
        int a[2][3],b[2][3],c[2][3];
        int i,j;
        printf("\nEnter value of matrix a\n");
        for(i=0;i<2;i++)
        {
                for(j=0;j<3;j++)
                {
                        scanf("%d",&a[i][j]);
                }
        }

        printf("\nEnter value of matrix b\n");
        for(i=0;i<2;i++)
        {
                for(j=0;j<3;j++)
                {
                        scanf("%d",&b[i][j]);
                }
        }
        printf("\nValue of matrix a\n");
        for(i=0;i<2;i++)
        {
                for(j=0;j<3;j++)
                {
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }
        printf("\nValue of matrix b\n");
        for(i=0;i<2;i++)
```

```
                {
                        for(j=0;j<3;j++)
                        {
                                printf("%d\t",b[i][j]);
                        }
                        printf("\n");
                }
                for(i=0;i<2;i++)
                {
                        for(j=0;j<3;j++)
                        {
                                c[i][j]=a[i][j]+b[i][j];
                        }

                }
                printf("\nAfter addition resultant matrix is\n");
                for(i=0;i<2;i++)
                {
                        for(j=0;j<3;j++)
                        {
                                printf("%d\t",c[i][j]);
                        }
                        printf("\n");
                }
Return 0;
}
```

INPUT/OUTPUT

RUN-1:
Enter value of matrix a
1
2
3
4
5
6

Enter value of matrix b
2
1
3
2
4
2

Value of matrix a
1   2   3
4   5   6

Value of matrix b
2   1   3
2   4   2

After addition resultant matrix is
3   3   6
6   9   8
RUN-2:
Enter value of matrix a
2
2
5
2
4
2

Enter value of matrix b
1
4
2
5
3
6

Value of matrix a
2   2   5
2   4   2

Value of matrix b
1   4   2
5   3   6

After addition resultant matrix is
3   6   7
7   7   8

PROGRAM NO. SA5.6

Write a program to multiply two matrices and display it.

PROGRAM CODE
```
#include<stdio.h>
int main()
{
        int a[3][3],b[3][3],c[3][3];
        int i,j,k;
        printf("\nEnter value of matrix a\n");
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        scanf("%d",&a[i][j]);
                }
        }

        printf("\nEnter value of matrix b\n");
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        scanf("%d",&b[i][j]);
                }
        }
        printf("\nValue of matrix a\n");
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }
        printf("\nValue of matrix b\n");
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        printf("%d\t",b[i][j]);
                }
                printf("\n");
        }
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
```

```
                        c[i][j]=0;
                        for(k=0;k<3;k++)
                        {
                                c[i][j]=c[i][j]+a[i][k]*b[k][j];
                        }
                }

        }
        printf("\nAfter Multiplication resultant matrix is\n");
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        printf("%d\t",c[i][j]);
                }
                printf("\n");
        }
return 0;
}
```

INPUT/OUTPUT

RUN-1:
Enter value of matrix a
1
1
1
1
1
1
1
1
1
Enter value of matrix b
2
2
2
2
2
2
2
2
2

Value of matrix a
1   1   1
1   1   1
1   1   1

Value of matrix b
2   2   2
2   2   2
2   2   2

After Multiplication resultant matrix is
6   6   6
6   6   6
6   6   6

RUN-2:
Enter value of matrix a
2
2
2
2
2
2
2
2
2

Enter value of matrix b
3
3
3
3
3
3
3
3
3
Value of matrix a
2   2   2
2   2   2
2   2   2

Value of matrix b
3   3   3
3   3   3
3   3   3

After Multiplication resultant matrix is
18   18   18
18   18   18
18   18   18

OR

PROGRAM NO. SA5.6

Write a program to multiply two matrices and display it.

PROGRAM CODE

```c
#include<stdio.h>
int main()
{
        int a[10][10],b[10][10],c[10][10];
        int i,j,k,m,n,p,q;
        clrscr();
        printf("\nThe row & column of Matrix A :");
        scanf("%d%d",&m,&n);
        fflush(stdin);
        printf("\nThe row & column of Matrix B :");
        scanf("%d%d",&p,&q);
        if (n==p)
        {
                printf("\nFor Matrix A:-\n");
                for(i=0;i<m;i++)
                {
                    for(j=0;j<n;j++)
                    {
                        printf("\nEnter values for A[%d][%d]=> ",i,j);
                        scanf("%d",&a[i][j]);
                    }
                }
                printf("\nFor Matrix B:-\n");
                for(i=0;i<p;i++)
                {
                    for(j=0;j<q;j++)
                    {
                        printf("\nEnter values for B[%d][%d]=> ",i,j);
                                scanf("%d",&b[i][j]);
                    }
                }
                //Matrix Multiplication Logic
                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]+=a[i][k]*b[k][j];
```

```
                }
              }
            }
      printf("\nMatrix A is\n");
      for(i=0;i<m;i++)
      {
         for(j=0;j<n;j++)
              printf("%d\t",a[i][j]);
         printf("\n");
       }
        printf("\n");

       printf("\nMatrix B is\n");
       for(i=0;i<p;i++)
       {
          for(j=0;j<q;j++)
               printf("%d\t",b[i][j]);
            printf("\n");
       }
       printf("\n");
       printf("\nMultiplication Matrix C is\n");
       for(i=0;i<m;i++)
       {
          for(j=0;j<q;j++)
              printf("%d\t",c[i][j]);
          printf("\n");
       }
   }
   else
      printf("\nMultiplication is not possible.\n");
 return 0;
}
```

INPUT/OUTPUT

RUN-1
The row & column of Matrix A :2 3

The row & column of Matrix B :3 1

For Matrix A:-

Enter values for A[0][0]=> 1

Enter values for A[0][1]=> 2

Enter values for A[0][2]=> 3

Enter values for A[1][0]=> 4

Enter values for A[1][1]=> 5

Enter values for A[1][2]=> 6

For Matrix B:-

Enter values for B[0][0]=> 7

Enter values for B[1][0]=> 6

Run the above code and check the output.

RUN-2
The row & column of Matrix A :3 4

The row & column of Matrix B :3 4

Multiplication is not possible.

PROGRAM NO. SA5.7

WAP to find the Trace(sum of the diagonal element) of a given mxn matrix .

PROGRAM CODE

```
#include <stdio.h>
int  main()
{
  int a[10][10],i,j,n,sum=0;
  printf("\nEnter the order of the square matrix A :-");
  scanf("%d",&n);
  printf("\n Enter the order of the square matrix A\n");
  for(i=0;i<n;i++)
        for(j=0;j<n;j++)
        scanf("%d",&a[i][j]);
  for(i=0;i<n;i++)
        for(j=0;j<=n;j++)
               if(i==j)
              sum=sum+a[i][j];
  printf("\nsum of digonal values=%d",sum);
  return 0;
}
```

INPUT/OUTPUT
RUN-1
Enter the order of the square matrix A :- 3

Enter the values of matrix A
3 4 5
6 8 9
1 3 4

sum of digonal values=15
RUN-2
Enter the order of the square matrix A :- 6

Enter the values of matrix A
1 2 3 4 5 6
7 8 9 3 5 3
4 5 6 7 8 1
1 2 3 4 1 2
1 1 1 1 1 1
3 4 5 6 6 7

sum of digonal values=22

LAB - 6
Function & Recursion
CONTENTS

Experiment No-6

Sample Answers

SA6.1 WAP to add two numbers entered through keyboard by using a suitable user defined function (say SUM) for addition operation.

SA6.2 WAP to find the factorial of a number n by using a suitable user defined function (say fact) for it.

SA6.3 WAP to find out the sum of digits of a number n by suing function.

SA6.4 A 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 ($F_i=F_{i-1}+F_{i-2}$). WAP to find out the value of nth term of the Fibonacci sequence by writing a suitable user defined function (say fib) for it.

SA6.5 WAP to compute the sine series using function.
$$\sin(x)=x-x^3/_{3!}+x^5/_{5!}-x^7/_{7!}+ \ldots\ldots$$

SA6.6 WAP to design a user defined function (say SUM-ARRAY) to calculate the sum of all the integers stored in the array.

SA6.7 WAP to sort the elements of an array in ascending order by using a suitable function for sort operation.

SA6.8 WAP to calculate GCD/HCF of two numbers by using a iterative function for GCD.

SA6.9 WAP to calculate GCD/HCF of two numbers by using a recursive function for GCD.

SA6.10 WAP to find the factorial of a number n by writing a recursive function for it.

Lab. Assignments

LA6.1 WAP to swap the values of two variables by using a suitable user defined function (say SWAP) for it.

LA6.2 WAP to find out ^nc_r factor by using a user defined function for factorial (say fact).

LA6.3 WAP to test whether a number n is palindrome number or not.

LA6.4 WAP to calculate x^y by writing a function(say POWER) for it.

LA6.5 WAP to generate all the prime numbers between 1 and n by using a user defined function (say isPRIME) to be used for prime number testing, where n is a value supplied by the user.

LA6.6 A 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 ($F_i=F_{i-1}+F_{i-2}$). WAP to generate the first n terms of the sequence by writing a suitable user defined function (say fib) to be used to get nth term Fibonacci value.

LA6.7 WAP to compute the cosine series using function.
$$\cos(x)=1-x^2/_{2!}+x^4/_{4!}-x^6/_{6!}+ \ldots\ldots$$

LA6.8 WAP to count number of digits of a positive integer n by using recursion.

Home Assignments

HA6.1 WAP to test whether a number num (num is entered through keyboard) is a number in the Fibonacci sequence or not.

HA6.2 WAP to compute the power series (e to the power x).
$e^x=1+x+x^2/_{2!}+x^3/_{3!}+x^4/_{4!}+\ldots\ldots..$

HA6.3 WAP to find the LCM of two numbers a and b by using a suitable function (say LCM) for this.

HA6.4 WAP to find out the sum of n elements of an integer array a[] by using recursion.

HA6.5 WAP by designing a recursive function to calculate the sum of all even digits of any given integer.

PROGRAM NO. SA 6.1

WAP to SUM two numbers entered through keyboard by using a suitable user defined function (say SUM) for addition operation.

PROGRAM CODE
(By using Category-1: Function taking arguments and returns value)

```
#include<stdio.h>
int SUM(int, int); //Function Prototype or Function Declaration
int main()
{
        int a, b, c;
        printf("\nEnter two numbers :");
        scanf("%d %d",&a, &b);
        c = SUM(a,b); //Function Call
        printf("\nAddition of two numbers is  %d.", c);
        return 0;
}
```

/*Function definition of SUM taking arguments and returns value*/		/*Function definition SUM taking arguments and returns value*/
`int SUM(int x, int y)`		`int SUM(int x, int y)`
`{`	**OR**	`{`
`    int z;`		`    return x+y;`
`    z= x + y;`		`}`
`    return z;`		
`}`		

PROGRAM CODE
(By using Category-2: Function taking arguments and does not return any value)

```
#include<stdio.h>
void  SUM(int, int); //Function Prototype or Function Declaration
int main()
{
        int a, b, c;
        printf("\nEnter two numbers :");
        scanf("%d %d",&a, &b);
        SUM(a,b); //Function Call
        return 0;
}


/*Function definition of SUM taking arguments and does not return any value*/
void  SUM(int x, int y)
{
        int z;
        z= x + y;
       printf("\nAddition of two numbers is  %d.", z);
}
```

PROGRAM CODE
(By using Category-3: Function does not take arguments and does not return any value)

```
#include<stdio.h>
void  SUM(); //Function Prototype or Function Declaration
int main()
{
        SUM(); //Function Call
        return 0;
}


/*Function definition of SUM  does not take arguments and does not return any value*/
void  SUM()
{
        int x, y, z;
        printf("\nEnter two numbers :");
        scanf("%d %d",&x, &y);
        z=x+y;
        printf("\nAddition of two numbers is  %d.", z);
}
```

PROGRAM CODE
(By using Category-4: Function does not take arguments and returns value)

```
#include<stdio.h>
int SUM(); //Function Prototype or Function Declaration
int main()
{       int k;
        k = SUM(); //Function Call
        printf("\nAddition of two numbers is  %d.", k);
        return 0;
}
```

/*Function definition of SUM does not take arguments and does not return any value*/
```
int  SUM()
{
        int x, y, z;
        printf("\nEnter two numbers :");
        scanf("%d %d",&x, &y);
        z=x+y;
        return z;
}
```

Note: Mark that the same user defined function SUM has been written in four category. Category-1 & 2 are used frequently used. Category-3 & 4 are rarely used.

PROGRAM NO. SA 6.2

WAP to find the factorial of a number n by using a suitable user defined function (say fact) for it.

PROGRAM CODE
```
#include <stdio.h>
long int fact(int); //Function Prototype
int main()
{
   int n;
   printf("\nEnter a number :");
   scanf("%d",&n);
   printf("\n%d!=%ld\n", n, fact(n));
   return 0;
}
```

/*Factorial function*/
```
long int fact(int n)
{
  long int f=1;;
  int i;
  for (i=1; i<=n; i++)
      f=f*i;
```

```
   return (f);
}
```

INPUT/OUTPUT
RUN-1
Enter a number: 5

5!=120

RUN-2
Enter a number: 6

6!=720

PROGRAM NO. SA 6.3

WAP to find out the sum of digits of a number n by suing function. n is the user input.

PROGRAM CODE
```
#include <stdio.h>
int SUM-DIGIT(int); //Function Prototype
int main()
{
    int n, s;
    printf("\nEnter a number :");
    scanf("%d",&n);
    s=SUM-DIGIT(n);
    printf("\nThe sum of digits of %d is %d." n, s);
    return 0;
}
```

/*User defined function to find out sum of digits of number n*/
```
int SUM-DIGIT(int n)
{
    int sum=0;
    while(n!=0)
    {
      sum=sum+n%10;
      n=n/10;
    }
    return sum;
}
```

INPUT/OUTPUT
RUN-1
Enter a number: 123

The sum of digits of 123 is 6.

RUN-2
Enter a number: 578

The sum of digits of 578 is 20.

PROGRAM NO. SA 6.4

A 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 ($F_i=F_i-1+F_{i-2}$). WAP to find out the value of nth term of the Fibonacci sequence by writing a suitable user defined function (say fib) for it.

PROGRAM CODE

```c
#include<stdio.h>
int fib(int);
int  main()
{
    int n;
    printf("\nEnter term number  :");
    scanf("%d",&n);
    printf("\nThe value of the term-%d of Fibonacci sequence is %d.", n, fib(n));
    return 0;
}
```

/*User defined iterative function fib that returns the value of ith term of Fibonacci sequence*/

```c
int fib(int i)
{
    int i,f1=0,f2=1,f;
    if (i==0 || i==1)
       return i;
    else
    {
      for(i=1; i<=n-2; i++)
      {
        f=f1+f2;
        f1=f2;
        f2=f;
      }
      return f;
    }
}
```
  OR

/*Recursive version of the Fibonacci function to compute the ith term*/
```c
int fib(int i)
{
    if(i==0 || i==1)
      return (i);
    else
      return (fib(i-1)+ fib(i-2));
}
```

INPUT/OUTPUT
RUN-1
Enter term number: 6

The value of the term-6 of Fibonacci sequence is 8.

RUN-2
Enter term number: 15

The value of the term-5 of Fibonacci sequence is 377.

PROGRAM NO. SA 6.5

WAP to compute the sine series using function.
$$Sin(x)=x-x^3/{3!}+x^5/{5!}-x^7/{7!}+ ……..$$

PROGRAM CODE

```c
#include<stdio.h>
#include<math.h>
long int fact(int);
int main()
{
    int n,i,p;
    float x, sum, term;
    printf("\nEnter no of terms:");
    scanf("%d",&n);
    printf("\nInput x :");
    scanf("%f",&x);
    //converstion of degree to radian
    x=x*3.1416/180;
    sum=0;p=-1;
    for(i=1; i<=n; i++)
    {
        p=p+2;
        term=pow(x,p)/fact(p);
        if(i%2==0)
            sum=sum-term;
        else
```

```
        sum=sum+term;
    }
    printf("\nSin(x) = %.4f", sum);
    return 0;
}
```

/*Factorial function*/
```
long int fact(int n)
{
  long int f=1;;
  int i;
  for (i=1; i<=n; i++)
      f=f*i;
  return (f);
}
```

INPUT/OUTPUT
RUN-1
Enter no of terms:10

Input x :45

Sin(x)= 0.7071

RUN-2
Enter no of terms:5

Input x :90

Sin(x)= 1.0000

PROGRAM NO. SA 6.6

WAP to design a user defined function (say SUM-ARRAY) to calculate the sum of all the integers stored in the array.

PROGRAM CODE
```
#include<stdio.h>
```
int SUM-ARRAY(int a[],int); //Function Prototype
```
int main()
{
    int a[100], n, i;
    printf("\nEnter how many numbers :");
    scanf("%d",&n);
    printf("\nEnter data for array: ");
    for(i=0;i<n;i++)
        scanf("%d",&a[i]);
```

```
    printf("\nThe sum of the elements of the array is %d", SUM-ARRAY(a, n);
    return 0;
}
```

/*User Defined Function SUM-ARRAY*/
```
void SUM-ARRAY(int a[], int n)
{
    int i, sum=0;
    for(i=0; i<n; i++)
    {
        sum=sum + a[i];
    }
    return sum;
}
```

INPUT/OUTPUT
RUN-1
Enter how many numbers : 4

Enter data for array: 7 6 5 4

The sum of the elements of the array is 22

RUN-2
Enter how many numbers : 5

Enter data for array: 1 2 3 4 5

The sum of the elements of the array is 15

PROGRAM NO. SA 6.7

WAP to sort the elements of an array in ascending order by using a suitable function for sort operation.

PROGRAM CODE
```
#include<stdio.h>
void bubbleSort(int a[],int); //Function Ptototype
int main()
{
    int a[100], n, i;
    printf("\nEnter how many numbers :");
    scanf("%d",&n);
    printf("\nEnter data for array: ");
    for(i=0;i<n;i++)
        scanf("%d",&a[i]);
    bubbleSort(a,n); //Function Call
    printf("\nThe Numbers in ascending order are:");
```

```
    for(i=0; i<n; i++)
        printf("%d  ",a[i]);
    return 0;
}
```

/*Bubble Sort Function*/
```
void bubbleSort(int a[], int n)
{
    int i, j, temp;
    for(i=1; i<=n-1; i++)
    {
        for(j=0; j<n-i; j++)
        {
            if(a[j]>a[j+1])
            {
                temp=a[j];
                a[j]=a[j+1];
                a[j+1]=temp;
            }
        }
    }
}
```

INPUT/OUTPUT
RUN-1
Enter how many numbers :8

Enter data for array: 7 6 5 4 5 2 4 8

The Numbers in ascending order are: 2 4 4 5 5 6 7 8

RUN-2
Enter how many numbers :9

Enter data for array: 1 4 3 8 6 5 2 9 7

The Numbers in ascending order are: 1 2 3 4 5 6 7 8 9

PROGRAM NO. SA 6.8

WAP to calculate GCD/HCF of two numbers by using a **iterative function** for GCD.

PROGRAM CODE
```
#include <stdio.h>
int gcd(int,int);
int main()
{
    int a,b,g;
```

```
    printf("\nEnter two numbers=>");
    scanf("%d%d",&a, &b);
    printf("\nThe GCD of %d and %d is %d\n",a, b, gcd(a,b));
    return 0;
}
```

/*GCD Iterative Function*/
```
int gcd(int a, int b)
{
    while(a!=b)
    {
        if(a>b)
            a=a-b;
        else if (b>a)
            b=b-1;
    }
    return (a);
}
```

INPUT/OUTPUT
RUN-1
Enter two numbers=>15 25

The GCD of 15 and 25 is 5

RUN-2
Enter two numbers=>22 14

The GCD of 22 and 14 is 2

PROGRAM NO. SA 6.9

WAP to calculate GCD/HCF of two numbers by using a **recursive function** for GCD.

PROGRAM CODE
```
#include <stdio.h>
int gcd(int,int);
int main()
{
    int a,b,g;
    printf("\nEnter two numbers=>");
    scanf("%d%d",&a, &b);
    printf("\nThe GCD of %d and %d is %d\n", a, b, gcd(a,b));
    return 0;
}
```

/*GCD Recursive Function*/

```
int gcd(int a, int b)
{
    if(a==b)
        return a;
    else if (a>b)
        gcd(a-b, b);
    else
        gcd(a, b-a);
}
```

INPUT/OUTPUT
RUN-1
Enter two numbers=>15 25

The GCD of 15 and 25 is 5

RUN-2
Enter two numbers=>22 14

The GCD of 22 and 14 is 2

PROGRAM NO. SA 6.10

WAP to find the factorial of a number n by writing a recursive function for it.

PROGRAM CODE

```
#include <stdio.h>
long int fact(int); //Function Prototype
int main()
{
    int n;
    printf("\nEnter a number :");
    scanf("%d",&n);
    printf("\n%d!=%ld\n", n, fact(n));
    return 0;
}
```

/*Recursive Factorial function*/

```
long int fact(int n)
{
    if(n==0 | n==1)
        return 1;
    else
        return n*fact(n-1);
}
```

INPUT/OUTPUT
RUN-1
Enter a number: 5

5!=120

RUN-2
Enter a number: 6

6!=720

LAB - 7
Strings
CONTENTS

Experiment No-7

Sample Answers

SA7.1 WAP to find the length of a string with/without using library function for getting length of the string.

SA7.2 WAP to copy one string into other with/without using a library function for copy operation.

SA7.3 WAP to compare two strings without using library function for comparison operation.

SA7.4 WAP to find the reverse of a string with/without using library function.

SA7.5 WAP to extract the first character of each word of a given string (Achromatic string).

SA7.6 WAP to extract a substring of a given string.

SA7.7 WAP to reads a sentence and prints the number of vowels and consonants present in the sentence.

SA7.8 WAP to replace all occurrences of a character in a given string with a new character.

Lab. Assignments

LA7.1 WAP to extract the last character of each word of a given string.

LA7.2 Write a program to concatenate two strings without using any library function.

LA7.3 WAP to check whether a string entered through keyboard is palindrome or not.

LA7.4 Write a program to count the number of characters, alphabets, tabs, newlines, words, vowels, consonants present in a in a string.

LA7.5 WAP to reads a sentence and prints frequency of each of the vowels and total count of Consonants.

LA7.6 WAP to replace all occurrences of a character in a string with the previous 3rd character if any of the character.

LA7.7 Develop a user defined function function and test them in the main program for the following standard function:

   int MatchAny(char s1[], char s2[]) :It takes two string arguments and it returns 1 if s2 is substring of s1, returns 0 if both s1 and s2 are equal strings, otherwise, returns -1. Do not use the standard library functions.

Home Assignments

HA7.1 WAP to capitalize first character of each word of a string entered through keyboard.

HA7.2 WAP to take a sentence as input and reverse every word of the sentence.

HA7.3 WAP to print a given string in an alphabetical order

HA7.4 WAP to sort a list of names/strings alphabetically.

HA7.5 WAP to replace all occurrences of a substring in a given string with a new one.

PROGRAM NO. SA7.1

Write a program to find the length of a string by using library function for getting length of the string.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int main()
{
        char s[100];
        int length;
        printf("\nEnter a string : ");
        gets(s);
        length = strlen(s);
        printf("\nLength of the String is : %d",
length);
        return 0 ;
}
```

INPUT/ OUTPUT
RUN-1
Enter a string : Be Good, Do Good.
Length of the String is : 17

RUN-2
Enter a string : !u=i
Length of the String is : 4

Write a program to find the length of a string without using library function for getting length of the string.

PROGRAM CODE
```
#include<stdio.h>
int main()
{
        char s[100];
        int length;
        printf("\nEnter a string : ");
        gets(s);
        length = 0;  // Initial Length
        while(s[length]!='\0')
            length++;
        printf("\nLength of the String is : %d",length);
        return 0 ;
}
```

INPUT/ OUTPUT
RUN-1
Enter a string : Be Good, Do Good.
Length of the String is : 17

RUN-2
Enter a string : !u=i
Length of the String is : 4

PROGRAM NO. SA7.2

WAP to copy one string into other by using library function for copy operation.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int main()
{
        char s[100], d[100];
        printf("\nEnter a string : ");
        gets(s);
        strcpy(d, s);
        printf("\nSourse String is ");
```

WAP to copy one string into other without using a library function for copy operation.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
void mystrcpy(char ns[], char os[]);
int main()
{
        char s[100], d[100];
        printf("\nEnter a string : ");
        gets(s);
        mystrcpy(d, s);
```

```
        puts(s);
        printf("\Destination String is ");
        puts(d);
        return 0 ;
}
```

INPUT/ OUTPUT
RUN-1
Enter a String : Be Good, Do Good.

Source String is Be Good, Do Good.

Destination String is Be Good, Do Good.

RUN-2
Enter a String : C Program

Source String is C Program

Destination String is C Program

```
        printf("\nSourse String is ");
        puts(s);
        printf("\Destination String is ");
        puts(d);
        return 0 ;
}

void mystrcpy(char ns[], char os[])
{
    int i=0;
    while(os[i]!='\0')
    {
        ns[i]=os[i];
        i++;
    }
    ns[i]='\0';
}
```

INPUT/ OUTPUT
RUN-1
Enter a String : Be Good, Do Good.

Source String is Be Good, Do Good.

Destination String is Be Good, Do Good.

RUN-2
Enter a String : C Program

Source String is C Program

Destination String is C Program

PROGRAM NO. SA7.3

WAP to compare two strings by using library function for comparison operation.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int main()
{
        char s1[100], s2[100];
        printf("\nEnter first string : ");
        gets(s1);
        printf("\nEnter second string : ");
```

WAP to compare two strings without using library function for comparison operation.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int mystrcmp(char s1[], char s2[]);
int main()
{
        char s1[100], s2[100];
        printf("\nEnter first string : ");
        gets(s1);
```

```
        gets(s2);
        if(strcmp(s1, s2)==0)
            printf("\nEntered strings are equal.");
        else
            printf("\nEntered strings are not
equal.");
        return 0 ;
}
```

INPUT/ OUTPUT
RUN-1
Enter first string: SUN

Enter second string: SUN

Entered strings are equal.

RUN-2
Enter first string: MOON

Enter second string: MOODLE

Entered strings are not equal.

```
        printf("\nEnter second string : ");
        gets(s2);
        if(mystrcmp(s1, s2)==0)
            printf("\nEntered strings are equal.");
        else
            printf("\nEntered strings are not
equal.");
        return 0 ;
}
```

/*User defined function for comparison operation*/
```
int mystrcmp(char s1[], char s2[])
{
    int i=0;
    while(s1[i]==s2[i])
    {
        if(s1[i]=='\0' || s2[i]=='\0')
            break;
        i++;
    }
    if(s1[i]=='\0' && s2[i]=='\0')
        return 0;
    else
        return 1;
}
```

INPUT/ OUTPUT
RUN-1
Enter first string: SUN

Enter second string: SUN

Entered strings are equal.

RUN-2
Enter first string: MOON

Enter second string: MOODLE

Entered strings are not equal.

PROGRAM NO. SA7.4

WAP to find the reverse of a string by using library function for reverse operation.

PROGRAM CODE

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

#include<stdio.h>
#include<string.h>
int main()
{
    char s[100];
    printf("\nEnter a string : ");
    gets(s);
    printf("\nThe reverse of the string is %s ", strrev(s));
    puts(s);
    return 0 ;
}
```

INPUT/ OUTPUT
RUN-1
Enter a String : I am good.

The reverse of the string is .doog ma I

RUN-1
Enter a String : How are you?

The reverse of the string is ?uoy era woH

PROGRAM NO. SA7.4

WAP to find the reverse of a string without using library function for reverse operation.

PROGRAM CODE

```
#include<stdio.h>
#include<string.h>
int main()
{
    char s[100];
```

```
    int l, i;
    printf("\nEnter a string : ");
    gets(s);
    l=strlen(s);
    printf("\nThe reverse of the string is  ");
    for(i=l-1; i>=0; i--)
        printf("%c", s[i]);
    return 0;
}
```

INPUT/ OUTPUT
RUN-1
Enter a String : I am good.

The reverse of the string is .doog ma I

RUN-1
Enter a String : How are you?

The reverse of the string is ?uoy era woH

PROGRAM NO. SA7.5

WAP to extract the first character of each word of a given string (Achromatic string).

PROGRAM CODE
```
#include <stdio.h>
#include <string.h>
int main()
{
    char os[100], ns[50];
    int i,j=0;
    printf("\nEnter a string :");
    gets(os);
    ns[j]=os[0];
    j++;
    for(i=0; os[i]!='\0'; i++)
    {
        if(os[i]==' ')
        {
            ns[j]=os[i+1];
            j++;
        }
    }
    ns[j]='\0';
    printf("\nThe required extracted string is %s", ns);
    return 0;
}
```

INPUT/OUTPUT
RUN-1
Enter a string : School of Computer Engineering
The required extracted string is SoCE

RUN-2
Enter a string : Kalinga Institute of Social Science
The required extracted string is KISS

PROGRAM NO. SA7.6

WAP to extract a substring of a given string.

PROGRAM CODE

```
#include <stdio.h>
#include <string.h>
int main()
{
    char s[100];
    int i,j,n,l,pos;
    printf("\nEnter a string :");
    gets(s);
    l=strlen(s);
    printf("\nEnter the position of the sub-string:");
    scanf("%d", &pos);
    printf("\nEnter number of character to be extracted :");
    scanf("%d", &n);
    if(pos+n-1>l)
        printf("\nCan not be extracted! Becoz out of range!");
    else
    {
        printf("\nThe Substring is:\n");
        for(i=pos-1; i<pos+n-1; i++)
            printf("%c",s[i]);
    }
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a string :If The End Is Good, Then It Is Good!

Enter the position of the sub-string:4

Enter number of character to be extracted: 7

The Substring is:
The End

RUN-2
Enter Any String :Hellow! How are U!

Enter the position of the sub-string:9

Enter number of character to be extracted :15

Can not be extracted! Becoz out of range!

PROGRAM NO. SA7.7

WAP to reads a sentence and prints the number of vowels and consonants present in the sentence.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int main()
{
  char s[100];
  int i, nv=0, nc=0;
  printf("\nEnter a sentence :");
  gets(s);
  for(i=0; s[i]!='\0'; i++)
  {
    if((s[i]>='a' && s[i]<='z') || (s[i]>='A' && s[i]<='Z'))
    {
      if(s[i]=='A' || s[i]=='a' || s[i]=='E' || s[i]=='e' || s[i]=='I' || s[i]=='i' || s[i]=='O' || s[i]=='o' ||
s[i]=='U' || s[i]=='u')
            nv++
      else
            nc++;
    }
  }
  printf("\n Number of vowels present in the given sentence is %d", nv);
  printf("\n Number of consonants present in the given sentence is %d", nc);
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a sentence: Bachelor of Engineering

Number of vowels present in the given sentence is 9

Number of consonants present in the given sentence is 12

RUN-2
Enter a sentence: Bachelor of Technology

Number of vowels present in the given sentence is 7

Number of consonants present in the given sentence is 13

PROGRAM NO. SA7.8

WAP to replace all occurrences of a character in a given string with a new character.

PROGRAM CODE
```
#include<stdio.h>
#include<string.h>
int main()
{
  char s[100], och, nch;
  int i, flag=0;
  printf("\nEnter a string :");
  gets(s);
  printf("\nEnter a character :");
  scanf("%c", %och);
  printf("\nEnter the new character :");
  scanf("%c", %nch)
  for(i=0; s[i]!='\0'; i++)
  {
    if(s[i]==och)
    {
        s[i]=nch;
        flag=1;
    }
  }
   if(flag==1)
      printf("\nAfter the replacement by new character, the string is %s", s;);
   else
      printf("\nThe given string does not contain the character %c", och);
   return 0;
}
```

INPUT/OUTPUT
RUN-1
Enter a string: Bachelor of Engineering

Enter a character: e

Enter a new character: A

After the replacement by new character, the string is BachAlor of EnginAAring

RUN-2
Enter a string: Bachelor of Engineering

Enter a character: q

Enter a new character: A

The given string does not contain the character q

LAB - 8
Pointer & Dynamic Memory Allocation
CONTENTS

Experiment No-8

Sample Answers

SA8.1 WAP to create, initialize, assign and access a pointer variable.

SA8.2 WAP to print size of different types of pointer variables.

SA8.3 WAP to add two numbers using pointers.

SA8.4 WAP to swap two numbers using call by reference.

SA8.5 WAP to print a string using pointer.

SA8.6 WAP to count vowels in a string using pointer.

SA8.7 WAP to store n elements in an array using dynamic memory allocation and print the elements using pointer.

Lab. Assignments

LA8.1 WAP to add two numbers using call by reference.

LA8.2 WAP to compute the sum of all elements in an array using pointer.

LA8.3 WAP to display values in reverse order from an integer array using pointer.

LA8.4 WAP to swap three numbers in cyclic order using Call by Reference. In other words, WAP that takes three variable (a, b, c) in as separate parameters and rotates the values stored so that value a goes to be, b, to c and c to a.

LA8.5 WAP to sort an array using Pointer.

LA8.6 WAP to count vowels and consonants in a string using pointer.

LA8.7 WAP to print a string in reverse using a pointer.

LA8.8 WAP to find the largest element stored in an array of n elements by using dynamic memory allocation.

Home Assignments

HA8.1 WAP to change the value of constant integer using pointers.

HA8.2 WAP to swap n numbers in cyclic order stored in an dynamic array.

HA8.3 WAP to count distinct number of vowels and consonants present in a string using pointer.

HA8.4 WAP to print all permutations of a given string using pointers.

HA8.5 WAP to swap two consecutive characters starting from left to right of a string.

HA8.6 WAP to find the number of times that a given word (i.e. a short string) occurs in a sentence (i.e. a long string!).

PROGRAM NO. SA8.1

WAP to create, initialize, assign and access a pointer variable.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
    int num;   /*declaration of integer variable*/
    int *ptr;   /*declaration of integer pointer*/

    ptr=&num; /*assigning address of num*/
    num=20;   /*assigning 20 to variable num*/

    /*Access value and address using variable num*/
    printf("\nUsing variable num:");
    printf("\nValue of variable num: %d", num);
    printf("\nAddress of variable num: %u",&num);

    /*Access value and address using pointer variable num*/
    printf("\n\nUsing pointer variable:");
    printf("\nValue of variable num: %d", *ptr);
    printf("\nAddress of variable num: %u",ptr);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Using variable num:
Value of variable num: 20
Address of num: 1345623478

Using pointer variable:
Value of variable num: 20
Address of variable num: 1345623478

RUN-2
Using variable num:
Value of variable num: 20
Address of num: 3421567845

Using pointer variable:
Value of variable num: 20
Address of variable num: 3421567845

PROGRAM NO. SA8.2

WAP to print size of different types of pointer variables.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
    printf("\nSize of char pointer: %d", sizeof(char*));
    printf("\nSize of int pointer: %d", sizeof(int*));
    printf("\nSize of float pointer: %d", sizeof(float*));
    printf("\nSize of long int pointer: %d", sizeof(long int*));
    printf("\nSize of double pointer: %d\n", sizeof(double*));
    return 0;
}
```

INPUT/OUTPUT

RUN-1(If run in a 16 bit machine)
Size of char pointer: 2
Size of int pointer: 2
Size of float pointer: 2
Size of long int pointer: 2
Size of double pointer: 2

If run in a 32-bit machine the size will be 4.

PROGRAM NO. SA8.3

WAP to add two numbers using pointers.

PROGRAM CODE

/*By using ordinary variables to store two numbers and pointers*/	/*By using dynamic memory allocation to store two numbers and pointers*/

`#include <stdio.h>`
`int main()`
`{`
`  int a, b, *x, *y, sum;`
`  printf("\nEnter two integers to add:");`
`  scanf("%d%d", &a, &b);`
`  x = &a;`
`  y = &b;`
`  sum = *x + *y;`
`  printf("\nSum of %d and %d is %d",a, b, sum);`
`  return 0;`
`}`
	`#include <stdio.h>`
	`int main()`
	`{`
	`  int  *x, *y, sum;`
	`  x=(int*)malloc(sizeof(int));`
	`  y=(int*)malloc(sizeof(int));`
	`  printf("\nEnter two integers to add:");`
	`  scanf("%d%d", x, y);`
	`  sum = *x + *y;`
	`  printf("\nSum of %d and %d is %d",a, b, sum);`
	`  return 0;`
	`}`

INPUT/OUTPUT

RUN-1
Enter two integers to add: 3 4
Sum of 3 and 4 is 7

RUN-2
Enter two integers to add: 10 20
Sum of 10 and 20 is 30

PROGRAM NO. SA8.4

WAP to swap two numbers using call by reference.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
   int num1,num2;
   void swap(int*, int*);  //Function Prototype
   printf("\nEnter value of num1: ");
   scanf("%d",&num1);
   printf("\nEnter value of num2: ");
   scanf("%d",&num2);

   //print values before swapping
   printf("\nBefore Swapping: num1=%d, num2=%d\n",num1,num2);

   //call function by passing addresses of num1 and num2
   swap(&num1,&num2);

   //print values after swapping
   printf("\nAfter  Swapping: num1=%d, num2=%d\n",num1,num2);
   return 0;
}

/*Function Definition: swap two numbers using call by reference*/
void swap(int *x, int *y)
{
    int t;
    t   = *x;
   *y  = *x;
   *x  = t;
}
```

INPUT/OUTPUT

RUN-1
Enter value of num1: 35
Enter value of num2: 72
Before Swapping: num1=35, num2=72
After Swapping: num1=72, num2=35

RUN-2
Enter value of num1: 15
Enter value of num2: 30
Before Swapping: num1=15, num2=30
After Swapping: num1=30, num2=15

PROGRAM NO. SA8.5

WAP to print a string using pointer.

PROGRAM CODE

```c
#include <stdio.h>
int main()
{
    char str[100];
    char *ptr;
    printf("\nEnter a string: ");
    gets(str);
    //assign address of str to ptr
    ptr=str;
    printf("\nEntered string is: ");
    while(*ptr!='\0')
        printf("%c",*ptr++);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter a string: Good Morning.
Entered string is: Good Morning.

RUN-2
Enter a string: All is well.
Entered string is: All is well.

PROGRAM NO. SA8.6

WAP to count vowels in a string using pointer.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
   char s[100];
   char *ptr;
   int  nov;
   printf("\nEnter a string: ");
   gets(str);
   //assign address of s to ptr
   ptr=s;
   nov=0;
   while(*ptr!='\0')
   {
      if(*ptr=='A' ||*ptr=='E' ||*ptr=='I' ||*ptr=='O' ||*ptr=='U' ||*ptr=='a' ||*ptr=='e' ||*ptr=='i' ||*ptr=='o'
||*ptr=='u')
         nov++;
      //increase the pointer, to point next character
      ptr++;
   }
   printf("\nTotal number of VOWELS: %d", nov);
   return 0;
}
```

INPUT/OUTPUT

RUN-1
   Enter a string: Good Morning.
   Total number of VOWELS: 4

RUN-2
   Enter a string: All is well.
   Total number of VOWELS: 3

PROGRAM NO. SA8.7

WAP to store n elements in an array using dynamic memory allocation and print the elements using pointer.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
   int *a, i,n;
```

```
printf("\n\n Pointer : Store and retrieve elements from an array :\n");
printf("--------------------------------------------------------------\n");
printf("\nEnter the number of elements to store in the array :");
scanf("%d",&n);
a=(int*)malloc(n*sizeof(int));
printf("\nEnter %d number of elements:", n);
for(i=0;i<n;i++)
  {
      scanf("%d",a+i);
  }
printf("\nThe elements you entered are :");
for(i=0;i<n;i++)
  {
     printf("%d  ", *(a+i));
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
Pointer : Store and retrieve elements from an array :

Enter the number of elements to store in the array : 5
Enter 5 number of elements: 10 20 30 40 50
The elements you entered are :10 20 30 40 50

RUN-2
Pointer : Store and retrieve elements from an array :

Enter the number of elements to store in the array : 7
Enter 5 number of elements: 3
4
5
6
5
9
8
The elements you entered are :3 4 5 6 5 9 8

LAB - 9
Structure & Union
CONTENTS

Experiment No-9

Sample Answers

SA9.1 WAP to store one student's information (i.e. student's roll no, name, gender, marks etc) of an educational institute and display all the data, using structure.

SA9.2 WAP to store n student's information (i.e. student's roll no, name, gender, marks etc) of an educational institute and display all the data, using array of structure.

SA9.3 WAP to add two distances (in inch-feet) using structures.

SA9.4 WAP to add two complex numbers by passing structure to a function

SA9.5 WAP to store n books data such as title, author, pulication, price etc using structures with dynamically memory allocation. Display all the books information of a particular author.

SA9.6 WAP to read item details used in party and calculate all expenses, divide expenses in all friends equally.

SA9.7 WAP to declare an union named as ABC having two members a as character and b as integer . Assign 'A' to a, 1088 to b respectively through an union variable ob one by one and display these these values immediately. Now assign these values to a, b through ob all together and display these values at last. Find the difference.

Lab. Assignments

LA9.1 WAP to store n student's information (i.e. student's roll no, name, gender, marks in 5 subjects etc) of an educational institute and display all the data with total marks of each student, using array of structure. If full mark of each subject is considered as 100 and pass mark as 40, then display the list of students failed in a particular subject.

LA9.2 WAP to add two distances (in km-meter) using structures.

LA9.3 WAP to add two times (in hr-min-sec) by passing structure to a function.

LA9.4 WAP to store n employees data such as employee name, gender, designation, department, basic pay etc using structures with dynamically memory allocation. Calculate the gross pay of each employees as follows:
Gross pay=basic pay + HR + DA
HR=25% of basic, DA=75% of basic

LA9.5 WAP to declare an union named as ABC having three members a, b and c as character, integer and double respectively. Assign user entered values to these members respectively one by one and display these values immediately. Again assign these user entered values to a, b, c one by one all together and display these values at last. Find the difference.

Home Assignments

HA9.1 WAP to create a new data type DATE with the help of structure and typedef. Write the following user defined functions for the date manipulations.

    a) To return next date

    b) To return next month.

    c) To return next year.

    d) to add few days in a date.

    e) To add few months in a date.

    f) To add few years in a date.

    g) To return month name from a date.

    h) To display date in various format such as DD-MM-YYYY, DD.MM.YY etc.

    i)

HA9.2 WAP to calulate the difference between two time periods. Times are given in hr, min and sec.

HA9.3 WAP to extract individual bytes from an unsigned int using union.

PROGRAM NO. SA9.1

WAP to store one student's information (i.e. student's roll no, name, gender, marks etc) of an educational institute and display all the data, using structure.

PROGRAM CODE

Accessing Structure Members with structure variabl	Accessing Structure Members with structure pointer

#include <stdio.h>
#include <string.h>
struct student
{
   int roll;
   char name[25];
   char gender;
   float marks;
};
 	
int main()
{
  struct student s;
  printf("\nEnter the students data:\n");
  printf("\nRoll Number: ");
  scanf("%d", &s.roll);
  printf("\nName: ");
  gets(s.name);
	#include <stdio.h>
	#include <string.h>
	struct student
	{
	   int roll;
	   char name[25];
	   char gender;
	   float marks;
	};
	
	int main()
	{
	  struct student s, *ptr;
	  ptr=&s;
	  printf("\nEnter the students data:\n");
	  printf("\nRoll Number: ");
	  scanf("%d", &ptr->roll);
	  printf("\nName: ");

```
  printf("\nGender: ");                        gets(ptr->name);
  scanf("%c", &s.gender);                       printf("\nGender: ");
  printf("\nMarks: ");                          scanf("%c", &ptr->gender);
  scanf("%f", &s.marks);                        printf("\nMarks: ");
                                                scanf("%f", &ptr->marks);
  printf("\nThe students details are\n");
  printf("\nRoll number: %d",s.roll);           printf("\nThe students details are\n");
  printf("\nName:%s ", s.name);                 printf("\nRoll number: %d",ptr->roll);
  printf("\nGender:%c ", s.gender);             printf("\nName:%s ", ptr->name);
  printf("\nMarks: %.2f", s.marks);             printf("\nGender:%c ", ptr->gender);
                                                printf("\nMarks: %.2f", ptr->marks);
  return 0;
}                                               return 0;
                                              }
```

INPUT/OUTPUT

RUN-1
  Enter the students data:
  Roll Number: 1505201
  Name: Rajesh Agarwal
  Gender:M
  Marks:95

  The students details are
  Roll Number: 1505201
  Name: Rajesh Agarwal
  Gender:M
  Marks:95

RUN-2
  Enter the students data:
  Roll Number: 1505202
  Name: Yashraj Behera
  Gender:M
  Marks:50

  The students details are
  Roll Number: 1505202
  Name: Yashraj Behera
  Gender:M
  Marks:50

PROGRAM NO. SA9.2

WAP to store n student's information (i.e. student's roll no, name, gender, marks etc) of an
educational institute and display all the data, using array of structure.

PROGRAM CODE

```c
#include <stdio.h>
#include <string.h>
struct student
{
    int roll;
    char name[25];
    char gender;
    float marks;
};

int main()
{
  struct student s[100];
  int i,n;
  printf("\nEnter number of students:");
  scanf("%d", &n);
  for(i=0, i<=n, i++)
  {
      printf("\n\nEnter student-%d data:\n", i+1);
      printf("\nRoll Number: ");
      scanf("%d", &s[i].roll);
      printf("\nName: ");
      gets(s[i].name);
      printf("\nGender: ");
      scanf("%c", &s[i].gender);
      printf("\nMarks: ");
      scanf("%f", &s[i].marks);
  }

  printf("\nThe student details are\n");
  printf("\nSl.No.\tRoll No.\tName\t\tGender\tMarks\n");
  printf("\n====\t=======\t====\t\t=====\t=====\n");
  for(i=0, i<=n, i++)
  {
     printf("\n%d\t%d\t%s\t%c\t%f", i+1, s[i].roll, s[i].name, s[i].gender, s[i].marks);
  }
  return 0;
}
```

INPUT/OUTPUT

RUN-1
   Enter number of students:2

   Enter student-1 data
   Roll Number: 1305314
   Name: Namrata Panda
   Gender: F
   Marks: 65

   Enter student-2 data
   Roll Number: 1305315
   Name: Ashish Talwar
   Gender: M
   Marks: 75

   The student details are

Sl. No.	Roll No.	Name	Gender	Marks
1	1305314	Namrata Panda	F	65
2	1305315	Ashish Talwar	M	75

PROGRAM NO. SA9.3

WAP to add two distances (in inch-feet) using structures.

PROGRAM CODE

```c
#include <stdio.h>
struct Distance
{
    int feet;
    float inch;
};

int main()
{
    struct Distance d1, d2, d;
    printf("\nEnter data for 1st distance\n");
    printf("\nEnter feet: ");
    scanf("%d", &d1.feet);
    printf("\nEnter inch: ");
    scanf("%f", &d1.inch);

    printf("\nEnter data for 2nd distance\n");
    printf("\nEnter feet: ");
    scanf("%d", &d2.feet);
    printf("\nEnter inch: ");
```

```
      scanf("%f", &d2.inch);

   d.feet = d1.feet+d2.feet;
   d.inch = d1.inch+d2.inch;

   /*If inch is greater than 12, changing it to feet*/
   if (d.inch>12.0)
   {
      d.inch = d.inch-12.0;
      ++d.feet;
   }

   printf("\nSum of distances = %d\'-%.1f\"", d.feet, d.inch);
   return 0;
}
```

INPUT/OUTPUT

RUN-1
```
   Enter data for 1st distance
   Enter feet: 6
   Enter inch: 8

   Enter data for 2nd distance
   Enter feet: 7
   Enter inch: 9

   Sum of distances = 14'-5.0"
```

RUN-2
```
   Enter data for 1st distance
   Enter feet: 3
   Enter inch: 8

   Enter data for 2nd distance
   Enter feet: 4
   Enter inch: 5

  Sum of distances = 8'-1.0"
```

PROGRAM NO. SA9.4

WAP to add two complex numbers by Passing structure to a function

PROGRAM CODE
```c
#include <stdio.h>
typedef struct complex
{
    float real;
    float imag;
} complex;

complex add(complex,complex);
int main()
{
    complex c1, c2, c;

    printf("\nFor 1st complex number \n");
    printf("\nEnter real and imaginary part respectively:");
    scanf("%f %f", &c1.real, &c1.imag);

    printf("\n\nFor 2nd complex number \n");
    printf("\nEnter real and imaginary part respectively:");
    scanf("%f %f", &c2.real, &c2.imag);

    c = add(c1, c2);
    printf("\n\nSum = %.1f + %.1fi", c.real, c.imag);

    return 0;
}

complex add(complex x, complex y)
{
    complex temp;

    temp.real = x.real + y.real;
    temp.imag = x.imag + y.imag;

    return(temp);
}
```
INPUT/OUTPUT
RUN-1
    For 1st complex number
    Enter real and imaginary part respectively: 2.5 3.5

    For 2nd complex number
    Enter real and imaginary part respectively: 4.5 6.7

    Sum = 7.0 + 10.2i

RUN-2
  For 1st complex number
  Enter real and imaginary part respectively: 6 8

  For 2nd complex number
  Enter real and imaginary part respectively: 7 9

  Sum = 13.0 + 17.0i

PROGRAM NO. SA9.5

WAP to store n books data such as title, author, pulication, price etc using structures with dynamically memory allocation. Display all the books information of a particular author.

PROGRAM CODE
```c
#include <stdio.h>
#include <string.h>
struct book
{
    char title[25];
    char author[25];
    char publication[25];
    float price;
};

int main()
{
  struct book *b;
  int i,n, sl=1;
  char auth[25];
  printf("\nEnter number of books:");
  scanf("%d", &n);
  b=(struct book *)malloc(n*sizeof(struct book));
  for(i=0, i<n, i++)
  {
      printf("\n\nEnter book-%d data:\n", i+1);
      printf("\nTitle: ");
      gets(b[i]->title);
      printf("\nAuthor: ");
      gets(b[i]->author);
      printf("\nPublication: ");
      gets(b[i]->publication);
      printf("\nPrice: ");
      scanf("%f", &b[i]->price);
  }
```

```
printf("\nEnter the author's name:");
gets(auth);
printf("\nThe books information of  author %s are\n", auth);
printf("\nSl.No.\tTitle\t\tPublication\tPrice\n");
printf("\n====\t\t===\t\t========\t\t===n");
for(i=0, i<n, i++)
{
   if(strcmp(b[i].author, auth)==0)
        printf("\n%d\t%s\t\t%s\t\t%f", sl++, b[i]->title, b[i]->publication, b[i].price);
}
return 0;
}
```

INPUT/OUTPUT

RUN-1
Enter number of books:5

Enter book-1 data
Title: Programming in C
Author: E.Balaguru Swamy
Publication: BPB
Price: 350

Enter book-2 data
Title: Object Oriented Programming
Author: Ashok N.Kamthane
Publication: Pearson
Price: 530

Enter book-3 data
Title: Object Oriented Programming
Author: E.Balaguru Swamy
Publication: BPB
Price: 430

Enter book-4 data
Title: Object Oriented Programming
Author: Reema Thereja
Publication: Oxford
Price: 525

Enter book-5 data
Title: Core Java
Author: E.Balaguru Swamy
Publication: BPB
Price: 520

Enter the author's name: E.Balaguru Swamy

The books information of author E.Balaguru Swamy are

The student details are

Sl. No.	Title	Publication	Price (Rs.)
=====	===	========	========
1	Programming in C	BPB	350
2	Object Oriented programming	BPB	430
3	Core Java	BPB	520

PROGRAM NO. SA9.6

WAP to read item details used in party and calculate all expenses, divide expenses in all friends equally.

PROGRAM CODE

```c
#include <stdio.h>
#define MAX 100 //maximum items entry

//structure definition
typedef struct item_details
{
    char itemName[30];
    int quantity;
    float price;
    float totalAmount;
}item;

int main()
{
  item thing[MAX]; //structure variable
  int i,choice;
  int count=0;
  float expenses=0.0f;
  i=0;
  do
  {
      printf("\nEnter item-%2d details\n",i+1);
      printf("\nItem Name: ");
      gets(thing[i].itemName);
      printf("\nPrice: ");
      scanf("%f",&thing[i].price);
      printf("\nQuantity: ");
      scanf("%d",&thing[i].quantity);

      thing[i].totalAmount=(float)thing[i].quantity*thing[i].price;
      expenses += thing[i].totalAmount;
      i++;
      count++;
      printf("\nWant to more items (press 1): ");
```

```
      scanf("%d",&choice);
   }while(choice==1);

   Printf("\n*******************Expenditure Bill*******************");
   printf("\nSl.\tItem Name\tPrice\tQuantity\tTotal Amount
   printf("\n---\t--------------\t------\t----------\t----------------
   for(i=0; i<count; i++)
   {
        printf("%-30s\t %.2f \t %3d \n %.2f\n",thing[i].itemName, thing[i].price, thing[i].quantity,
thing[i].totalAmount);
   }
   printf("\n-----------------------------------------------------------------------------------------");
   printf("\n                               Total expense: Rs.%.2f\n",expenses);

   printf("\nHow many friends to pay the expences:");
   scanf("%d",&n);
   printf("\nEach friend will have to pay:Rs. %.2f\n",(expenses/(float)n));
   return 0;
}
```

INPUT/OUTPUT

RUN-1
   Enter item-1 details
   Item Name: Rice
   Price: 50.00
   Quantity: 4

   Want to more items (press 1): 1
   Enter item-2 details:
   Item Name: Dal fry
   Price:35
   Quantity: 5

   Want to more items (press 1): 1
   Enter item-3 details:
   Item Name: Mix. Veg
   Price:55
   Quantity: 4

   Want to more items (press 1): 1
   Enter item-4 details:
   Item Name: Chilly Chiken
   Price:120
   Quantity: 3

   Want to more items (press 1): 1
   Enter item-5 details:
   Item Name: Ice cream

Price:45
Quantity: 5

Want to more items (press 1): 0

********************Expenditure Bill********************

Sl	Item Name	Price	Quantity	Total Amount
--	-------------	------	----------	-----------------
1	Rice	50.00	4	200.00
2	Dal fry	35	5	175.00
3	Mix. Veg.	55	4	220.00
4	Chilly Chiken	120	3	360.00
5	Ice Cream	45	5	225.00

Total Expenses: Rs.1180.00

How many friends to pay the expences: 5
Each friend will have to pay:Rs.236.00

PROGRAM NO. SA9.7

WAP to declare an union named as ABC having two members a as character and b as integer . Assign 'A' to a, 1088 to b respectively through an union variable ob one by one and display these these values immediately. Now assign these values to a, b through ob all together and display these values at last. Find the difference.

PROGRAM CODE

```
#include<stdio.h>
union ABC
{
   char    a;
   int      b;
};

int main()
{
        union ABC ob;
        printf("\nOccupied size by union ABC: %d",sizeof(union ABC));

        printf("\nValue of a and b  if  value  assigned to each member one by one and display
immediately");
        ob.a='A';
        printf("\nValue of a:%c", ob.a);
        ob.b=1088;
        printf("\nValue of b:%d",ob.b);

        printf("\nValue of a and b if  value  assigned to each member together and display at last\n");
        ob.a='A';
```

```
        ob.b=1088;
        printf("\nValue of a:%c, b:%d",ob.a,ob.b);

        return 0;
}
```

INPUT/OUTPUT

RUN-1
Occupied size by union ABC: 4 /*if integer takes 4 bytes and char 2 bytes*/
Value of a and b if value assigned to each member one by one and display immediately
Value of a:A
Value of b:1088

Value of a and b if value assigned to each member together and display at last
Value of a: @
Value of b:1088

N.B: if the assignments can be done in reverse order, then the output will be as follows:

Occupied size by union ABC: 4 /*if integer takes 4 bytes and char 2 bytes*/
Value of b and a if value assigned to each member one by one and display immediately
Value of b:1088
Value of a: A

Value of b and a if value assigned to each member together and display at last
Value of b: 1089
Value of a: A

LAB - 10
File Handling &
Other Additional Features in C
CONTENTS

Experiment No-10

Sample Answers

SA10.1 WAP to create a file & write some data in it.

SA10.2 WAP to read the contents of a text file given by user.

SA10.3 WAP to count the number of characters, number of lines, blankspaces, tabs in a given text file.

SA10.4 WAP to copy the contents of one file in to another file.

SA10.5 WAP to convert all characters in uppercase of a file.

Lab. Assignments

LA10.1 WAP to read roll number, name, gender and marks data of n number of students from user and store them in a file. If the file previously exits, add the information of n students.

LA10.2 WAP to copy the contents of two files named as source1.txt and source2.txt into a third file dest.txt.

LA10.3 WAP to compare contents of two files and display appropriate message.

LA10.4 WAP to replace first letter of every word of the contents of a file with capital letter.

LA10.5 WAP to print the content of a file in reverse order.

Home Assignments

HA10.1 WAP which produces its own source code as its output.

HA10.2 WAP to copy the specified bytes from given offset of a file and write them into another file.

HA10.3 Write a menu driven program to perform the following operations in a file.
   a)   to delete a specific line from a text file.
   b)   To replace a specified line by another from a text file.

HA10.4 WAP to merge lines alternatively from two files & print the result.

HA10.5 WAP to display the files and sub-directories present in a specified directory.

<mark>PROGRAM NO. SA10.1</mark>

WAP to create a file & write some data in it.

PROGRAM CODE
```c
#include <stdio.h>
int main()
{
    FILE *fp;
    int roll;
    char name[20];
    char gender;
    float marks;

    /*  open for writing */
    fp=fopen("std.txt", "w");

    if (fp == NULL)
    {
        printf("\nCan not open the file");
        return;
    }
    printf("\nEnter one Student Details\n:");

    printf("\nRoll number of  student:");
    scanf("%d", roll);
    fprintf(fp, "\nRoll number of  student= %d", roll);

    printf("\nName of  student:");
    scanf("%s", name);
    fprintf(fp, "\nName of student= %s", name);

    printf("\nGender of  student:");
    scanf("%c", gender);
    fprintf(fp, "\nGender of student= %c", gender);

    printf("\nMarks of student: ");
    scanf("%f", &marks);
    fprintf(fp, "\nStudent Marks = %.2f\n", marks);

    fclose(fp);
    return 0;
}
```

INPUT/OUTPUT

RUN-1
   Enter one Student Details
   Roll number of student: 1305175
   Name of student: Ashok
   Gender of student: M
   Marks of student: 86

RUN-2
   If the file does not exits, then it will create a new one named as std.txt, in case it unables to open the file for any reseon, then it will show the following message:
       Can not open the file

PROGRAM NO. SA10.2

WAP to read the contents of a text file given by user.

PROGRAM CODE
```c
#include <stdio.h>
#include <stdlib.h>
 int main()
{
   FILE *fp;
   char filename[15];
   char ch;

   printf("\nEnter the filename to be opened:");
   scanf("%s", filename);

   /*Open the file for reading*/
   fp = fopen(filename, "r");
   if (fptr == NULL)
   {
      printf("Cannot open file \n");
      return;
   }

   /*Read character by character from the file & display on computer screen*/
   while ((ch=fgetc(fp))!= EOF)
   {
      printf ("%c", ch);
   }
   fclose(fp);
}
```

INPUT/OUTPUT

RUN-1
If the file std.txt is given as input, then it will give the output as follows:

Enter the filename to be opened:std.txt
Roll number of student: 1305175
Name of student: Ashok
Gender of student: M
Marks of student: 86

RUN-2
If the file does not exits, then it will show the following message:
Can not open the file

PROGRAM NO. SA10.3

WAP to count the number of characters, number of lines, blankspaces, tabs in a given text file.

PROGRAM CODE
```c
#include<stdio.h>
int main()
{
        FILE *fp;
        char ch;
        int nol=0,not=0,nob=0,noc=0;
        fp=fopen("aks.txt","r");
        while(1)
        {
                ch=fgetc(fp);
                if(ch==EOF)
                    break;
                noc++;
                if(ch==' ')   nob++;
                if(ch=='\n')  nol++;
                if(ch=='\t')  not++;
        }
        fclose(fp);
        printf("\n The no. of characters =%d",noc);
        printf("\n The no. of blanks =%d",nob);
        printf("\n The no. of tabs =%d",not);
        printf("\n The no. of lines =%d",nol);
        return 0;
}
```

INPUT/OUTPUT

RUN-1

Enter value of num1: 35
Enter value of num2: 72

RUN-2
Enter value of num1: 15

PROGRAM NO. SA10.4

WAP to copy the contents of one file in to another file.

PROGRAM CODE
```
#include <stdio.h>
#define file1  "source.txt"
#define file2  "dest.txt"

int main()
{
        FILE *fp1, *fp2;
        char ch;
        fp1=fopen(file1, "r");
        fp2=fopen(file2, "w");
        while(( ch=fgetc(fp1)) != EOF)
        {
            fputc(ch, fp2);
        }
        fclose(fp1);
        fclose(fp2);
}
```


INPUT/OUTPUT

RUN-1
Enter value of num1: 35
Enter value of num2: 72

RUN-2
Enter value of num1: 15

PROGRAM NO. SA10.5

WAP to convert all characters in uppercase of a given file.

PROGRAM CODE
```
#include <stdio.h>
#include <ctype.h>
```

```c
int main()
{
    const char *filename="aks.txt";
    FILE *fp,*fp1;
    char ch;

    //open file in read mode
    fp=fopen(fileme,"r");
    if(fp==NULL)
    {
        printf("\nError in opening file.");
        return -1;
    }
    //create temp file
    fp1=fopen("temp.txt","w");
    if(fp1==NULL)
    {
        printf("\nError in creating temp file.");
        return -1;
    }
    /*read file from one file aks.txt and copy into another temp.txt in uppercase*/
    while((ch=fgetc(fp))!=EOF)
    {
        if(islower(ch))
        {
            ch=ch-32;
        }
        putc(ch,fp1);
    }
    fclose(fp);
    fclose(fp1);
    //rename temp.txt file to aks.txt
    rename("temp.txt","aks.txt");
    //remove temp file
    remove("temp.txt");

    /*now, print content of the file*/
    fp=fopen(filename,"r");
    if(fp==NULL)
    {
        printf("\nError in opening file.");
        return -1;
    }
    printf("\nContent of file aks.txt");
    while((ch=getc(fp))!=EOF)
    {
        printf("%c",ch);
    }
    printf("\n");
```

```
    fclose(fp);
    return 0;
}
```


INPUT/OUTPUT

RUN-1
    Enter value of num1: 35
    Enter value of num2: 72

RUN-2
    Enter value of num1: 15

**Note: Any error you identify, kindly mail me at <u>anilkumarswain@gmail.com</u> or
<u>anil.swainfcs@kiit.ac.in</u> or call @9938853866**

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