LAB EXERCISE #1

Objective(s):

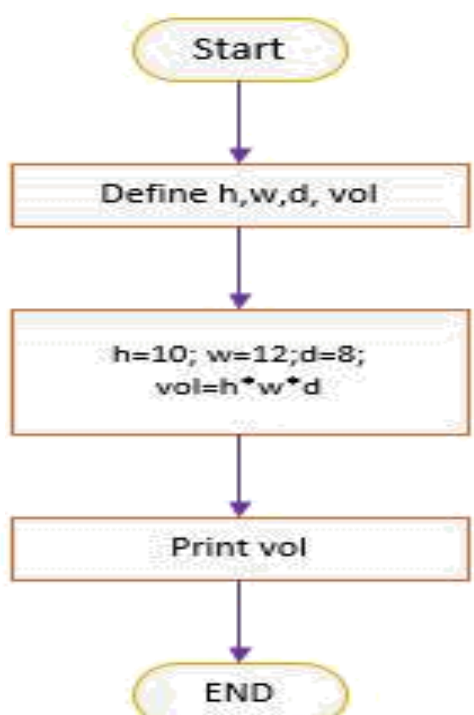
To be familiar with syntax and structure of C- programming.
To learn problem solving techniques using C

Program: Write a Program to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm).

Algorithm:

1. Start
2. Define variables: h(int), w(int), d(int), vol(int)
3. Assign value to variables: h = 10, w=12, d=8
4. Calculate the volume as: vol = h*w*d
5. Display the volume (vol)
6. Stop

Flowchart:



Code: *(Use comments wherever applicable)*

```
#include<stdio.h>
void main()
{
//start the program
int h,w,d,vol; //variables declaration
h=10;w=12;d=8; //assign value to variables
vol=h*w*d;     //calculation using mathematical formula
printf("The Volume of the cube is: %d",vol); //display the
volume
getch();
//end the main program
}
```

Output :

The Volume of the cube is: 960

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a C program to display "This is my first C Program".
2. Write a C program to add two numbers (2 and 6) and display its sum.
3. Write a C program to multiply two numbers (4 and 5) and display its product.
4. Write a C program to calculate area and circumference of a circle.
5. Write a C program to perform addition, subtraction, division and multiplication of two numbers.
6. Write C program to evaluate each of the following equations.
   (i) V = u + at. (ii) S = ut+1/2at^2 (iii) T=2*a+√b+9c (iv) H = $\sqrt{b^2 + p^2}$

LAB EXERCISE #2

Objective(s):

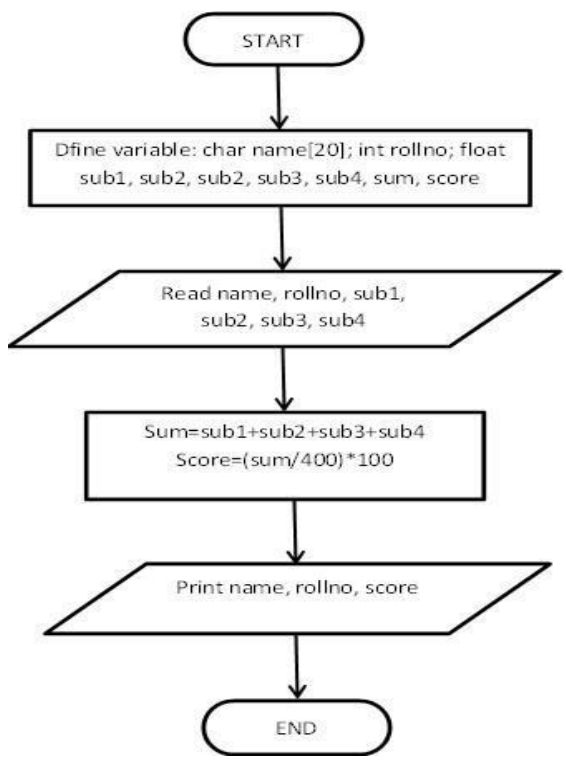
To be familiar with different data types, Operators and Expressions in C.

Program: Write a program to take input of name, rollno and marks obtained by a student in 4 subjects of 100 marks each and display the name, rollno with percentage score secured.

Algorithm:

1. Start
2. Define variables: name, rollno, sub1, sub2, sub3, sub4, sum, score
3. Take input from keyboard for all the input variables
4. Calculate the sum of marks of 4 subjects and also calculate the percentage score as:
   sum = sub1 + sub2 + sub3 + sub4;
   score = (sum/400) * 100
5. Display the name, roll number and percentage score.
6. Stop

Flowchart:



Code: *(Use comments wherever applicable)*

```
#include<stdio.h>
#include<conio.h>
void main()
{
char name[20];
int rollno;
float sub1, sub2, sub3, sub4, , sum, score;
printf("Enter name of student: ");
scanf("%s",&name[]);
printf ("\n Enter Roll Number: ");
scanf("%d", &rollno);
printf ("\n Enter Marks in 4 Subjects:\n");
scanf("%f%f%f%f", &sub1, &sub2, &sub3, &sub4);
sum=sub1+sub2+sub3+sub4;
score = (sum/500)*100;
printf("\n Name of student: %s", name[]);
printf("\n Roll Number: %d", rollno);
printf ("\nPercentage score secured: %2.2f%c", score,'%');
getch();
}
```

Output:

Enter name of student: Ajit Singh
Roll Number: 25
Enter Marks in 4 Subjects:
50
75
85
62
Name of student: Ajit Singh
Roll Number: 25
Percentage score secured: 68.00%

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a program to calculate simple and compound interest.
2. Write a program to swap values of two variables with and without using third variable.
3. Write a program to display the size of every data type using "sizeof" operator.
4. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
5. Write a program to input two numbers and display the maximum number.
6. Write a program to find the largest of three numbers using ternary operators.
7. Write a program to find the roots of quadratic equation.
8. Write a program to input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored and the class of result.

LAB EXERCISE #3

Objective(s):

To understand the programming knowledge using Decision Statements (if, if-else, if-else-if ladder, switch and GOTO)

Program: Write a program to print whether a given number is even or odd.

Code: *(Use comments wherever applicable)*

```
#include<stdio.h>
#include<conio.h>
void main()
{
int num;
printf("Enter the number: ");
scanf("%d",&num);
if(num%2==0)
     printf("\n %d is even", num);
else
     printf("\n %d is odd", num);
getch();
}
```

Output:

Enter the number: 6
6 is even

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a Program to Check Whether a Number is Prime or not.
2. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd.
3. Write a program to compute grade of students using **if else adder**. The grades are assigned as followed:

a. Marks	**Grade**
b. marks<50	F
c. 50≤marks< 60	C
d. 60≤marks<70	B
e. 70≤marks<80	B+
f. 80≤marks<90	A
g. 90≤mars≤ 100	A+

4. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
5. Write a program to find the factorial of a number.
6. Write a program to check number is Armstrong or not.
   (Hint: A number is Armstrong if the sum of cubes of individual digits of a number is equal to the number itself).

Program: Write a program to find whether a character is consonant or vowel using **switch statement**.

```
#include <stdio.h>
void main()
{
char ch;
printf("Enter any alphabet:");  //input alphabet from user
scanf("%c", &ch);
switch(ch)
  {
     case „a":
     case „A":
          printf("Vowel");
          break;
     case „e":
     case „E":
          printf("Vowel");
          break;
     case „i":
     case „I":
          printf("Vowel");
          break;
     case „o":
     case „O":
          printf("Vowel");
          break;
     case „u":
     case „U":
          printf("Vowel");
          break;
     default:
          printf("Consonant");
  }
}
```

7. Write a program to print day name using **switch case.**

8. Write a program to determine whether the input character is capital or small letter, digits or special symbol.
9. Write a program to check whether a date is valid or not.
10. Write a program to check whether a number is positive, negative or zero using switch case.

LAB EXERCISE #4

Objective(s):

To understand the programming using Loop & nested loop Statements (for, while, do-while)

Program: Write a program to print positive integers from 1 to 10.

Code:

```
//Using FOR LOOP

#include<stdio.h>
#include<conio.h>
void main()
{
int i;
for(i=1; i<=10;i++)
     printf("%d \n", i);
getch();
}
```

```
//Using WHILE LOOP

#include<stdio.h>
#include<conio.h>
void main()
{
int i=1;
while(i<=10)
     {
     printf("%d \n", i);
     }
     i++;
getch();
}
```

```
//Using DO-WHILE LOOP

#include<stdio.h>
#include<conio.h>
void main()
{
int i=1;
do
     {
     printf("%d \n", i);
     i++;
     }
while(i<=10);
getch();
}
```

Output:

1
2
3
4
5
6
7
8
9
10

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a program to count number of digits in a given integer.
2. Write a program to reverse a given integer.
3. Write a program to print number in reverse order with a difference of 2.
4. Write a program to print the sum of digits of a number using **for** loop.
5. Write a program to check whether a number is Palindrome or not.
6. Write a program to generate Fibonacci series.
7. If a four-digit number is input through the keyboard, write a program to obtain the sum of the first and last digit of this number.
8. Write a program to find GCD (greatest common divisor or HCF) and LCM (least common multiple) of two numbers.

Program: Write a program to display the following pattern.

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

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j;
for(i=1; i<=5;i++)
{
     for(j=1;j<=i;j++)
     {
      printf("*");
     }
printf("\n");
}
getch();
}
```

9. Write programs to display each of the following patterns.

(i)

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

(ii)

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

(iii)

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

(iv)

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

(v)

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

(vi)

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

(vii)

```
      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
```

(viii)

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

(ix)

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

(x)

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

(xi)

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

(xii)

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

LAB EXERCISE #5

Objective(s):

To understand programming using different dimensions of Array.

Program: Write a program to insert 5 elements into an array and print the elements of the array.

Code: *(Use comments wherever applicable)*

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i, arr[5];
printf("Enter the elements into the array:");
for(i=0; i<=4;i++)
     scanf("%d",&arr[i]);
printf("The elements of the array are:");
for(i=0; i<=4;i++)
     printf("%d \t", arr[i]);
getch();
}
```

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a Program to Search an element in array.
2. Write a Program to perform addition of all elements in Array.
3. Write a Program to find the largest and smallest element in Array.

4. Write a Program to reverse the array elements in C Programming.
5. Write a Program for deletion of an element from the specified location from Array.
6. Write a Program to access an element in 2-D Array.
7. Write a program for addition of two matrices of any order in C.
8. Write a Program to multiply two 3 X 3 Matrices.
9. Write a program to read a string and check for palindrome without using string related function (a string is palindrome if its half is mirror by itself eg: abcdcba).
10. Write a program to accept a string and count the number of vowels present in this string.

LAB EXERCISE #6

Objective(s):

To understand function programming, its types and function-call.

Program: Write a program to calculate factorial of a number using recursion.

Code:

```
#include<stdio.h>
long factorial(int);  //Function declaration
int main()
{
  int num;
  long fact;
  printf("Enter a number to find factorial: \n");
  scanf("%d", &num);
  if(num<0)
    printf("Factorial of negative no. is not defined. \n");
  else
    {
       fact = factorial(num);
       printf("%d!=%d \n", num, fact);
    }
return 0;
}
//Function definition
long factorial(int num)
{
       if(num==0)
              return 1;
       else
              return(num*factorial(num-1));
}
```

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a program to add, subtract, multiply and divide two integers using user-defined type function with return type.
2. Write a program to calculate sum of first 20 natural numbers using recursive function.
3. Write a program to generate Fibonacci series using recursive function.
4. Write a program to swap two integers using call by value and call by reference methods of passing arguments to a function.
5. Write a program to find sum of digits of the number using Recursive Function.
6. Write a program to read an integer number and print the reverse of that number using recursion.
7. Write a C program to find maximum and minimum between two numbers using functions.
8. Write a C program to check whether a number is even or odd using functions.
9. Write a C program to check whether a number is prime, Armstrong or perfect number using functions.
10. Write a C program to find power of any number using recursion.

LAB EXERCISE #7

Objective(s):

To understand programming with Pointer, String and Function call by reference.

Program: Write a program to find biggest among three numbers using pointer.

Code:

```
#include<stdio.h>
#include<conio.h>
int main()
{
int a,b,c;
int*ptra=&a,*ptrb=&b,*ptrc=&c;
printf("enter three values");
scanf("%d%d%d",ptra,ptrb,ptrc);
printf("a=%d\n b=%d\n c=%d\n",*ptra,*ptrb,*ptrc);
if((*ptra>*ptrb && *ptra>*ptrc))
     printf("biggest number=%d",*ptra);
else if((*ptrb>*ptra && *ptrb>*ptrc))
     printf("biggest number =%d",*ptrb);
else
     printf("biggest number=%d",*ptrc);
getch();
return 0;
}
```

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

Programs List

1. Write a program to find the sum of all the elements of an array using pointers.
2. Write a program to swap value of two variables using pointer.
3. Write a program to add two numbers using pointers.
4. Write a program to input and print array elements using pointer.
5. Write a program to copy one array to another using pointer.
6. Write a program to swap two arrays using pointers.
7. Write a program to reverse an array using pointers.
8. Write a program to search an element in array using pointers.
9. Write a program to add two 2 X 2 matrix using pointers.
10. Write a program to multiply two 2 X 2 matrix using pointers.
11. Write a program to find length of string using pointers.
12. Write a program to copy one string to another using pointer.
13. Write a program to concatenate two strings using pointers.
14. Write a program to compare two strings using pointers.

LAB EXERCISE #8

Objective(s):

To understand programming with Structure.

Program 1: Write a C program to create, declare and initialize structure.

Code:

```
#include <stdio.h>
/*structure declaration*/
struct employee{
     char name[30];
     int empId;
     float salary;
};

int main()
{
     /*declare and initialization of structure variable*/
     struct employee emp={"Anil",201,80000.00};

     printf("\n Name: %s"     ,emp.name);
     printf("\n Id: %d"       ,emp.empId);
     printf("\n Salary: %f\n",emp.salary);
     return 0;
}
```

Program 2: Write a program to store information of 5 students in structure and display it.

Code:

```
#include<stdio.h>
struct student
{
     char name[30];
     int roll;
     float marks;
} s[5];
int main( )
{
     int i;
     printf("Information of students:");
```

```
     for (i=0; i<5; ++i)
     {
         s[i].roll =i+1;
         printf("\n Roll number %d, \n", s[i].roll);
         printf("Enter name:");
         scanf("%s", s[i].name);
         printf("Enter marks:");
         scanf("%f", &s[i].marks);
     }
printf("\n Displaying Information:\n");
for(i=0;i<10;++i)
{
     printf("\n Roll number:%d \n", i+1);
     printf("Name:");
     puts(s[i].name);
     printf("\n Marks:%.1f", s[i].marks);
}
return 0;
}
```

Program 3: Write a program to declare, initialize an UNION.

Code:

```
#include <stdio.h>
// union declaration
union pack{
char a;
int  b;
double c;
};
int main()
{
     pack p; //union object/variable declaration
     printf("\nOccupied size by union pack:
%d",sizeof(pack));
     // assign value to each member one by one other it
will replace last value
     p.a='A';
     printf("\nValue of a:%c",p.a);
     p.b=10;
     printf("\nValue of b:%d",p.b);
     p.c=12345.6790;
     printf("\nValue of c:%f",p.c);
```

```
     // see, what will happen? if u will assign values
together
     p.a='A';
     p.b=10;
     p.c=12345.6790;
     // here the last value of p.c will be accessed by all
members
     printf("\nValue of a:%c, b:%d, c:%f",p.a,p.b,p.c);
     return 0;
}
```

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

1. Write a program to create a structure named company which has name, address, phone and noOfEmployee as member variables. Read name of company, its address, phone and noOfEmployee. Finally display these members‟ value.

2. Define a structure “complex” (typedef) to read two complex numbers and perform addition, subtraction of these two complex numbers and display the result.

3. Write a program to read RollNo, Name, Address, Age & average-marks of 12 students in the BCT class and display the details from function.

4. Write a program to add two distances in feet and inches using structure

5. Write a program to read and print an Employee‟s Details using Structure.

LAB EXERCISE #9

Objective(s):

To understand data files and file handling in C.

Program 1: Write a program to create a file called emp.rec and store information about a person, in terms of his name, age and salary.

Code:

```
#include <stdio.h>
void main()
{
   FILE *fptr;
   char name[20];
   int  age;
   float salary;
    /*  open for writing */
   fptr = fopen("emp.rec", "w");
    if (fptr == NULL)
   {
       printf("File does not exists \n");
       return;
   }
   printf("Enter the name \n");
   scanf("%s", name);
   fprintf(fptr, "Name    = %s\n", name);
   printf("Enter the age\n");
   scanf("%d", &age);
   fprintf(fptr, "Age     = %d\n", age);
   printf("Enter the salary\n");
   scanf("%f", &salary);
   fprintf(fptr, "Salary  = %.2f\n", salary);
   fclose(fptr);
}
```

Program 2: Write a program to illustrate how a file stored on the disk is read.

Code:

```
#include <stdio.h>
#include <stdlib.h>
void main()
{
    FILE *fptr;
    char filename[15];
    char ch;
    printf("Enter the filename to be opened \n");
    scanf("%s", filename);
    /*  open the file for reading */
    fptr = fopen(filename, "r");
    if (fptr == NULL)
    {
        printf("Cannot open file \n");
        exit(0);
    }
    ch = fgetc(fptr);
    while (ch != EOF)
    {
        printf ("%c", ch);
        ch = fgetc(fptr);
    }
    fclose(fptr);
}
```

SAMPLE PROGRAMS

(Students are to code the following programs in the lab and show the output to instructor/course co-ordinator)

Instructions

- *Write comment to make your programs readable.*
- *Use descriptive variables in your programs(Name of the variables should show their purposes)*

1. C Program to list all files and sub-directories in a directory
2. C Program to count number of lines in a file
3. C Program to print contents of file
4. C Program to copy contents of one file to another file
5. C Program to merge contents of two files into a third file
6. C program to delete a file