Birla Institute of Technology,

Off Campus Deoghar

PROGRAMMING FOR PROBLEM SOLVING LAB

NAME: AKASH DIP
ROLL NUMBER: BTECH/60002/20
SEMESTER: 2ND
BRANCH: COMPUTER SCIENCE ENGINEERING

Birla Institute of Technology, Mesra

Off Campus Deoghar

PROGRAMMING FOR PROBLEM SOLVING LAB

Akash Dip
BTECH/60002/20
CSE 2020
btech60002.20@bitmesra.ac.in

INDEX				
S. NO.	ASSIGNMENT NO.	DATE	PAGE NO.	REMARKS
1.	**ASSIGNMENT 1**	**28/04/2021**	**2**	

ASSIGNMENT NUMBER – 1

[DATE: 28/04/2021]

<table>
<tr><th>PROBLEM NO.</th><th>PROBLEM STATEMENT</th><th>PAGE NO.</th><th>REMARKS</th></tr>
<tr><td>1</td><td>Write a C program to calculate the simple interest using the formula $I = PNR/100$, where P=Principal amount, N=Number of years and R=Rate of interest [P, N and R being user input]</td><td>3</td><td></td></tr>
<tr><td>2</td><td>Write a C program to find the sum of two numbers without using arithmetic operator.</td><td>4</td><td></td></tr>
<tr><td>3</td><td>Write a C program to check whether a year is leap year or not. [check the result with the year,1996,1900,2000,2004]</td><td>5</td><td></td></tr>
<tr><td>4</td><td>Write a C program to calculate the commission for sales as per the sales amount given below.
<table>
<tr><td>if sales <= 500</td><td>commission is 5%</td></tr>
<tr><td>if sales > 500 but <= 2000</td><td>commission is Rs. 35 plus 10 % above Rs.500</td></tr>
<tr><td>if sales > 2000 but <= 5000</td><td>commission is Rs. 185 plus 12% above Rs. 2000</td></tr>
<tr><td>if sales > 5000</td><td>commission is 12.5%</td></tr>
</table></td><td>7</td><td></td></tr>
<tr><td>5</td><td>Write a C program to find the average of best three marks from the given four test marks. [All the marks will be user input]</td><td>8</td><td></td></tr>
<tr><td>6</td><td>Write a C program to evaluate:
<table>
<tr><td>$f(x) = 1 + x/\sqrt{1+x^2}$</td><td>$if\ x < 0$</td></tr>
<tr><td>$f(x) = 0$</td><td>$if\ x = 0$</td></tr>
<tr><td>$f(x) = 1 - x/\sqrt{1-x^2}$</td><td>$if\ x > 0$</td></tr>
</table></td><td>10</td><td></td></tr>
</table>

PROGRAMMING LANGUAGE USED: **C**

Problem Number: 1

Problem Statement: Write a C program to calculate the simple interest using the formula $I = PNR/100$, where P=Principal amount, N=Number of years and R=Rate of interest [P, N and R being user input]

Solution:

```
//1
#include <stdio.h>

int main()
{
    //declaring variables
    float P, N, R, SI;

    //accepting values from the user
    printf("Enter Principle Amount: ");
    scanf("%f", &P);
    printf("Enter Number of Years: ");
    scanf("%f", &N);
    printf("Enter Rate of Interest: ");
    scanf("%f", &R);

    // Calculating Simple Interest
    SI = (P * N * R) / 100;

    // printing the resultant value of SI
    printf("Simple Interest = %f", SI);

    return 0;
}
```

Output Discussion:

```
Enter Principle Amount: 150000
Enter Number of Years: 3
Enter Rate of Interest: 7.8
Simple Interest = 35100.000000
```

On passing the values of P as 1,50,000, N as 3 and R as 7.8 the program returns the Simple Interest i.e., 35,100 which satisfies the desired output. The variables here are taken in float data type to maintain the minuteness of the answer as well as give user the facility to input decimal values.

Problem Number: 2

Problem Statement: Write a C program to find the sum of two numbers without using arithmetic operator.

Solution:

```
//2
#include <stdio.h>

int main()
{
    //declaring variables
    int num1,num2,i;

    //accepting the values of two numbers
    printf("Enter the 1st Number: ");
    scanf("%d",&num1);
    printf("Enter the 2nd Number: ");
    scanf("%d",&num2);

    //calculating the sum using loop to avoid arithmetic operations
    for(i=0; i<num2; i++)
        num1++;

    //displaying the sum of both the numbers
    printf("Sum : %d ",num1);

    return 0;
}
```

Output Discussion:

```
Enter the 1st Number: 60
Enter the 2nd Number: 80
Sum : 140
```

On passing the values of both the numbers as 60 and 80 respectively, we successfully get the result as 140 without using any arithmetic operations.

Problem Number: 3

Problem Statement: Write a C program to check whether a year is leap year or not. [check the result with the year,1996,1900,2000,2004]

Solution:

```
//3
#include <stdio.h>
int main()
{
   //declaring a variable
   int year;
   //accepting YEAR
   printf("Enter a Year: ");
   scanf("%d", &year);

    //checking whether the YEAR is leap year or not
    //also following 100 year rule
    if (((year % 4 == 0) && (year % 100!= 0)) || (year%400 == 0))
      printf("YEAR- %d is a leap year", year);
    else
      printf("YEAR- %d is not a leap year", year);

   return 0;
}
```

Output Discussion:

Sample I/O 1:

```
Enter a Year: 1996
YEAR- 1996 is a leap year
```

For the year 1996, it is divisible by 4 and not by 100 thereby satisfying the first part of OR operator and hence goes to the true part of if statement that prints the year to be a leap year.

Sample I/O 2:

```
Enter a Year: 1900
YEAR- 1900 is not a leap year
```

For the year 1900, it is divisible by 4 and also by 100 thereby dissatisfying the first part of OR operator and also is not completely divisible by 400 thereby dissatisfying the other part of OR operator hence goes to the false part of if statement that prints the year to be not a leap year.

Sample I/O 3:

```
Enter a Year: 2000
YEAR- 2000 is a leap year
```

For the year 2000, it is divisible by 4 and also by 100 thereby dissatisfying the first part of OR operator but satisfies the other part of OR operator as it is divisible by 400 and hence goes to the true part of if statement that prints the year to be a leap year.

Sample I/O 4:

```
Enter a Year: 2004
YEAR- 2004 is a leap year
```

For the year 2004, it is divisible by 4 and not by 100 thereby satisfying the first part of OR operator and hence goes to the true part of if statement that prints the year to be a leap year.

Problem Number: 4

Problem Statement: Write a C program to calculate the commission for sales as per the sales amount given below.

if sales <= 500	commission is 5%
if sales > 500 but <= 2000	commission is Rs. 35 plus 10 % above Rs.500
if sales > 2000 but <= 5000	commission is Rs. 185 plus 12% above Rs. 2000
if sales > 5000	commission is 12.5%

Solution:

```
//4
#include <stdio.h>
int main()
{
   //declaring variable
   float salesAmt, commission;
   printf("Enter your Sales Amount: ");
   scanf("%f", &salesAmt);

   //calculating commission
   if(salesAmt<=500)
   commission = 0.05*salesAmt;
   if(salesAmt<=2000 && salesAmt>500)
   commission = 35 + (salesAmt-500)*0.10;
   if(salesAmt<=5000 && salesAmt>2000)
   commission = 185 + (salesAmt-2000)*0.12;
   if(salesAmt>5000)
   commission = salesAmt*0.125;

   //displaying commission
   printf("Commission on Your Sales : %f", commission);
   return 0;
}
```

Output Discussion:

```
Enter your Sales Amount: 2500
Commission on Your Sales : 245.000000
```

On passing Rs 2500 as Sales Amount, the program finds out the commission that user will get and its 245 in this case i.e., $185 + (500 * 12\%) = 245$

Problem Number: 5

Problem Statement: Write a C program to find the average of best three marks from the given four test marks. [All the marks will be user input]

Solution:

```
//5
#include <stdio.h>
int main() {
   //variable declaration
   int m1, m2, m3, m4, sum = 0;
   float avg;
   //accepting values
   printf("Enter Marks of 1st Subject: ");
   scanf("%d", &m1);
   printf("Enter Marks of 2nd Subject: ");
   scanf("%d", &m2);
   printf("Enter Marks of 3rd Subject: ");
   scanf("%d", &m3);
   printf("Enter Marks of 4th Subject: ");
   scanf("%d", &m4);
   //calculating the sum of best 3 subjects
   if(m1==m2||m2==m3||m3==m4||m4==m1){
       if(m1==m2)
       sum = m1+m3+m4;
       if(m2==m3)
       sum = m1+m2+m4;
       if(m3==m4)
       sum = m1+m2+m3;
       if(m4==m1)
       sum = m2+m3+m4;
   }
   else{
    if((m1<m2) && (m1<m3) && (m1<m4))
        sum = m2+m3+m4;
    else if((m2<m1) && (m2<m3) && (m2<m4))
        sum = m1+m3+m4;
    else if((m3<m2) && (m3<m1) && (m3<m4))
        sum = m1+m2+m4;
    else if((m4<m2) && (m4<m3) && (m4<m1))
        sum = m1+m2+m3;
   }

    avg = sum/3;
    printf("Average of Best three subjects: %f", avg);
}
```

Output Discussion:

Sample I/O 1:

```
Enter Marks of 1st Subject: 50
Enter Marks of 2nd Subject: 50
Enter Marks of 3rd Subject: 50
Enter Marks of 4th Subject: 60
Average of Best three subjects: 53.000000
```

On passing same values for 3 subjects i.e., 50 and 60 for the fourth subject we get back the desired output i.e., 53, as the average of best three subjects.

Sample I/O 2:

```
Enter Marks of 1st Subject: 80
Enter Marks of 2nd Subject: 90
Enter Marks of 3rd Subject: 12
Enter Marks of 4th Subject: 34
Average of Best three subjects: 68.000000
```

On passing 80, 90, 12 and 34, the program finds out the best three scored subjects i.e., 80, 90 and 34 (in this case) returning 204 as its sum and then dividing it by 3 to get the average marks i.e., 68 henceforth satisfying our result.

Problem Number: 6

Problem Statement: Write a C program to evaluate:

$f(x) = 1 + x/\sqrt{1+x^2}$	$if\ x < 0$
$f(x) = 0$	$if\ x = 0$
$f(x) = 1 - x/\sqrt{1-x^2}$	$if\ x > 0$

Solution:

```
//6
#include <stdio.h>
#include <math.h>
int main()
{
   //declaring variables
   int x;
   float ans;

   //accepting the value of x
   printf("Enter the value of x: ");
   scanf("%d", &x);

   //calculating the value of x
   if(x<0)
   ans = 1+x/(sqrt(1+x*x));
   else if(x>0)
   ans = 1-x/(sqrt(1-x*x));
   else if(x==0)
   ans=0;

   //displaying answer
   printf("Solution : %f", ans);
}
```

Output Discussion:

```
Enter the value of x: -5
Solution : 0.019419
```

On passing -5 as the value of x, the program displays the output after solving the given equation i.e., 0.019419.