

1. WAP in C to check whether an input character is alphabet, digit or special symbol?**Source Code:**

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

int main() {
    char ch;
    int asciiCode;
    printf("Enter any character: ");
    scanf("%c", &ch);
    asciiCode = ch;
    // Check character is number.
    if (asciiCode >= 48 && asciiCode <= 57) {
        printf("Character '%c' is an number.", ch);
    }
    // Check character is alphabet.
    else if ((asciiCode >= 65 && asciiCode <= 90) || (asciiCode >= 97 && asciiCode <= 122)) {
        printf("Character '%c' is an Alphabet.", ch);
    }
    // Check character is special symbol.
    else {
        printf("Character '%c' is an special symbol", ch);
    }
    return 0;
}
```

Output:

```
[F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q1.exe]
Enter any character: 5
Character '5' is an number.
Process returned 0 (0x0)  execution time : 15.858 s
```

```
[F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q1.exe]
Enter any character: S
Character 'S' is an Alphabet.
Process returned 0 (0x0)  execution time : 4.406 s
```

```
[F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q1.exe]
Enter any character: $
Character '$' is an special symbol
Process returned 0 (0x0)  execution time : 4.203 s
```

2. WAP in C to check whether a triangle is valid or not by providing all the sides. If valid then check whether the triangle is equilateral, isosceles, or scalene?

Source Code:

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

int main(){
    int side1, side2, side3;
    printf("Enter three sides of the triangle:");
    scanf("%d%d%d", &side1, &side2, &side3);
    // Triangle is valid.
    if(side1 + side2 > side3 && side1 + side3 > side2 && side2 + side3 > side1)
    {
        // Check Equilateral Triangle.
        if(side1 == side2 && side1 == side3 && side2 == side3){
            printf("The triangle you entered is a Equilateral Triangle.");
        }
        // Check Isosceles Triangle.
        else if(side1 == side2 || side1 == side3 || side2 == side3){
            printf("The triangle you entered is a Isosceles Triangle.");
        }
        // Check Scalene Triangle.
        else{
            printf("The triangle you entered is a Scalene Triangle.");
        }
    }
    // Triangle is Invalid.
    else
    {
        printf("The triangle is invalid!");
    }
    getch();
    return 0;
}
```

Output:

```
[F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q2.exe]
Enter three sides of the triangle:10 10 10
The triangle you entered is a Equilateral Triangle.
```

```
[F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q2.exe]
Enter three sides of the triangle:10 10 15
The triangle you entered is a Isosceles Triangle.
```

3. WAP in C to enter the marks in three subjects for a student and find percentage and Scholarship. Rules for the semester scholarship are as follows:

Below 50 = 0
51 to 60 = 5%
61 to 74 = 20%
75 to 84 = 30%
85 & above = 50%

Semester fee is Rs. 125000/- print the net amount payable.

Ask the user to enter marks in 5 subjects and display the corresponding grade.

Source Code:

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

int main() {
    float marks[5], total = 0, percentage, scholarship = 0, fee = 125000, netAmount;
    // Input marks for 5 subjects
    printf("Enter marks of 5 subjects (out of 100):\n");
    for(int i = 0; i < 5; i++) {
        printf("Subject %d: ", i + 1);
        scanf("%f", &marks[i]);
        total += marks[i];
    }

    // Calculate percentage
    percentage = total / 5;
    // Determine scholarship percentage based on rules
    if (percentage < 50) {
        scholarship = 0;
    }
    else if (percentage >= 51 && percentage <= 60) {
        scholarship = 0.05 * fee;
    }
    else if (percentage >= 61 && percentage <= 74) {
        scholarship = 0.20 * fee;
    }
    else if (percentage >= 75 && percentage <= 84) {
        scholarship = 0.30 * fee;
    }
    else if (percentage >= 85) {
        scholarship = 0.50 * fee;
    }

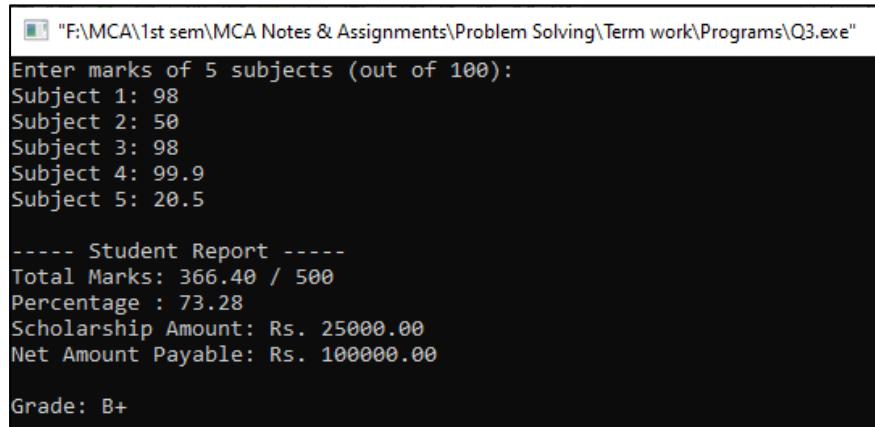
    // Calculate net payable amount
    netAmount = fee - scholarship;

    // Display results
    printf("\n----- Student Report -----");
}
```

```
printf("Total Marks: %.2f / 500\n", total);
printf("Percentage : %.2f%\n", percentage);
printf("Scholarship Amount: Rs. %.2f\n", scholarship);
printf("Net Amount Payable: Rs. %.2f\n", netAmount);

// Display Grade
printf("\nGrade: ");
if (percentage >= 90)
    printf("A+\n");
else if (percentage >= 80)
    printf("A\n");
else if (percentage >= 70)
    printf("B+\n");
else if (percentage >= 60)
    printf("B\n");
else if (percentage >= 50)
    printf("C\n");
else
    printf("F (Fail)\n");

return 0;
}
```

Output:

```
"F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q3.exe"
Enter marks of 5 subjects (out of 100):
Subject 1: 98
Subject 2: 50
Subject 3: 98
Subject 4: 99.9
Subject 5: 20.5

----- Student Report -----
Total Marks: 366.40 / 500
Percentage : 73.28
Scholarship Amount: Rs. 25000.00
Net Amount Payable: Rs. 100000.00

Grade: B+
```

4. WAP in C to check whether an input year is leap-year or not?**Source Code:**

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

int main() {
    int year;
    printf("Enter any year to check whether it is a leap year or not: ");
    scanf("%d", &year);
    if(year%4 == 0 || (year%100 == 0 && year%400 == 0 )) {
        printf("The year %d is a leap year", year);
    }
    else {
        printf("The year %d is not a leap year", year);
    }
    return 0;
}
```

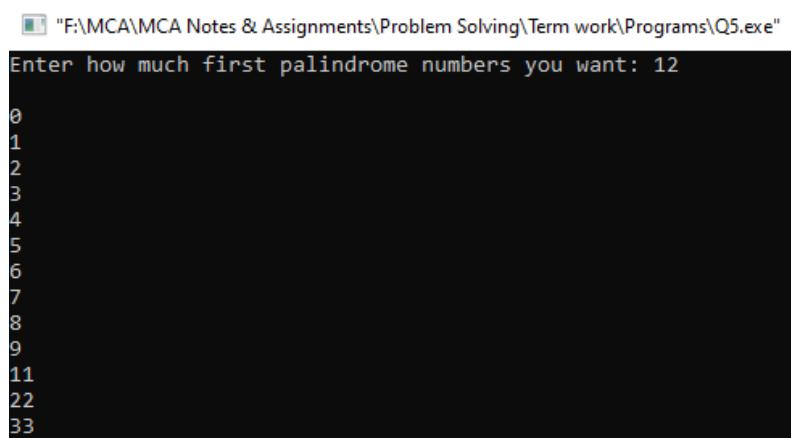
Output:

```
"F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q4.exe"
Enter any year to check whether it is a leap year or not: 2000
The year 2000 is a leap year
```

```
"F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q4.exe"
Enter any year to check whether it is a leap year or not: 2025
The year 2025 is not a leap year
```

5. Write a program in C to print first n palindrome number.**Source Code:**

```
#include<stdio.h>
#include<conio.h>
int checkNumberIsPalindrome(int n){
    int num = n, reversed = 0, remainder;
    while(num != 0){
        remainder = num%10;
        reversed = reversed * 10 + remainder;
        num = num/10;
    }
    if(reversed == n){ return 1; }
    else{ return 0; }
}
int main(){
    int size, count = 0, num = 0, result;
    printf("Enter how much first palindrome numbers you want: ");
    scanf("%d", &size);
    while(count <= size){
        result = checkNumberIsPalindrome(num);
        if(result != 0){
            printf("\n%d", num);
            count++;
        }
        num++;
    }
    return 0;
}
```

Output:

```
F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q5.exe"
Enter how much first palindrome numbers you want: 12
0
1
2
3
4
5
6
7
8
9
11
22
33
```

6. Write a program in C to convert a Decimal number into Binary, Octal and Hexadecimal number.**Source Code:**

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
int main(){
    int number, rem, base, choice, index = -1;
    char result[100], ch;
    printf("Enter any decimal number: ");
    scanf("%d", &number);
    printf("1. Convert into Binary \n");
    printf("2. Convert into Octal \n");
    printf("3. Convert into HexaDecimal \n");
    printf("Please enter your choice: ");
    scanf("%d", &choice);
    switch(choice){
        case 1:
            base = 2; break;
        case 2:
            base = 8; break;
        case 3:
            base = 16; break;
        default:
            printf("Invalid choice!!"); exit(0);
    }
    while(number != 0){
        rem = number%base;
        switch(rem){
            case 10:
                ch = 'A'; break;
            case 11:
                ch = 'B'; break;
            case 12:
                ch = 'C'; break;
            case 13:
                ch = 'D'; break;
            case 14:
                ch = 'E'; break;
            case 15:
                ch = 'F'; break;
            default:
                ch = rem+48; break;
        }
        index++;
        result[index] = ch;
        number = number/base;
    }
}
```

```
for(int i = index; i >= 0; i--)  
{  
    printf("%c", result[i]);  
}  
return 0;  
}
```

Output:

The image displays three separate terminal windows, each showing the execution of a C program named Q6.exe. Each window has a title bar reading "F:\MCA\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q6.exe".

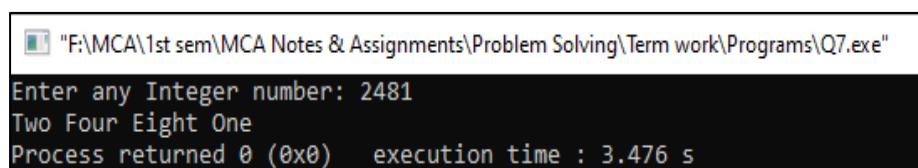
- Terminal 1 (Input 20):** The user enters "Enter any decimal number: 20". The program then lists three conversion options: 1. Convert into Binary, 2. Convert into Octal, and 3. Convert into HexaDecimal. The user chooses option 1 and the output is "10100".
- Terminal 2 (Input 150):** The user enters "Enter any decimal number: 150". The program lists the same three conversion options. The user chooses option 2 and the output is "226".
- Terminal 3 (Input 8333):** The user enters "Enter any decimal number: 8333". The program lists the same three conversion options. The user chooses option 3 and the output is "208D".

7. Write a C program to print the digits of a number in words.**Sample example of Output will be:****Enter any number: 2481****Two Four Eight One****Source Code:**

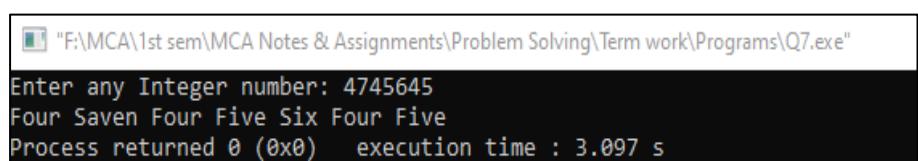
```
#include<stdio.h>
#include<conio.h>

int main(){
    char ch[10][10] = {"Zero", "One", "Two", "Three", "Four", "Five", "Six", "Saven", "Eight", "Nine"};
    int digits[50];
    int number, index = -1;
    printf("Enter any Integer number: ");
    scanf("%d", &number);

    while(number != 0){
        index++;
        digits[index] = number%10;
        number = number/10;
    }
    for(int i = index; i>=0; i--){
        printf("%s ", ch[digits[i]]);
    }
    return 0;
}
```

Output:

```
"F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q7.exe"
Enter any Integer number: 2481
Two Four Eight One
Process returned 0 (0x0)  execution time : 3.476 s
```

```
"F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q7.exe"
Enter any Integer number: 4745645
Four Saven Four Five Six Four Five
Process returned 0 (0x0)  execution time : 3.097 s
```

8. Write a C program to compute the sum of first N terms for the following series.

- (i) $S=1 + 2^2/2! + 3^3/3! + 4^4/4! + \dots$
- (ii) $S=1 + 2/2! + 3^2/3! + 4^3/4! + \dots$
- (iii) $S=1 - 2! + 3! - 4! + 5! - 6! + \dots$

(i) $S=1 + 2^2/2! + 3^3/3! + 4^4/4! + \dots$

Source Code:

```
#include<stdio.h>
#include<conio.h>
int fact(int num){
    if(num <= 1){
        return num;
    }
    else{
        return num * fact(num-1);
    }
}

int power(int num, int pow){
    int result = num;
    if(pow == 0){
        return 1;
    }
    for(int i=2; i <= pow; i++){
        result = result * num;
    }
    return result;
}

int main(){
    int number;
    float sum = 0, term;
    printf("Enter any number of terms: ");
    scanf("%d", &number);
    for(int i = 1; i <= number; i++){
        term = (float) power(i, i) / fact(i);
        sum += term;
    }
    printf("The sum of the series is: %f", sum);
    return 0;
}
```

Output:

```
"F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q8i.exe"
Enter any number of terms: 4
The sum of the series is: 18.166668
Process returned 0 (0x0)   execution time : 2.622 s
```

(ii) $S=1 + 2/2! + 3^2/3! + 4^3/4! + \dots$

Source Code:

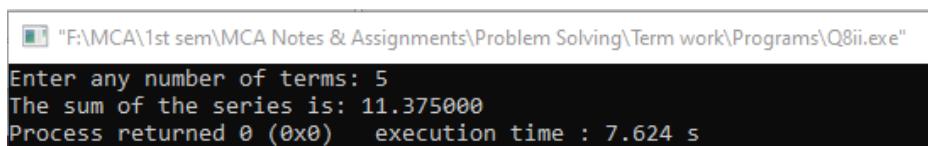
```
#include<stdio.h>
#include<conio.h>

int fact(int num){
    if(num <= 1){
        return num;
    }
    else{
        return num * fact(num-1);
    }
}

int power(int num, int pow){
    if(pow == 0){
        return 1;
    }
    int result = num;
    for(int i=2; i<=pow; i++){
        result = result * num;
    }
    return result;
}

int main(){
    int number;
    float sum = 0, term;
    printf("Enter any number of terms: ");
    scanf("%d", &number);
    for(int i = 1; i<=number; i++){
        term = (float)power(i, i-1)/fact(i);
        sum += term;
    }
    printf("The sum of the series is: %f", sum);
    return 0;
}
```

Output:



```
[F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q8ii.exe]
Enter any number of terms: 5
The sum of the series is: 11.375000
Process returned 0 (0x0)   execution time : 7.624 s
```

(iii) $S=1 - 2! + 3! - 4! + 5! - 6! + \dots$

Source Code:

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

int fact(int num){
    if(num <= 1){
        return num;
    }
    else{
        return num * fact(num-1);
    }
}

int main(){
    int number, sum = 0, term;
    printf("Enter any number of terms: ");
    scanf("%d", &number);
    for(int i = 1; i<=number; i++){
        term = fact(i);
        if(i%2 == 0){
            sum -= term;
        }
        else{
            sum += term;
        }
    }
    printf("The sum of the series is: %d", sum);
    return 0;
}
```

Output:

```
[F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q8iii.exe]
Enter any number of terms: 5
The sum of the series is: 101
Process returned 0 (0x0)   execution time : 2.165 s
```

```
[F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q8iii.exe]
Enter any number of terms: 6
The sum of the series is: -619
Process returned 0 (0x0)   execution time : 1.998 s
```

9. Write a program in C to find out the highest common factor (HCF) and lowest common multiple (LCM) of two number.

Source Code:

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

int calculateLCM(int num1, int num2){
    int lcm, large = num1>num2?num1:num2;
    for(int i = large; i <= num1*num2; i+=large){
        if(i%num1 == 0 && i%num2 == 0){
            lcm = i;
            break;
        }
    }
    return lcm;
}

int calculateHCF(int num1, int num2){
    int hcf, small = num1<num2?num1:num2;

    for(int i = small; i >= 1; i--){
        if(num1%i == 0 && num2%i == 0){
            hcf = i;
            break;
        }
    }
    return hcf;
}

int main(){
    int num1, num2, lcm, hcf;
    printf("Enter any two integer numbers to calculate LCM and HCF: ");
    scanf("%d%d", &num1, &num2);
    lcm = calculateLCM(num1, num2);
    hcf = calculateHCF(num1, num2);
    printf("LCM of given two numbers is: %d\n", lcm);
    printf("HCF of given two numbers is: %d\n", hcf);
    return 0;
}
```

Output:

```
F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q9.exe
Enter any two integer numbers to calculate LCM and HCF: 4 6
LCM of given two numbers is: 12
HCF of given two numbers is: 2

Process returned 0 (0x0)  execution time : 7.031 s
Press any key to continue.
```

10. Write C code to print the following patterns:

(i)

```

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 3 2 1
1 2 3 2 1
1 2 1
1

```

(i) Source Code:

```

#include<stdio.h>
#include<conio.h>
int main(){
    int n, num;
    printf("Enter number of rows: ");
    scanf("%d", &n);

    for(int i=1; i<=n; i++){
        for(int s=1; s<=n-i; s++){
            printf(" ");
        }
        num = 0;
        for(int j=1; j<=2*i-1; j++){
            if(j <= i){
                num++;
            }
            else{
                num--;
            }
            printf("%d ", num);
        }
        printf("\n");
    }

    for(int i=1; i<n; i++){
        for(int s=1; s<=i; s++){
            printf(" ");
        }
        num = 0;
        for(int j=1; j<=2*n-2*i-1; j++){
            if(j<=n-i){
                num++;
            }
            else{

```

(ii)

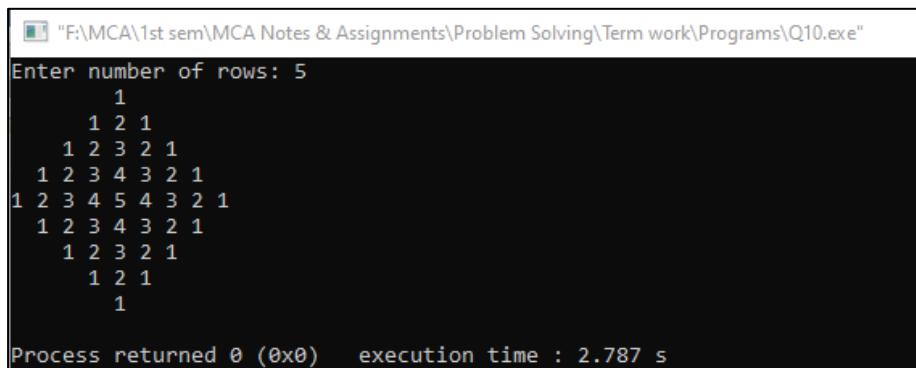
```

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

```

```
    num--;
}
printf("%d ", num);
}
printf("\n");
}

return 0;
}
```

Output:

```
F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q10.exe
Enter number of rows: 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
 1 2 3 4 3 2 1
 1 2 3 2 1
 1 2 1
 1

Process returned 0 (0x0)  execution time : 2.787 s
```

(ii) Source Code:

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

int main(){
    int n, num;
    printf("Enter the size of pattern: ");
    scanf("%d", &n);

    for(int i=1; i<=n; i++){
        for(int s=1; s<=n-i; s++){
            printf(" ");
        }
        num = n + 65;
        for(int j=1; j<=2*i-1; j++){
            if(j <= i){
                num--;
            }
            else{
                num++;
            }
            printf("%c ", num);
        }
        printf("\n");
    }

    for(int i=1; i<n; i++){
        for(int s=1; s<=i; s++){
            printf(" ");
        }
        num = n + 65;
        for(int j=1; j<=2*n-2*i-1; j++){
            if(j<=n-i){
                num--;
            }
            else{
                num++;
            }
            printf("%c ", num);
        }
        printf("\n");
    }
}

return 0;
}
```

```
"F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q10ii.exe"
Enter the size of pattern: 5
      E
      E D E
      E D C D E
      E D C B C D E
      E D C B A B C D E
      E D C B C D E
      E D C D E
      E D E
      E
```

11. WAP in C to input time in hour, minutes, and seconds. Display it in proper format. Then input two time-instance and add them and display the added time again in proper format.

First time is 10:12:34

Second time 21:21:59

Added time 31:34:33

Source Code:

```
#include<stdio.h>
#include<conio.h>
struct Time{
    int hours;
    int minutes;
    int seconds;
};

int main(){
    struct Time firstTime, secondTime, addedTime;
    int carry = 0;
    printf("Enter the first time in hour, minute and seconds: ");
    scanf("%d%d%d", &firstTime.hours, &firstTime.minutes, &firstTime.seconds);
    printf("Enter the second time in hour, minute and seconds: ");
    scanf("%d%d%d", &secondTime.hours, &secondTime.minutes, &secondTime.seconds);
    // Adding times.
    addedTime.seconds = firstTime.seconds + secondTime.seconds;
    if(addedTime.seconds >= 60){
        addedTime.seconds -= 60;
        carry = 1;
    }
    addedTime.minutes = firstTime.minutes + secondTime.minutes + carry;
    carry = 0;
    if(addedTime.minutes >= 60){
        addedTime.minutes -= 60;
        carry = 1;
    }
    addedTime.hours = firstTime.hours + secondTime.hours + carry;
    carry = 0;
    printf("\nFirst Time- %d:%d:%d", firstTime.hours, firstTime.minutes, firstTime.seconds);
    printf("\nLast Time- %d:%d:%d", secondTime.hours, secondTime.minutes, secondTime.seconds);
    printf("\nAdded Time- %d:%d:%d", addedTime.hours, addedTime.minutes, addedTime.seconds);
    return 0;
}
```

```
F:\MCA\1st sem\MCA Notes & Assignments\Problem Solving\Term work\Programs\Q11.exe
Enter the first time in hour, minute and seconds: 10 12 34
Enter the second time in hour, minute and seconds: 21 21 59

First Time- 10:12:34
Last Time- 21:21:59
Added Time- 31:34:33
Process returned 0 (0x0)  execution time : 39.980 s
Press any key to continue.
```