Batch: C1-2	**Roll No.: 16010123036**
Experiment / assignment / tutorial No. 3	
Grade: AA / AB / BB / BC / CC / CD /DD	
Signature of the Staff In-charge with date	

TITLE: Write a program in C to demonstrate use of looping control structures

AIM: Write a menu driven program for following option

a. To find whether a number is palindrome or not. (e.g. 1221 is palindrome) using while loop

b. To calculate the sum of the Fibonacci series up to 'n' terms(use do-while loop only)

c. Write a program in C to make such a pattern like a right angle triangle with a number which will repeat a number in a row. (Pattern is given below)

Expected OUTCOME of Experiment:

Apply basic concepts of C programming for problem solving.(CO1 and CO2).

Books/ Journals/ Websites referred:

1. Programming in C, second edition, Pradeep Dey and Manas Ghosh, Oxford University Press.
2. Programming in ANSI C, fifth edition, E Balagurusamy, Tata McGraw Hill.
3. Introduction to programming and problem solving , G. Michael Schneider ,Wiley India edition.

Problem Definition:

The program accepts a choice from the user using a switch case statement and generates output accordingly.

Choice a: The program checks whether a given numbered by user is palindrome or not. If a number remains same, even if we reverse its digits then the number is known as palindrome number. For example, 12321 is a palindrome number because it remains same if we reverse its digits.

Choice b: Sum of Fibonacci series up to n terms will be generated. Fibonacci series is a series in which each number is the sum of the last two preceding numbers. The first two terms of a Fibonacci series are 0 and 1.(use while loop only)

Example:

Input: n = 5

Output: 7

Explanation: 0 + 1 + 1 + 2 + 3 = 7

Choice c: Write a program in C to make such a pattern like right angle triangle with a number which will repeat a number in a row.
The pattern like :
1
22
333
4444

Algorithm:

1. Start

2. Define a function palin():

   a. Declare variables n, n1, k, ans.

   b. Prompt the user to enter a number to check for Palindrome.

   c. Read and store the entered number in n.

   d. Assign n to n1 and initialize k and ans to 0.

e. Enter a while loop until n is greater than 0:

i. Extract the last digit of n and store it in k.

ii. Update ans by multiplying it by 10 and adding k.

iii. Divide n by 10 to remove the last digit.

f. Check if ans is equal to n1:

i. If true, print "The Number is a Palindrome".

ii. If false, print "The Number is not a Palindrome".

3. Define a function fibo():

a. Declare variables a, b, range, c, sum.

b. Prompt the user to enter the range of the Fibonacci series.

c. Read and store the entered range in the variable range.

d. Initialize a, b, and sum to 0.

e. Enter a while loop until a is less than or equal to the range:

i. Print the value of a.

ii. Add a to the sum.

iii. Update c as the sum of a and b.

iv. Update a and b with the values of b and c, respectively.

f. Print the sum of the Fibonacci series.

5. Define a function triangle():

a. Declare a variable a.

b. Prompt the user to enter a value for a.

c. Read and store the entered value in the variable a.

d. Use nested loops to print a triangle pattern with each row containing numbers from 1 to the row number.

7. In the main function:

a. Print student information (Name and Roll No).

b. Declare a variable n and prompt the user to enter a choice.

c. Read and store the entered choice in the variable n.

d. Use a switch case to call the appropriate function based on the user's choice:

i. If choice is 1, call palin().

ii. If choice is 2, call fibo().

iii. If choice is 3, call triangle().

iv. If choice is not 1, 2, or 3, print an error message.

8. End.

Implementation details:

```c
#include <stdio.h>
void palin()
{
    int n;
    printf("Enter a num to check for Palindrome: ");
    scanf("%d",&n);
    int n1=n,k=0,ans=0;
    while(n>0)
    {
        k=n%10;
        ans=ans*10+k;
        n=n/10;
    }
    if(ans==n1)
    printf("The Number is a Palindrome");
    else
    printf("The Number is not a Palindrome");
}
void fibo()
{
    int i, n, first = 0, second = 1, sum = 1, third;

   printf ("Enter the range \n");
   scanf( "%d", &n);
   for(i = 2; i < n; i++){
     third = first + second;
     sum = sum + third;
     first = second;
     second = third;
   }

   printf("Sum of Fibonacci series for given range is %d", sum);
}
```

```c
void triangle()
{
    int a;
    printf("Enter a: ");
    scanf("%d",&a);
    for (int i = 0; i < a; i++)
    {
        for (int j = 0; j <= i; j++)
        {
            printf("%d ",i+1);
        }
        printf("\n");
    }

}
int main()
{
    printf("Name: Amandeep Singh\nRoll no: 16010123036\n");
    int n=0;
    printf("Enter any one of the following choices\n");
    printf("1. Palindrome\n");
    printf("2. Fibonacci\n");
    printf("3. Enter a number that you want as the height of triangle\n");
    scanf("%d",&n);
    switch (n)
    {
    case 1:
        palin();
        break;
    case 2:
        fibo();
        break;
    case 3:
        triangle();
        break;
    default:
    printf("Enter a correct option only");
        break;
    }
    return 0;
}
```

Output(s):

```
Name: Amandeep Singh
Roll no: 16010123036
Enter any one of the following choices
1. Palindrome
2. Fibonacci
3. Enter a number that you want as the height of triangle
1
Enter a num to check for Palindrome: 1221
The Number is a Palindrome
```

```
Name: Amandeep Singh
Roll no: 16010123036
Enter any one of the following choices
1. Palindrome
2. Fibonacci
3. Enter a number that you want as the height of triangle
2
Enter the range
7
Sum of Fibonacci series for given range is 20
```

```
Name: Amandeep Singh
Roll no: 16010123036
Enter any one of the following choices
1. Palindrome
2. Fibonacci
3. Enter a number that you want as the height of triangle
3
Enter a: 6
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
6 6 6 6 6 6
```

Conclusion:
In conclusion, this experiment effectively demonstrated the use of looping control structures in C programming. The menu-driven program covered tasks such as checking for palindrome numbers, calculating Fibonacci series sums, and creating a right-angled triangle pattern. The experiment successfully applied basic C programming concepts, aligning with Course Outcomes 1 and 2. Overall, it provided practical experience in problem-solving and algorithmic design, contributing to the development of strong programming skills.

Post Lab Descriptive Questions

- Write a program to enter numbers till the user wants. At the end it should display the count of positive, negative and zeros entered.

```c
#include <stdio.h>

int main() {
    int num;
    int positiveCount = 0, negativeCount = 0, zeroCount = 0;
    char choice;
    do {
        printf("Enter a number: ");
        scanf("%d", &num);
        if (num > 0) {
            positiveCount++;
        } else if (num < 0) {
            negativeCount++;
        } else {
            zeroCount++;
        }
        printf("Do you want to enter another number? (y/n): ");
        scanf(" %c", &choice);
    } while (choice == 'y' || choice == 'Y');
    printf("\nCount of Positive Numbers: %d\n", positiveCount);
    printf("Count of Negative Numbers: %d\n", negativeCount);
    printf("Count of Zeroes: %d\n", zeroCount);
    return 0;
}
```

```
Enter a number: 5
Do you want to enter another number? (y/n): y
Enter a number: -2
Do you want to enter another number? (y/n): y
Enter a number: 0
Do you want to enter another number? (y/n): y
Enter a number: 2
Do you want to enter another number? (y/n): y
Enter a number: 0
Do you want to enter another number? (y/n): n

Count of Positive Numbers: 2
Count of Negative Numbers: 1
Count of Zeroes: 2
```

- Write a program to print all the ASCII values and their equivalent characters using a while loop. The ASCII values vary from 0 to 255.

```c
#include <stdio.h>

int main() {
    int asciiValue = 0;

    printf("ASCII Values and their Equivalent Characters:\n");

    while (asciiValue <= 255) {
        printf("ASCII Value: %d, Character: %c\n", asciiValue, asciiValue);
        asciiValue++;
    }

    return 0;
}
```

Date: _____ **Signature of faculty in-charge**