LAB 4

1. A certain grade of steel is graded according to the following conditions:
   (i) Hardness must be greater than 50 (ii) Carbon content must be less than 0.7 (iii) Tensile strength must be greater than 5600
   The grades are as follows:
   Grade is 10 if all three conditions are met Grade is 9 if conditions (i) and (ii) are met Grade is 8 if conditions (ii) and (iii) are met Grade is 7 if conditions (i) and (iii) are met Grade is 6 if only one condition is met Grade is 5 if none of the conditions are met Write a program, which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.
2. Print the maximum value of an unsigned int using One's Compliment (~) Operator in C.
3. Write a C program that reads an integer n from the keyboard and prints out the factorial of n.
4. Given the coordinates (x, y) of a center of a circle and it's radius, write a program which will determine whether a point lies inside the circle, on the circle or outside the circle.
5. Write a C program that calculates the sum of integers between 9 and 300 inclusive which are divisible by 7 but not divisible by 63.
   Expected output:
   Sum of integers between 9 & 300 that are divisible by 7 but not by 63 is 5684
6. Write a program to print all palindrome numbers between 1 to 100
7. Write a C program to generate the first n terms of Fibonacci sequence.
8. Write a C program to enter numbers until the user wants. At the end, display the total number of positive, negative and zeros entered.
9. Write a C program to read an integer and print its multiplication table.
10. Write a C program that accepts a positive integer n less than 50 from the terminal and prints out the sum 14 +24 +44 +74 +114 +⋯+m4, where m is less than or equal to n. If the input is outside the range, the program terminates with appropriate message.

    Test data and expected output:
    Enter a +ve integer less than 50: 0 Invalid input
    Enter a +ve integer less than 50: 39 Sum of the series is 2898549
    Enter a +ve integer less than 50: 0 Invalid input

11. Write a C program that asks the user to enter a positive integer n less than 10. If the user enters an invalid input, the code repeats the command of asking the user

for a positive integer less than 10 until the input is correct. It then prints out the sum of the first n terms of the series 14 + 24 + 44 + 74 + 114 +⋯.

Test data and expected output:
Enter a +ve integer less than 10: 0
Invalid input, enter again: 4
Sum of the 4 terms of the series is 2674
Enter a +ve integer less than 10: 11
Invalid input, enter again: 5
Sum of the 5 terms of the series is 17315

Test data and expected output:
Enter an integer:6 Factorial of 6 is 720
Enter an integer:-3 n must be non-negative

12. Write a C program that accepts a positive integer n and a real number x from the keyboard and prints out the sum of the n terms of the series

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$$

Test data and expected output:
Enter the value of n & x:0 1.0
Number of terms must be +ve
Enter the value of n & x:5 0.5
Sum of the series at x=0.50 with 5 terms is 0.47943

13. Write a C program that accepts a non-negative integer from the keyboard and checks whether the entered number is a palindrome number.
Test data and expected output:
Enter a non-negative integer:9
9 is a palindrome number
Enter a non-negative integer:246642
246642 is a palindrome number
Enter a non-negative integer:24312
24312 is NOT a palindrome number