Assignment 2: Bit Stuffing and Destuffing

Objective:

To understand and implement **bit stuffing and destuffing**, which are used in data link layer protocols (e.g., HDLC) for frame synchronization.

Part 1: Theoretical Questions

1. Explain the concept of **bit stuffing**. Why is it necessary in communication protocols?

2. Differentiate between **bit stuffing** and **byte stuffing** with examples.

3. Consider the following bit stream:
   01111110 11011111011111010

   o Apply **bit stuffing** (assuming '011111' is the flag sequence).

   o Perform **bit destuffing** to retrieve the original bit sequence.

4. What are the advantages and disadvantages of bit stuffing?

Part 2: Practical Implementation

Write a program (in Python, C, or Java) to implement:

1. **Bit stuffing**: Given an input bit stream, insert a '0' after every five consecutive '1's.

2. **Bit destuffing**: Remove the extra '0' from the stuffed bit stream to retrieve the original data.

Sample Input:

Original Data: 11011111011111010

Bit Stuffed Data:

1101111101101111010

Bit Destuffed Data:

11011111011111010 (Same as the original)