MORSE CODE - BINARY COMMUNICATION

__ _._. _... _._.

PROBLEM STATEMENT

Developed in 1837 by the American artist Samuel F. B. Morse, Morse code is a character encoding scheme based on standard sequences of two different signal durations (dots and dashes). You are required to develop a Morse code transmission and reception system over a single wire channel using a set of ICs and microcontrollers.

TASKS AND CONSTRAINTS

In this problem you are supposed to complete the following tasks with the following constraints -

1. A dot is to be represented by a digital '0' and a dash by a digital '1'. Example - 01 for A.
2. ITU standard for Morse code must be followed.
3. At most two buttons 'must' be used for input and transmission.
4. Since Morse code contains maximum 5-bit information, design a 5-bit(minimum) shift register/flip flops to store the current letter.
5. The clock 'must' be provided by a 555-timer circuit or other electronic circuits (microcontroller pins as clocks are not to be used).
6. In one clock cycle, a bit is stored into the register. You can come up with creative ways to store the information (or add some more information) so that it can be efficiently decoded in the receiver.
   For Example: Two presses for 1 and a single press for 0. However, the 'information stored' (other than additional bits before or after the Morse letter for decoding) in the register should be in the format as given in point 1.
   No additional data can be stored between the information i.e. If X represents additional bits, XX01XX is valid for A in point 1 X0X1XX is invalid for A in point 1.
7. Once the data is taken, the other button can be used as the transmission trigger.
8. The data is transmitted along a single wire to the decoder module, which is a microcontroller (like Arduino) for decoding. The decoded data must be displayed on an LCD screen.

JUDGING CRITERIA

1. All the participating hostels start with 400 points.
2. Each hostel will be provided with a sentence (~same length for each hostel).

3. For each extra memory bit used (> 5 bits) for additional data, a deduction of 40 points will be done.
4. For each extra clock cycle used for a letter, a deduction of 60 points will be done.
5. No deduction will be done for the clock cycles required for the additional bits before and after the information.
6. No deduction will be done for the steps between letters and words.
7. If errors are found in any of the steps during the demonstration, a deduction of 80 points will be done for the step regardless of the type of error. The step must be repeated again after deduction.

   Examples for errors: Error in data storage due to push button bouncing error, erroneous jumps in clock cycles, missing clock cycles etc.
8. Deduction of 20 points for each bit error in decoding.

The hostels will be sorted according to the final points after deduction and the GC points will be distributed accordingly. For hostels with same number of points, another test sentence will be set and the one with higher total deduction will be shifted below. For hostels with negative marks, participation points won't be provided.