

Overview

In this unit your students should:

- understand the meaning of the terms transparent and frozen as applied to a latch
- know how to assemble a latch from a bistable and logic system
- learn how to use latches for timed capture of binary words

This should not require more than 2 hours of class time.

Hour	Suggested Activity
1	<p>You could start by quickly testing students' knowledge of bistables made from NAND and NOR gates.</p> <p>Get them to work through the Latches exercises. Allow them to consult the text book if they need to.</p> <p>Allow them to start the Latches practical.</p> <p>Ask them to finish off steps 2 and 3 of the practical before the next session.</p>
2	<p>Launch them straight into step 4 of the Latches practical. Students who have not arrived with a design for the logic system could do question 1 on page 80 of the text book instead.</p> <p>As they successfully demonstrate their latch, allow them to move straight on to the Random numbers practical.</p> <p>Ask them to answer question 2 on page 80 of the text book before the next session.</p>

Model Answers

1 (a) The signal at D is transferred to Q when EN is high.

When EN goes low, the state of Q is frozen at its value at that instant.

(b)

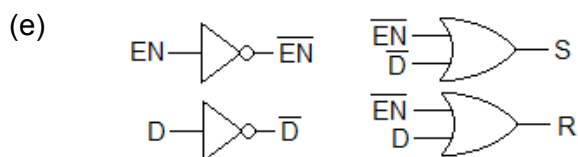
S	R	Q
1	1	1 or 0
1	0	0
0	1	1

(c)

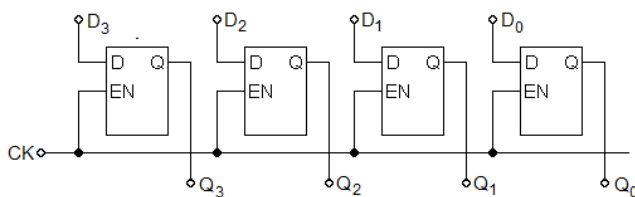
D	EN	S	R
0	0	1	1
0	1	1	0
1	0	1	1
1	1	0	1

(d) $S = \overline{D} \cdot \overline{EN} + \overline{D} \cdot EN + D \cdot \overline{EN} = \overline{D} + \overline{EN}$

$R = \overline{D} \cdot \overline{EN} + D \cdot \overline{EN} + D \cdot EN = D + \overline{EN}$



2 (a)



(b) The word to be stored is placed at the inputs D₃ to D₀. Then CK is pulsed high. The word is now stored at the outputs Q₃ to Q₀.