

Counter Exercises

Question 1

Convert decimal 18 to **8 bit** binary

Question 2

Convert binary **0 0 1 1 1 0 0 1** to decimal

Question 3

Draw two D-type flip flops configured as a binary counter with LEDs and series resistors to show the output

Question 4

Explain the term “the rising edge of the clock”

Question 5

Explain why Q-bar is feedback and connected to DATA when a D-type flip flop is configured as a binary counter

Question 6

Explain the difference between a binary counter and a Binary Coded Decimal (BCD) counter

Question 7

Draw a 7 segment display showing the decimal number 4

Question 8

Explain the function of a 7 segment display decoder

Question 9

Describe the function of the LOAD input for a binary counter and the STORE input for a display decoder

Question 10

Explain the difference between a BCD counter and a 4017 decade counter

Counter Answers

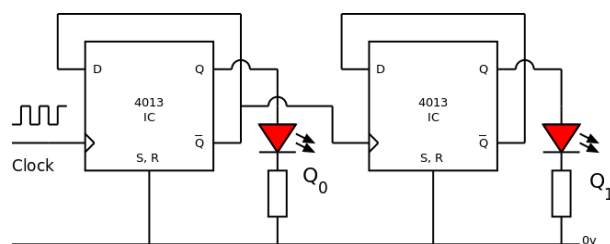
Question 1

18 in decimal is **0 0 0 1 0 0 1 0**

Question 2

0 0 1 1 1 0 0 1 in binary is 57 in decimal

Question 3



Question 4

The rising edge of the clock is when the clock changes from LOW to HIGH

Question 5

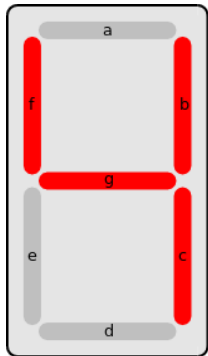
When the output (Q) is HIGH it needs to go LOW on the next clock. Therefore, when Q is HIGH, DATA needs to be LOW and is therefore connected to Q-Bar which is LOW when Q is HIGH

Question 6

A binary counter can have any number of bits and can count to all binary values. In the case of a 4 bit binary counter, the output of a binary counter counts from 0 to 15

A BCD counter is a 4 bit counter. A BCD counter counts in binary from 0 to 9 but then resets back to 0 on the next clock pulse (and so does not ever count 10 to 15)

Question 7



Question 8

The output from a BCD counter or a 4 bit binary counter is in 4 bit binary. A 7 segment display has 7 inputs. A decoder converts the 4 bits of binary into the inputs required to illuminate the correct segments of the display

Question 9

LOAD allows the binary counter to start from a value other than zero

STORE allows the decoder to keep the display showing a given value even when the inputs change

Question 10

A BCD counter counts from 0 to 9 in binary

A 4017 counter has ten outputs which come on in sequence, one after another, with only one output being HIGH at any given time