

preLab

Experiment No. 6 - Sequential Logic Circuits using Breadboard and IC's

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1) What is the appropriate display type (common anode/common cathode) that must be used with 7447 display decoders? Explain your answer.

The appropriate display type to be used with the 7447 decoder depends on the internal circuitry of the 7447. 7447A: This version is designed for use with common anode 7-segment displays. In a common anode display, the anode (positive terminal) of all the LED segments are connected together and are typically driven with a logic low (0) to activate a particular segment. 7447B: This version is designed for use with common cathode 7-segment displays. In a common cathode display, the cathode (negative terminal) of all the LED segments are connected together and are typically driven with a logic high (1) to activate a particular segment.

It's important to note that connecting the 7447 to a display of the incorrect type will result in incorrect output.

2) Assuming that the turn-on voltage for the LEDs is 1.7V, what is the proper value of the resistors to be connected between the 7447 decoder and the seven-segment display, to limit the current in the LED segments to 10mA?

$$R = V_r / I$$

$$V_r = V_{cc} - V_{led}$$

where V_r = Voltage across the resistor, V_{cc} = Supply voltage V_{led} = LED voltage drop

$I = 10\text{mA}$ (given), $V_{cc} = 5\text{V}$ since it's what we are using. $V_{led} = 1.7$ (given)

$$R = (5\text{V} - 1.7\text{V}) / 0.01\text{A}$$

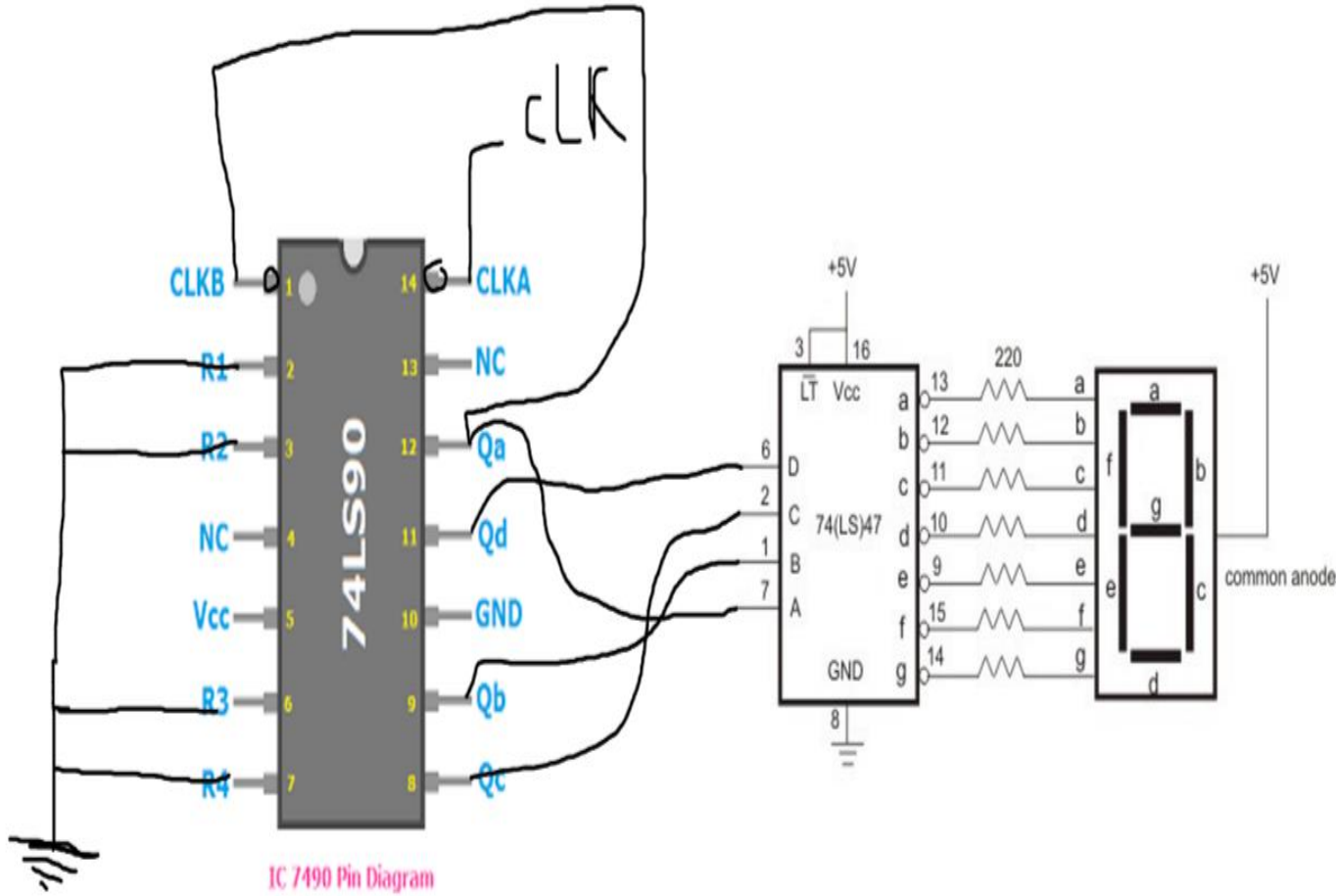
$$R = 330\Omega$$

3) Assume that the resistors provided in the lab are 220Ω . What would the current flowing into the LEDs be?

$$I = V / R \rightarrow I = (V_{cc} - V_{led}) / R \rightarrow I = (V_{cc} - 1.7\text{V}) / 220\Omega \rightarrow I = (5\text{V} - 1.7\text{V}) / 220\Omega$$

$$I \approx 0.013\text{A} \text{ or } 13\text{mA}$$

4) Design a decade counter circuit using the 7490 counters, the 7447 decoder and a seven-segment display. Show the pin numbers on the ICs in your design.



IC 7490 Pin Diagram