

Laboratory 7: Digital combinational and sequential circuit

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Digital multiplier

Use adder (74LS83) chip and demonstrate two 2-bit multiplier circuit. For your reference, the datasheet of 74LS83 chip is available in LMS and dropbox. Use LEDs to represent the bit value as '1' or '0'.

Sequential circuits

Sequential circuit consists of combinational circuit to which storage elements are connected in a feedback path. The output of the sequential circuits depends on the present state of the output and external inputs. D latch and J-K flipflops are two such examples.

D latch

Use the Quad D flipflop (74HC175) and demonstrate the working of D latch by providing an AC Square signal (100 Hz) from any one of digital Arduino output pin and determine the output from the D latch. Apply clock signal (200 Hz) using another output pin from arduino microcontroller. Maintain the Clear pin to 5 V (Logic HIGH). When does the output change with respect to the change in the input. Do you think the output is driven by rising or falling edge of the clock signal or is it positive or negative level of clock signal ?

Capture the waveform of output signal and clock signal in Oscilloscope and show to your instructor or lab-in-charge.

What is the use of Clear pin in the chip ? Connect the Clear pin to LOW logic and check the output. So is it asynchronous or synchronous operation ?

Could you make the output to toggle using D Latch ?

If we provide the output of first D latch to input of another D latch which is driven by inverted clock signal. Capture and show the output of second D latch with that of input to first D latch to the lab instructor or lab-in-charge ?