

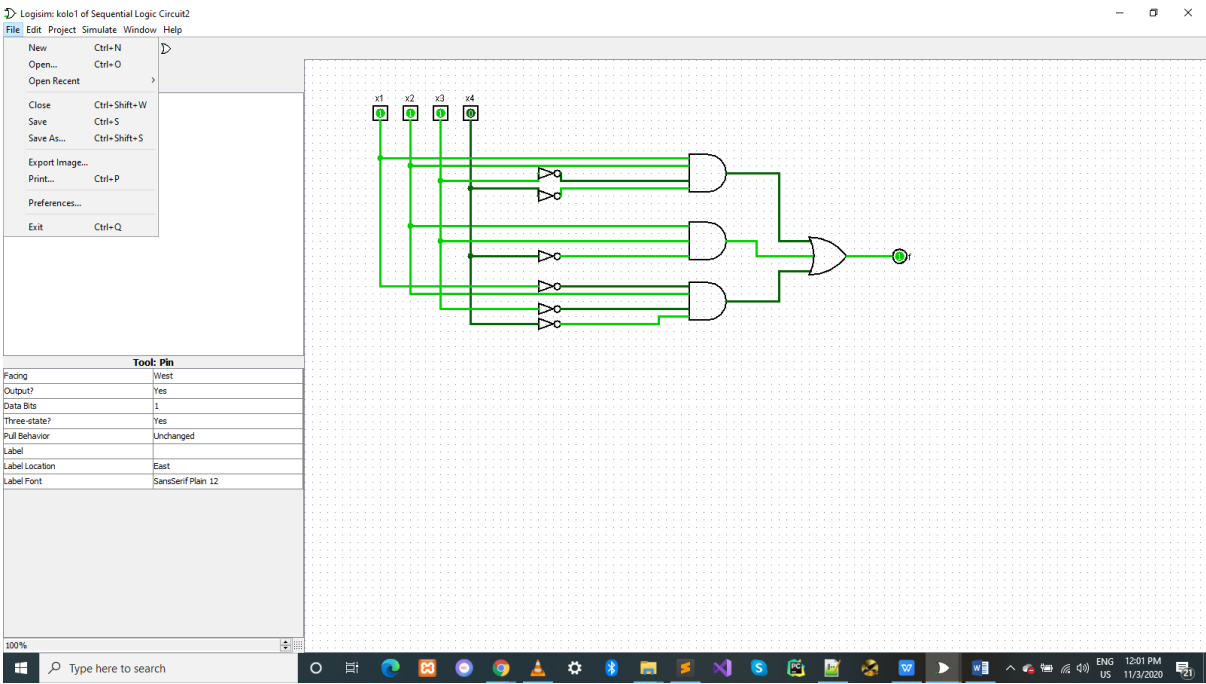
Student's Name

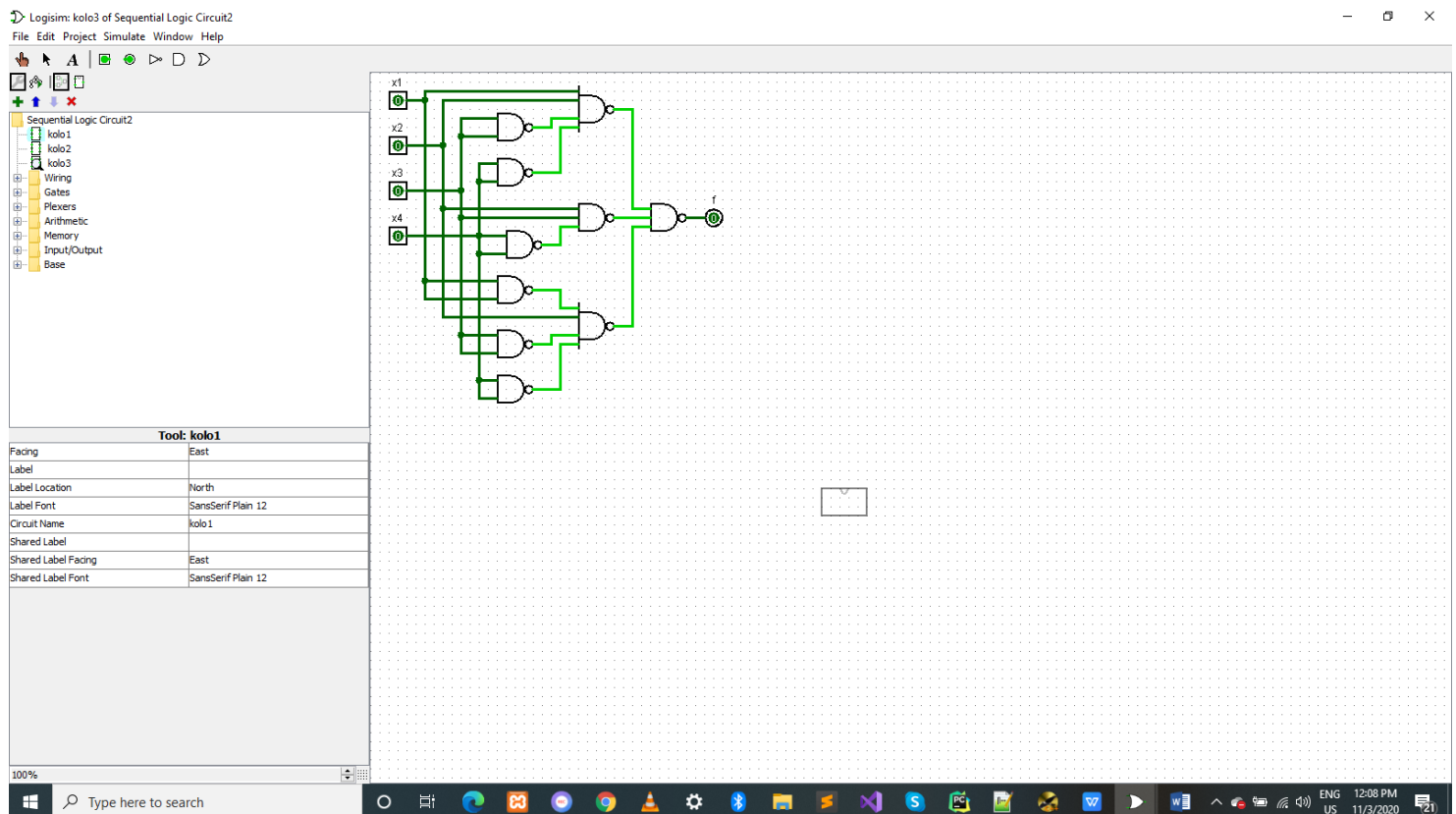
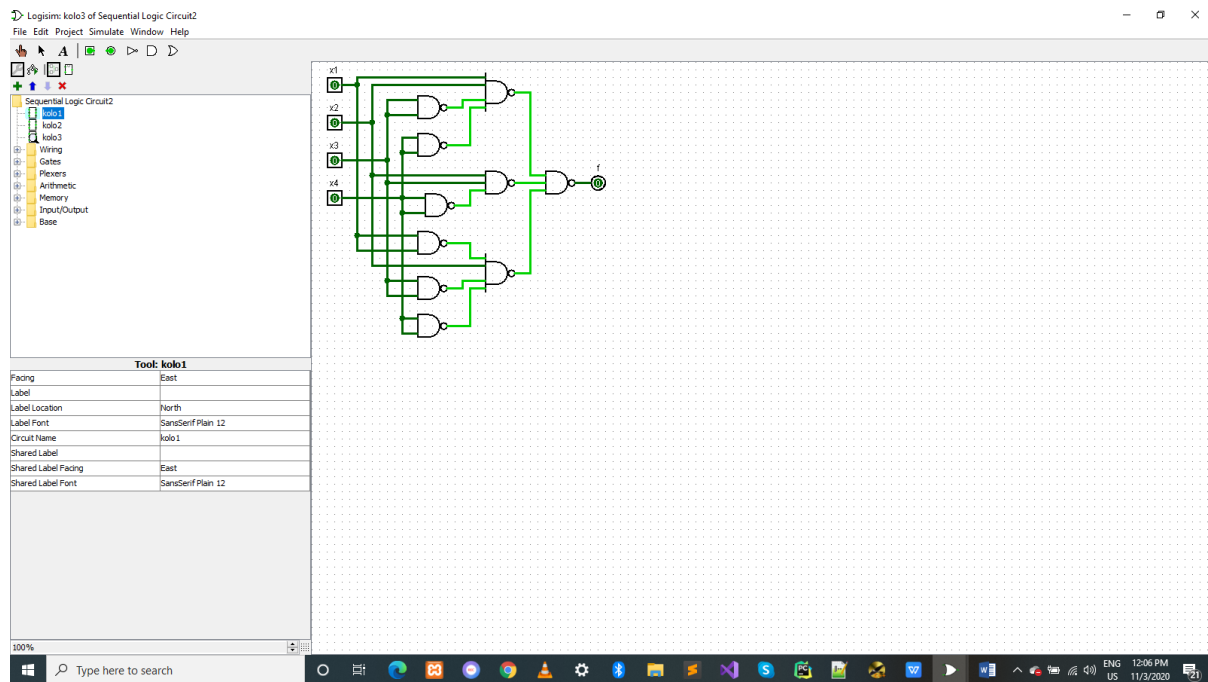
Instructor's Name

Course

Date

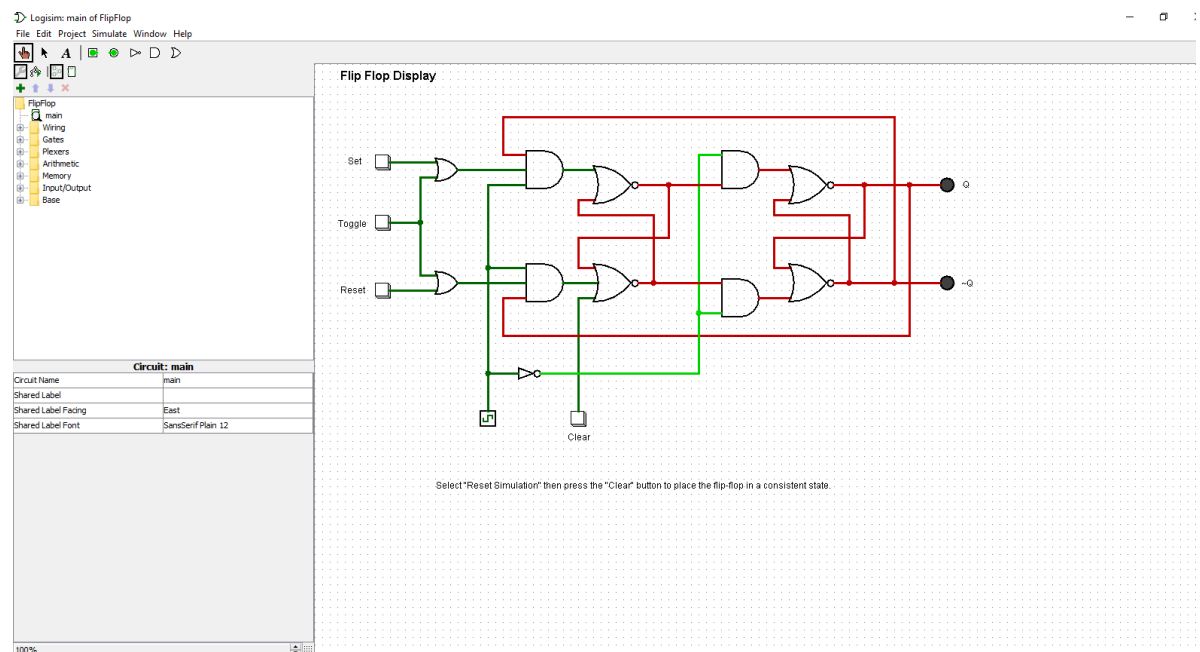
SEQUENTIAL LOGIC CIRCUITS



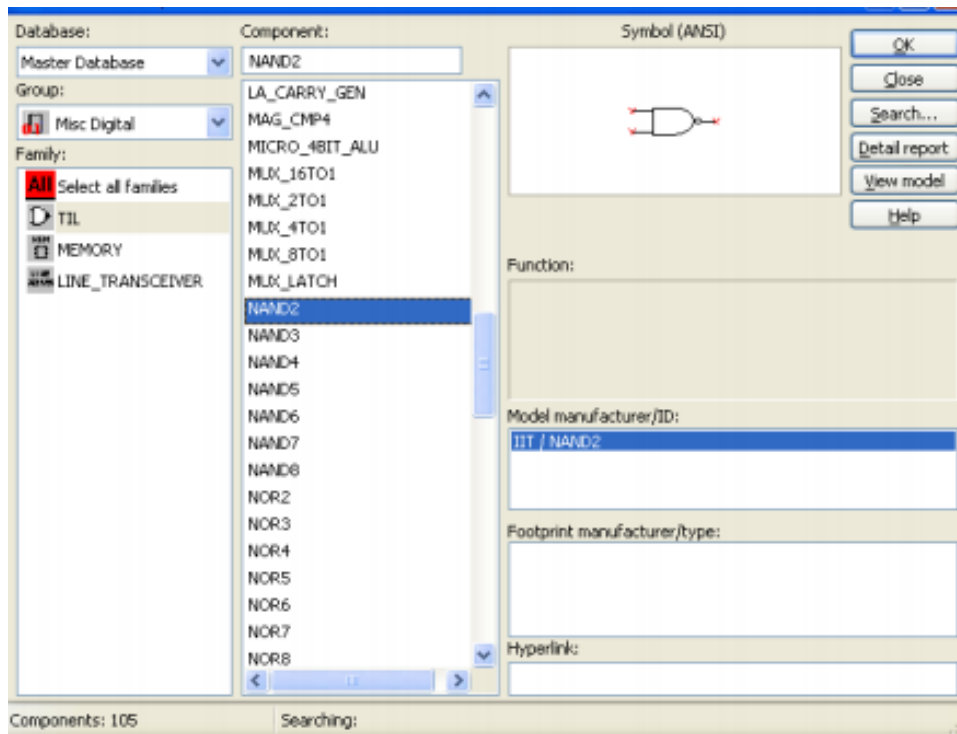


FlipFlop Display

1)



2) Drawing the Diagram



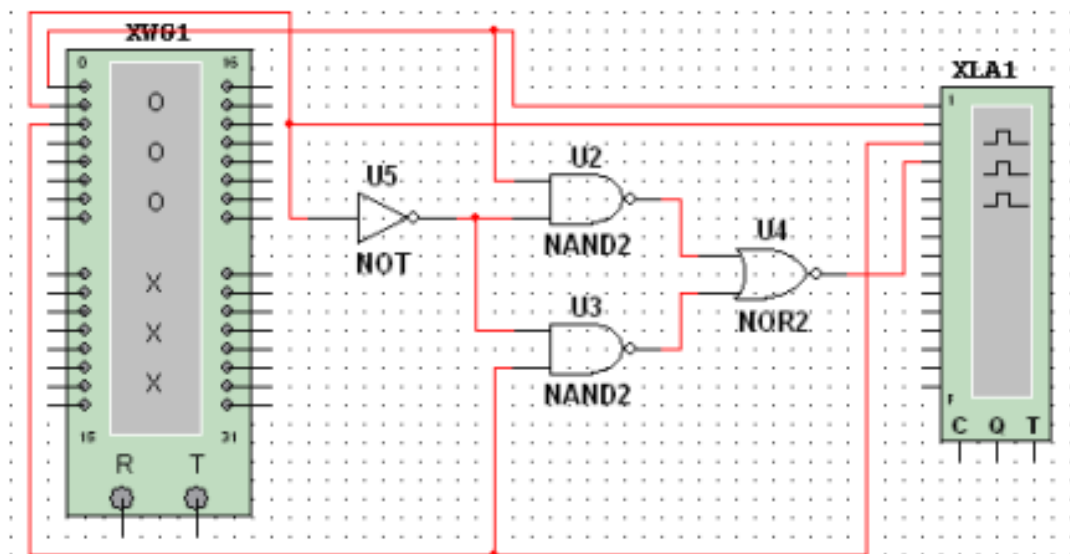
- i. Basic logic gates: AND_x, NAND_x, NOT, NOR_x, OR_x, XNOR_x, XOR_x, where x is the number of gate inputs (2-8).
- ii. Flip flops: D_FF, JK_FF, SR_FF, T_FF, and latches D_LATCH, SR_LATCH, plus versions that have active-high or active-low asynchronous Set and Reset pins (ex. D_FF_POSSR and D_FF_NEGSR, respectively).
- iii. Standard digital modules: multiplexers, decoders, encoders, counters, ALU, BCD-to-7 segment decoder, registers, shift registers, etc.
- iv. . DIGITAL_PULLUP, DIGITAL_PULLDOWN – to pull a pin to a constant logic 1 and 0, respectively.

Drawing the Wires

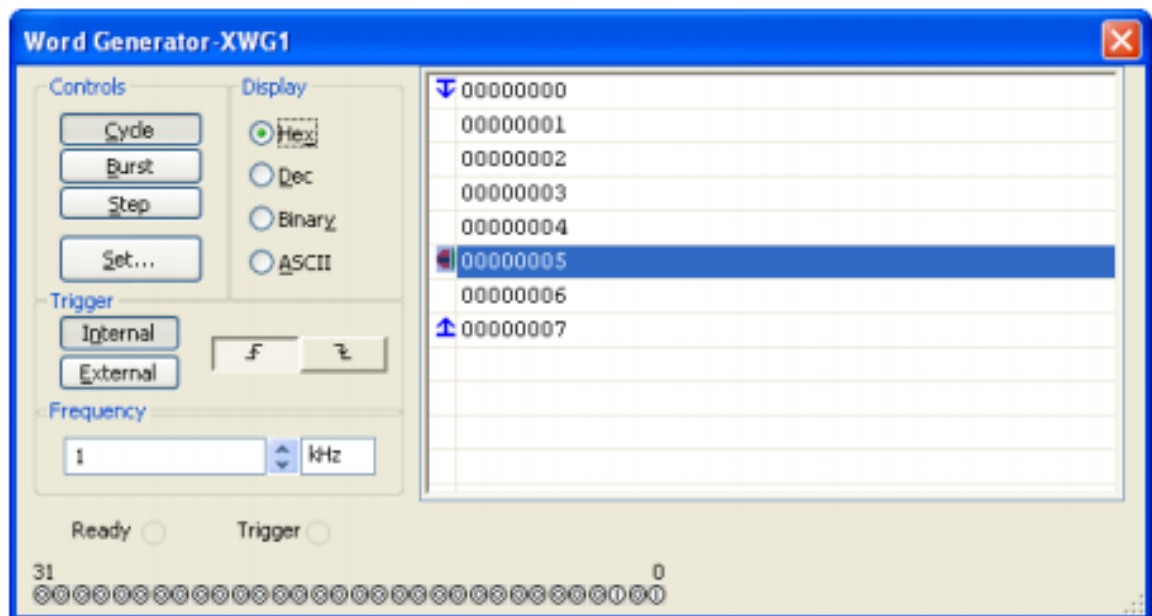
I have used below buttons and boxes to draw the wires and ensure that the project is successful.

- a) **DIGITAL_CONSTANT** – this is a box with a constant logic 1 or 0 output, and would be used where the logic values is not to be changed during simulation. To change the output value, right click on the box, select Properties, select the desired value on the Value tab, and click the OK button.
- b) **INTERACTIVE_DIGITAL_CONSTANT** – this is a clickable box that can be connected to a circuit input. Clicking on the box toggles its output between 0 and 1. This can be used to interactively change a circuit input during simulation.
- c) **DIGITAL_CLOCK** – this is a box that produces a repeating pulse train (square waveform), oscillating between 0 and 1 at a specified frequency. To set the frequency and duty cycle, right click on the box, select Properties, select the desired frequency and duty cycle value on the Value tab, and click the OK button.

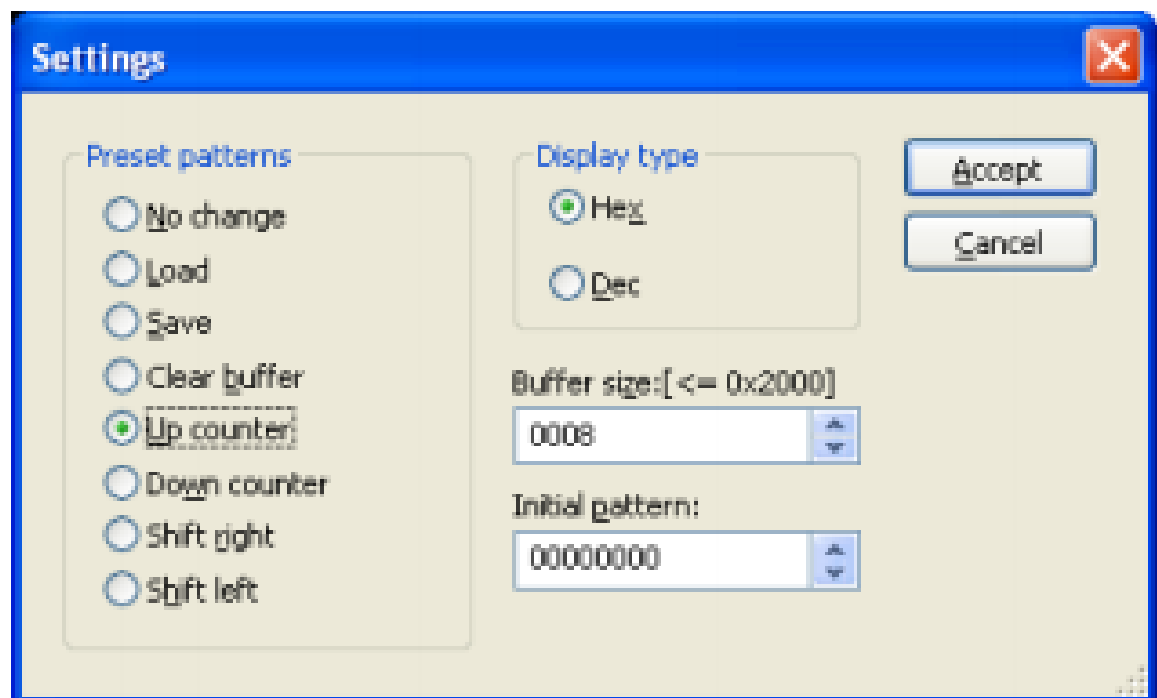
Generators connected to the Output



Generator connected to circuit inputs



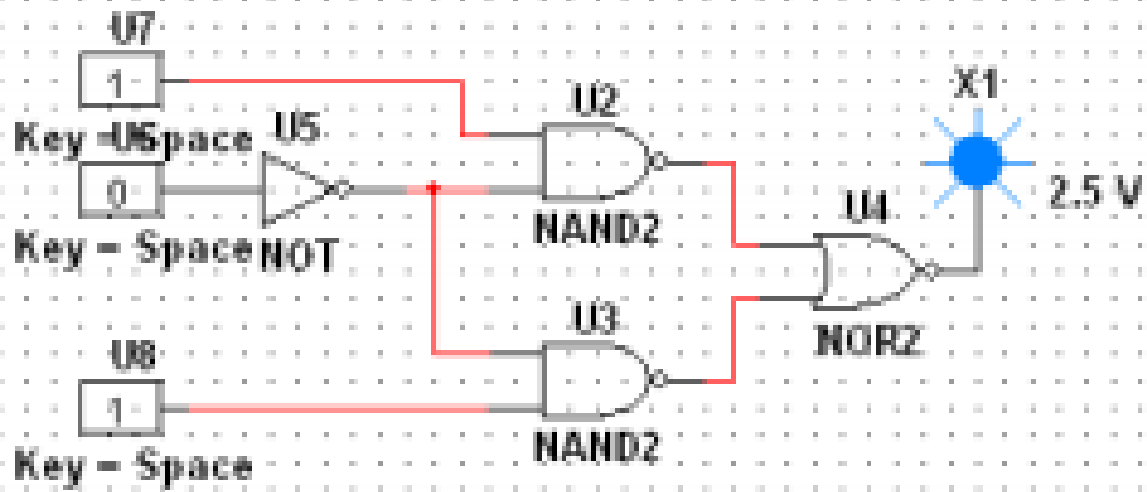
Generator window showing count up patterns



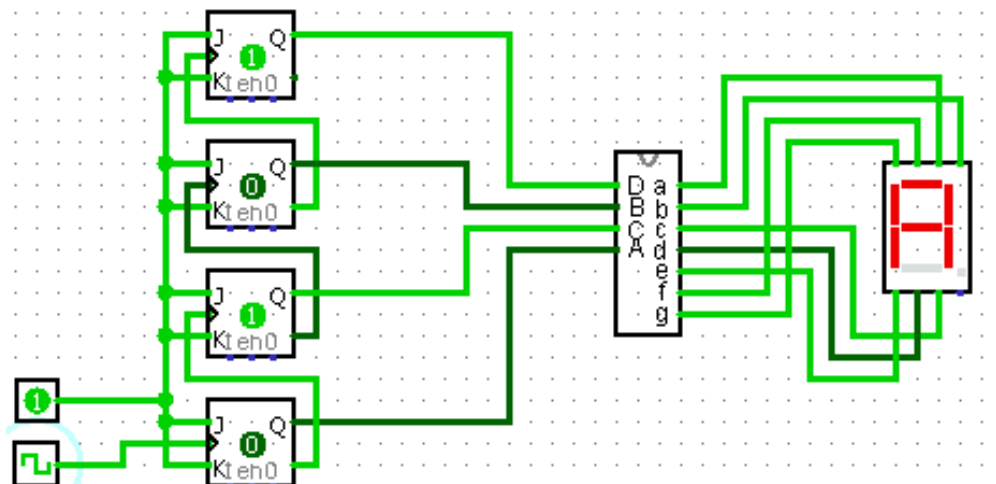
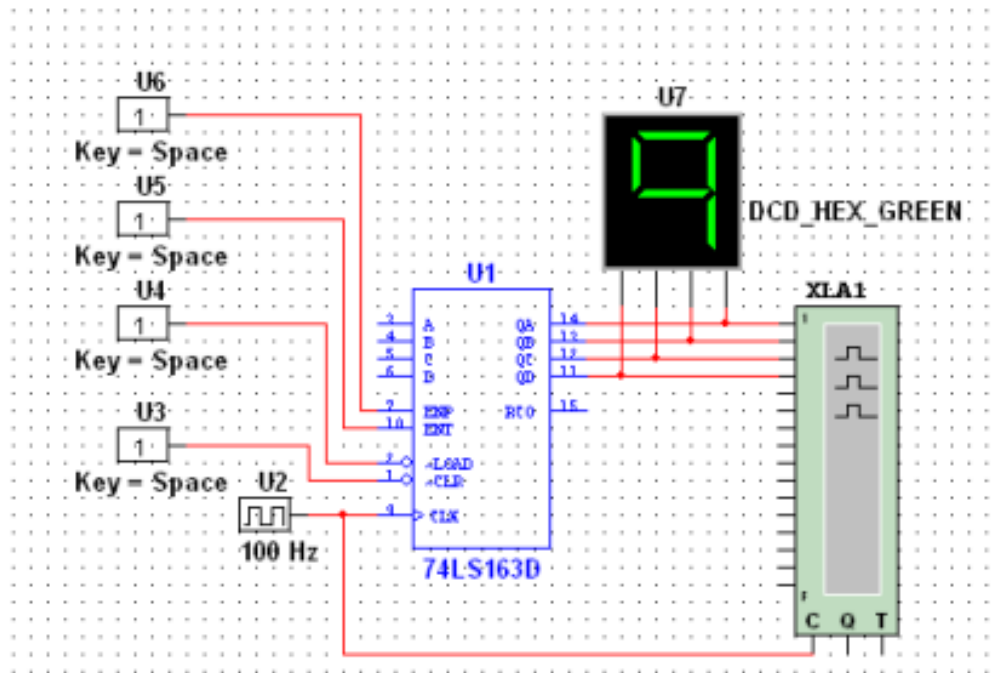
Circuit Outputs connected to indicators

The PROBE of Indicators group includes a generic PROBE_DIG and several PROBE_DIG_color indicators (color = BLUE, GREEN, ORANGE, RED, YELLOW).

The probe in Figure 11 is PROBE_DIG_BLUE. This circuit can be verified by manually changing the three INTERACTIVE_DIGITAL_CONSTANT inputs to each of the 8 possible combinations, and recording the probe value for each combination to create a truth table



Hex indicator displays counter output



Logic Analyser display of the 3 circuit inputs and circuit output of Figure 8, for the 8 patterns produced by the Word Generator

