ET285 DIGITAL ELECTRONICS II
LAB PROJECT 1: 2BIT BINARY ASYNCHRONOUS COUNTER

INTRODUCTION:
The key distinction of an Asynchronous Counter is all flip flops (FF) are clocked by the previous stage one after another. With all of the stages of the Asynchronous counter not clocked together, a "ripple" effect propagates as each flip-flop is clocked. Based on this "rippling" effect of FF clocking, the Asynchronous Counter is also known as **RIPPLE COUNTER**. To build such a counter either "D" or "JK" flip-flops can be wired in a "toggle" mode for assuring correct input clocking and output switching response.

This lab project will investigate building and testing a basic digital 2 Bit Binary Asynchronous Counter. The lab project will be implemented into 2 stages:

- STAGE 1: Build and Test Circuit using Multisim or Microcap circuit simulation software.
- STAGE 2: Build and Test a physical circuit using a solderless breadboard and +5VDC Power Supply.

Bill Of Materials (BOM)

(1) 7474/74LS74 Dual D FF (Positive-Edge Triggered) IC
(2) 1KΩ resistor
(1) 7400/74LS00 NAND GATE IC
(2) LEDs (Red)
(2) 330Ω resistor
(2) 4.7KΩ resistors
(1) SPDT Switch

Miscellaneous

- 22AWG solid wire
- +5VDC power supply
- Digital Multimeter (DMM)
- Oscilloscope
- Solderless breadboard

Stage 1: Virtual Circuit Build and Test Procedures

1. Using either Multisim or Microcap Circuit Simulation SW(Software) build the 2 Bit Asynchronous Binary Counter Circuit shown in **Figure 1**

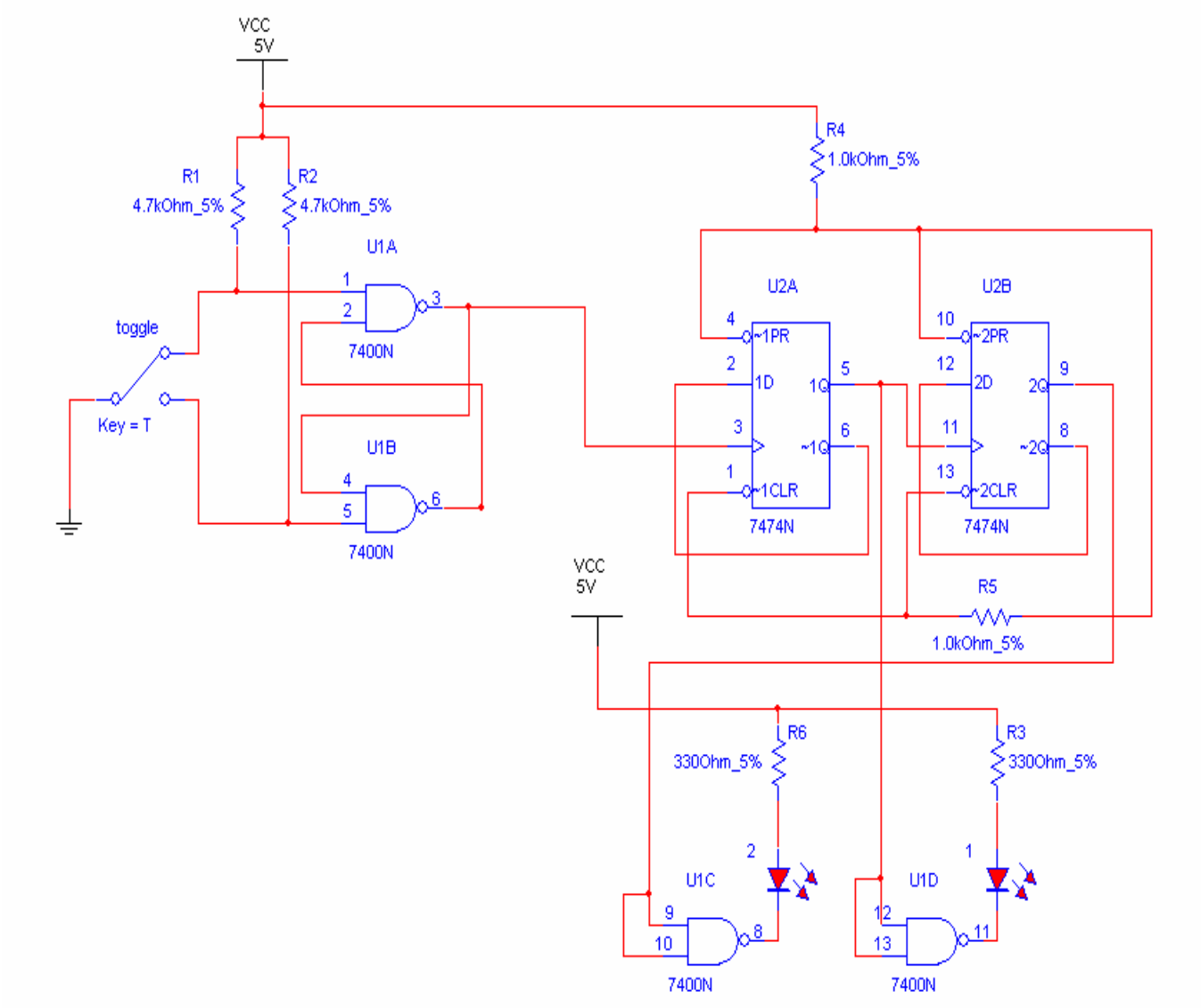

Figure 1. 2 Bit Binary Asynchronous Counter

2. Run a circuit simulation event on the target virtual digital circuit.

3. Observe the output on the LEDs as the SPDT switch is toggled back and forth. Record the maximum count value from the observation. Maximum count value _____ **Instructor's Initials_____**

Stage 2: Physical Circuit Build and Test Procedures

1. Using a solderless breadboard, build the circuit investigated in STAGE 1 shown in Figure 1.

2. Check your wiring for errors prior to applying a +5VDC voltage to the breadboard circuit.

3. Turn **ON** the +5VDC Power Supply.

4. Observe the output on the LEDs as the SPDT switch is toggled back and forth. Record the maximum count value from the observation. Maximum count value _____ **Instructor's Initials_____**

5. Turn **OFF** the +5VDC Power Supply.

LAB REPORT TECH QUESTIONS

The following tech questions should be included in the LAB REPORT.

- Explain the circuit operation of the 2Bit Binary Asynchronous Counter Circuit.

- Include a Block Diagram illustrating how this circuit would interface with a transistor relay driver for the creation of a 2Bit Binary

Digital Controller. (**NOTE**: This description may be used as a circuit application for the report.)

THE 2BIT BINARY ASYNCHRONOUS COUNTER CIRCUIT LAB REPORT IS DUE 6/23

NOTES