Name & Std No.:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lab Section:\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PRELAB:**

### *Refer to Chapter 5 in your textbook and the lab instructions to complete your pre-lab. Please read all the material and complete the circuit diagrams before you come to the lab.*

**Q1.** Draw the circuit diagram for the 4-bit **Shift Register** using D flip-flops in the space below.

**Q2.** Draw the circuit diagram for the 4-bit **Synchronous Up-Counter** using **D flip-flops** in the space below.

**Q3.** Draw the circuit diagram for the 4-bit **Synchronous Up-Counter** using **T flip-flops** in the space below.

**Q4.** Draw the circuit diagram for the 4-bit **Asynchronous Up-Counter** using T flip-flops in the space below.

**Q5.** Draw the circuit diagram for the 4-bit **Asynchronous Down-Counter** using T flip-flops in the space below.

**LAB:**

**2.0**  Fill in the sequence table below. *Watch out for switch bouncing!*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***In*** | ***Q1*** | ***Q2*** | ***Q3*** | ***Q4*** |
| t0 = 1 | ---- | ---- | ---- | ---- |
| t1 = 0 |  | ---- | ---- | ---- |
| t2 = 1 |  |  | ---- | ---- |
| t3 = 1 |  |  |  | ---- |
| t4 = 1 |  |  |  |  |
| t5 = 0 |  |  |  |  |
| t6 = 0 |  |  |  |  |
| t7 = 0 |  |  |  |  |

Hardware results demonstrate a good circuit. TA Initials: \_\_\_\_­\_\_\_

**3.1**  Hardware results demonstrate a good circuit. (D flip-flops) TA Initials: \_\_\_\_­\_\_\_

Hardware results demonstrate a good circuit. (T flip-flops) TA Initials: \_\_\_\_­\_\_\_

**3.2**  Seven segment shows 0 to F. (UP) TA Initials: \_\_\_\_­\_\_\_

Seven-segment display shows F to 0. (DOWN) TA Initials: \_\_\_\_­\_\_\_