UNIVERSITY OF TEHRAN

Electrical and Computer Engineering Department

Digital Logic Design LAB

Lab1-Deliverables

1. **Ring Oscillator**
    a. Briefly explain the experiment procedure.
    b. Report the observed waveform along with the measured frequency of the chain.
    c. Report the propagation delay of the chain.
    d. Calculate the delay of a single inverter.
2. **LM555 Timer**
    a. Briefly explain the experiment procedure.
    b. For all three cases of R_2 resistor:
        i. Include the waveform along with the measured frequency and duty cycle.
        ii. Using the equations provided in the manual, calculate the expected frequency and duty cycle to verify your measurement.
    c. Explain the changes in the duty cycle by varying the resistor R_2.
3. **Schmitt Trigger Oscillator**
    a. Briefly explain the experiment procedure.
    b. Report the output frequency and calculate the α parameter for all three values of the resistor.
    c. Report the average α.
4. **Synchronous Counter as a Frequency Divider**
    a. Briefly explain the experiment procedure.
    b. Explain how can one determine the Parallel Input values of each counter.
    c. Explain the presetting mechanism used in the circuit.
    d. Report the observed waveform of the circuit output (MSB carry out) along with the measured frequency.
    e. Compare the output frequency with the Ring Osc. frequency and discuss the observed changes in the duty cycle.
5. **T Flip-Flop**
    a. Briefly explain the purpose of using TFF.
    b. Measure the output frequency and compare it with its input and the Ring Osc. frequency.