CircuitLab Simulation

ECE 401 - Homework #4

Due Week #8

Once the project has been selected and the group chosen, your will need to research the needed parts and design the circuit. Make sure that you take into considerations the requirements that are listed below.

Simulate the major sections of your circuit using CircuitLab

- DC Analysis
  - Currents and voltages
- Transient Response (if applicable)
  - Simulate waveforms if using a 555 timer
  - Check resulting frequency and duty cycle

Compare the simulation results vs. your calcultions

- Were your calculations correct?

Adjust your components so that your circuit meets your requirements (if necessary)

Test Points: Your simulation results should show a minimum of the listed test points.

- DC Measurements (all cases)
  - Vbat (9V)
  - Vreg (5V)
  - Vce for the NPN transistor when ON and OFF
  - Current through the LED when ON
  - Total current draw
- If using a 555 Timer, also provide waveforms (transient response: 2-3 cycles)
  - Waveform @ C1
  - Waveform @ Threshold
  - Waveform @ Discharge
  - Waveform @ Timer Out
- If using an op-amp (MCP602), also provide the following DC measurements:
  - Voltge at inverting input when on and off
  - Voltage at non-inerting input when on and off
  - Voltage at Op-Amp output when on and off
- If using a microcontroller (Raspberry Pi-Pico)
  - Model the microcontroller as a 0V or 3.3V voltage source (max current = 12mA)