ECN-252 Lab 3

Please complete all three parts. Submissions are due by Friday, 5th March, 11:59PM. Remember to take screenshots and save your circuit schematic/simulation result window as soon as you finish each part. You need to submit this as a part of the report.

Like last assignment, submit one zip file that includes your circuit, screenshot of results/saved figures, report with results/comments. Save the .zip file with your roll number, e.g., if your roll no. is 191112002, you need to submit 191112002.zip.

There are 8 sets of problem (4 for ECE, 4 for CSE). To select within set 1 - 4, use mod (Roll No.,4)+1 and select the corresponding problem from the table below.
[For example, if your roll no. is 191112002, you should select mod(191112002,4)+1 = 3; i.e. set 3.]

All exercises will use NE555 timer IC. This is listed in LTSpice as NE555 block in the "Misc" group of components. Datasheet for NE555 can be obtained from here: https://www.ti.com/lit/ds/symlink/ne555.pdf. For resistor and capacitor that you'll need to add to the circuit, use only standard components, i.e., use R and C values that are available as discrete components – (see a list here https://ecee.colorado.edu/~mcclurel/resistorsandcaps.pdf). If you are unable to meet the specs, note that as your comment.

Part 1:
Read relevant part of the data sheet to understand the basic operation of the IC

Part 2:
Design a *free running* multi-vibrator for frequency and duty cycle specifications listed in the table below. Show your calculation for the frequency and duty cycle.

Part 3:
Design a *monostable* multi-vibrator with specifications listed in the table below. Show your calculation.

Group	Free running multi-vibrator	Monostable multi-vibrator
ECE, Set 1	4 kHz, 25%	Negative edge-triggered, 100us pulse width
ECE, Set 2	10 kHz, 40%	Negative edge-triggered, 400us pulse width
ECE, Set 3	2 KHz, 67%	Positive edge-triggered, 400us pulse width
ECE, Set 4	1 kHz, 75%	Positive edge-triggered, 100us pulse width
CSE, Set 1	1 kHz, 30%	Negative edge-triggered, 200us pulse width
CSE, Set 2	2 kHz, 50%	Negative edge-triggered, 1ms pulse width
CSE, Set 3	4 KHz, 70%	Positive edge-triggered, 1ms pulse width
CSE, Set 4	10 kHz, 90%	Positive edge-triggered, 400us pulse width