ECE 320 - Homework #7

DC to AC, SCR, Boolean Logic. Due Monday, Octiber 11th

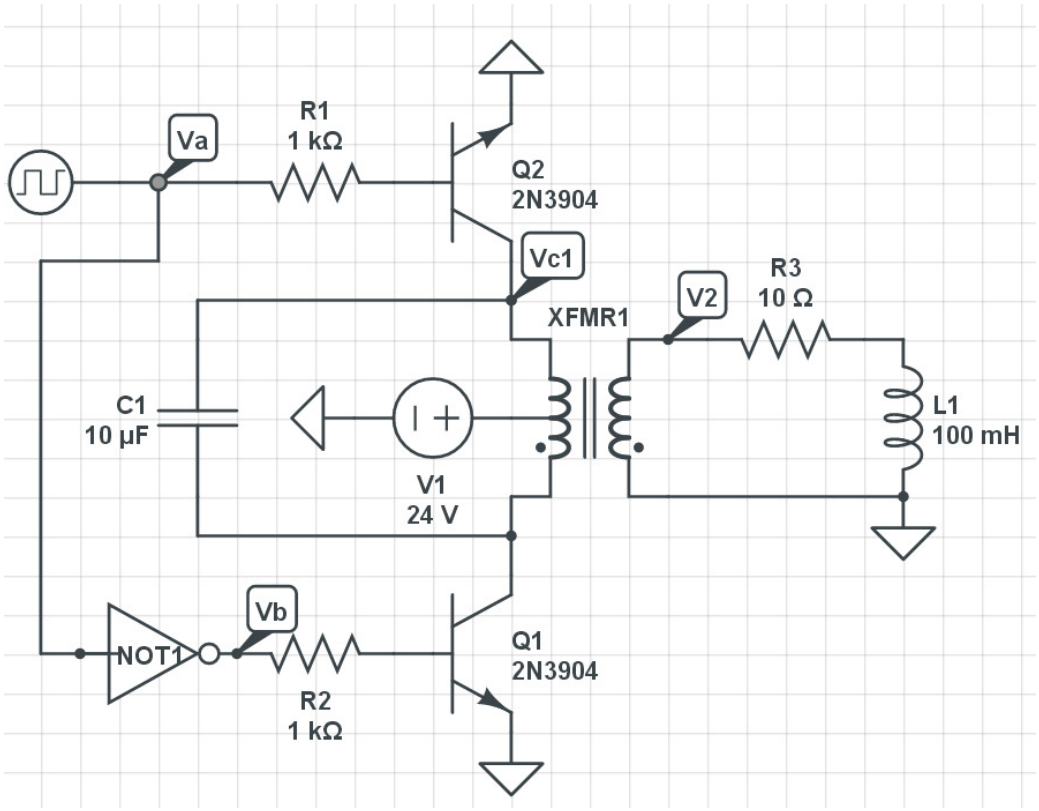
DC to AC

1) Let

- A = 0V / 5V square wave, 60Hz, 0 degree time delay
- B = 0V / 5V square wave, 60Hz, 180 degree time delay
- C1 = 10uF

Determine using CircuitLab the voltage V2 (i.e. the votlage across a DC motor, modeled as a 10 Ohm & 100mH load)

2) Adjust C1 so that the voltage across the motor is as close to a sine wave as possible (trial and error)



DC to AC Converter (problem 4 & 5)

SCR

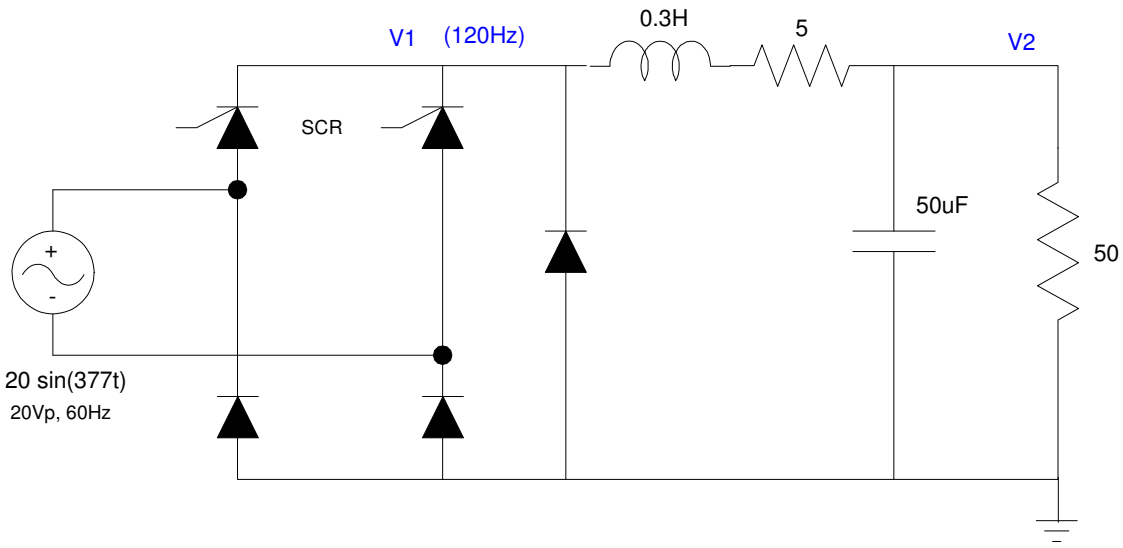
3) Assume a firing angle of 45 degrees. Determine the voltage at V1 and V2 (both DC and AC).

4) Change this circuit so that

- The voltge at V2 is 10.00V (DC)
- With a ripple of 500mVpp

5) Simulate this circuit in Matlab by

- Writing the differential eqautions which describe this circuit (state variables: IL and Vc)
- Specify V1(t) as a full-wave rectified sine wave, clipped at X degrees (from problem #4)
- Use numerical integration to find V2(t)



SCR: Problem 6 - 8

Boolean Logic

6) Design a circuit to implement Y using NAND gates

7) Design a circuit to implement Y using NOR gates

Y(A,B,C,D)	CD			
AB	00	01	11	10
00	1	0	1	x
01	1	0	0	1
11	1	1	1	0
10	x	1	x	0