ECE 320 - Homework #6

DC to AC Converters, SCR's. Due Monday, February 29th

DC to AC Converters

1) Design an H-Bridge to drive an 8-Ohms speaker forward and back.

Input:

- 5VDC, capable of driving 3A (i.e. DC power supply on lab bench)
- 0V / 5V TTL signals capable of driving 25mA (i.e. switches on the CADET boards)

Output: 8 Ohm Speaker

Relationship: You should be able to apply +5V, -5V, or 0V across the speaker by adjusting the switches

2) Check youd design in PartSim (three tests: 0V, 5V, -5V)

3) Assume the H-bridge is to be used to drive an AC motor (BLDC, AC Synchronous, AC Induction motor).

- 3a) Explain how you convert a DC power supply into an AC voltage
- 3b) Explain how you adjust the speed of the AC motor
- 3c) Specify the AC waveform you would send to the motor at 10Hz
- 3d) Calculate the efficiency of your DC to AC converter (MATLAB helps here)

SCR: AC to DC Converter

4) Design a full-wave AC to DC converter using diodes and SCRs.

Input: 12V peak, 60Hz, AC signal capable of driving 1A (i.e. AC wall transformer room 235 / 237)

Output: 5V DC signal, capable of driving 100mA

Tolerance: Output ripple < 100mVpp @ 100mA

Lab:

5. Build the H-bridge and verify your computations for problem 1.