ME 285 Mechatronic Systems Engineering

Homework #3: Power Interfacing and Filtering

1. Interface a TTL level signal source having a 1 mA drive current in such a way that you could control an AC motor for a refrigerator (i.e., turn it on or off). Assume the refrigerator motor can draw up to 10 A at 110 VAC. Show a schematic of your interface, including choice of components. Explain your choice of components and design approach. Reference any pertinent data sheets for any components other than resistors, capacitors, etc.

2. What integrated circuit chips are used on the Handy Board for driving DC motors? What current drive capability do they have? What if you wanted to drive a motor or load whose current requirement were larger than could be handled by the Handy Board? Show/explain would you work around this problem.

3. What command in Interactive C (IC) is used to control the speed of a DC motor connected to a motor port?

4. Design a band pass filter centered at 1 kHz, such that the magnitude of its transfer function is less than or equal to -1dB at 1 kHz. The lower corner frequency should be greater than 100 Hz and the upper corner frequency should be less than 10 kHz.