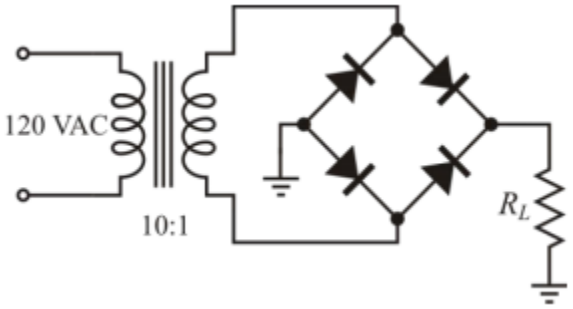
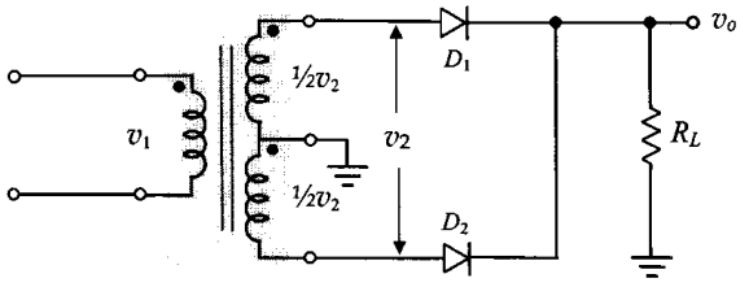
CE 432 Robotics II Homework Package

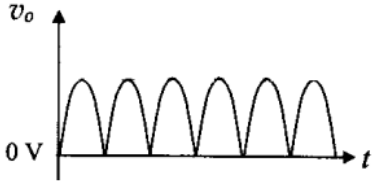
Homework 1 Power Supply for Robots

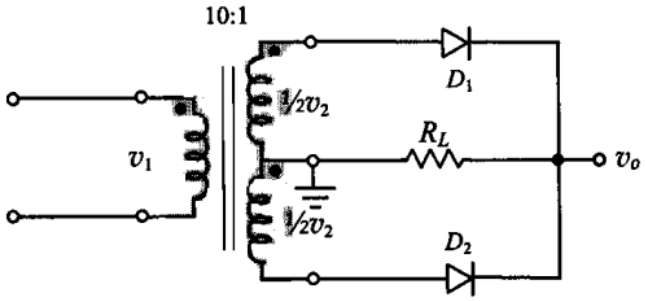
1. A full-wave, 4-diode bridge rectifier circuit with a 1 kΩ load operates from a 120-V (rms) 60-Hz household supply through a 10-to-1 step-down transformer. It uses silicon diodes that one can model to have a 0.7-V drop for any current. (a) What is the peak voltage of the rectified output? (b) Derive the rectification efficiency of this full wave bridge rectifier (ignore the diode voltage drop). (c) What is the PIV (do not ignore the diode voltage drop)? **(25 points)**



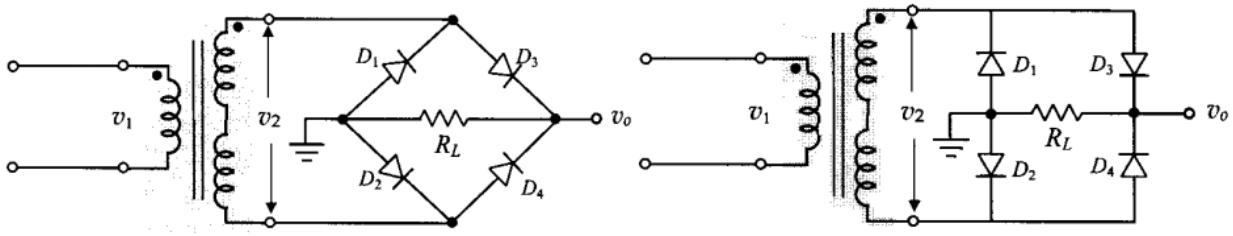
2. For the following Full Wave Center-Tapped Rectifier, find the rectified DC voltage output. Vin (RMS) = 110V (60Hz), Turns Ration 10:1. (Assume each diode has a 0.7 voltage drop in the conduction mode). **(25 points)**







3. (a) For the following Full Wave Bridge Rectifier, find the rectified DC voltage output. Vin (RMS) =110V (60Hz), Turns Ration 10:1. (Assume each diode has a 0.7 voltage drop in the conduction mode). **(25 points)**



(b) What is the capacitor should be used at the output as the smoothing filter (assume the peak-peak ripple voltage is 1V and RL=100 ohm)? **(25 points)**