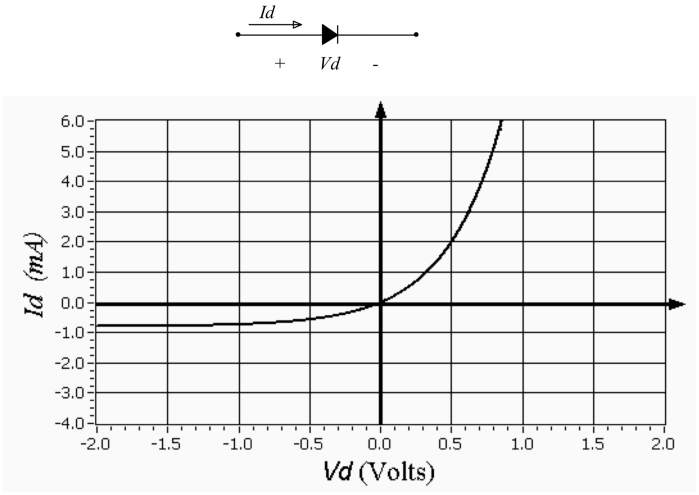
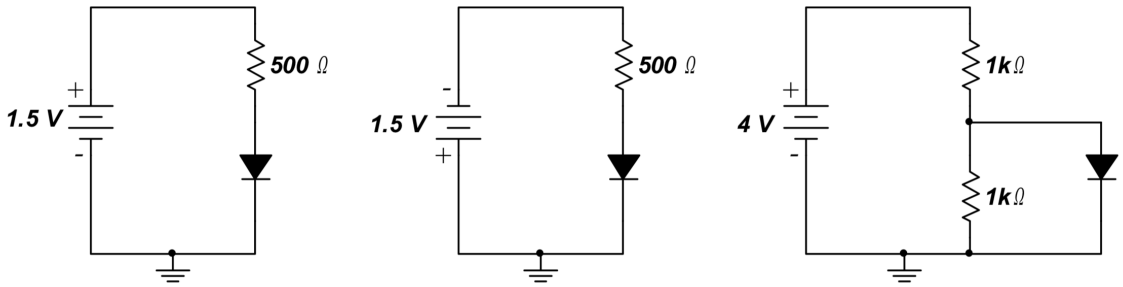
Phys2610 (2019) Assignment 4
Due Tuesday, 19 March 2018

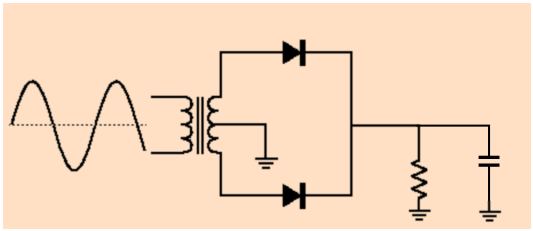
1. The graph below shows the *I-V* characteristic curve of a certain diode. The diode is used in the following circuits. Draw on the plot and label, the load-line you would use for each circuit in order to obtain the diode voltage and current. Do not use an equivalent circuit for the diodes for this purpose. You should get an equation for I_d as a function of V_d. Is the result approximately consistent with the result you expect from replacing the diodes with a suitable equivalent model?



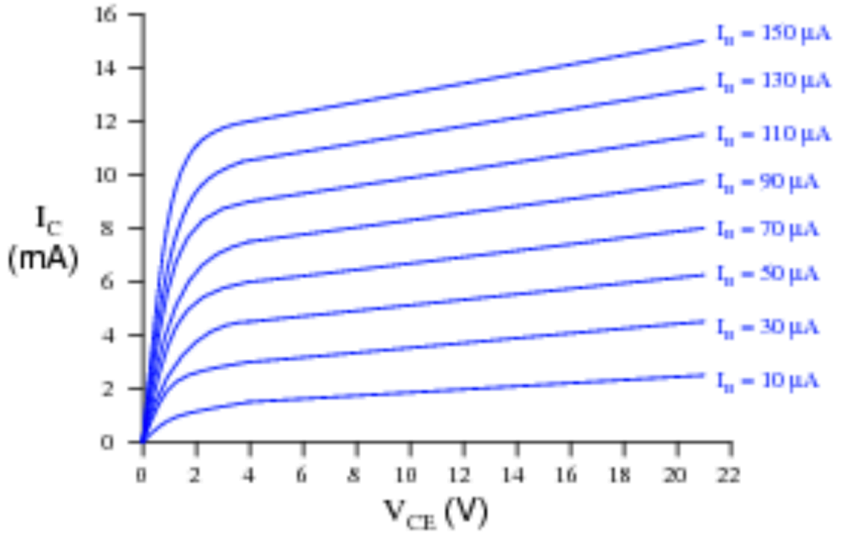


(A) (B) (C)

2. Calculate the approximate peak-to-peak ripple and the ripple factor for a centre-tapped full-wave rectifier. The two outer taps of the secondary coil have a peak voltage of 170 V with respect to the centre tap, and the frequency is 60 Hz. The output is filtered using a 3000 μF capacitor and the load resistance is 200 Ω.



3. Design an H-biased common emitter amplifier circuit that will set a reasonable operating point for a transistor with the characteristics shown below.



4. Draw a simplified ac equivalent circuit for the circuit of question 3, and estimate the midband voltage gain and input and output impedances with and without a bypass capacitor across the emitter resistor. Use $r_{BE} = 2\ k\Omega$.