

COURSE WEBSITE: <http://cobweb.ecn.purdue.edu/~ee255/>

- 1) Text problem 3.71, page 137
- 2) Continue Text problem 3.71, page 137 – (c) Repeat using a diode model containing an ideal diode, a voltage source, $V_0 = .65 \text{ V}$, and resistor, $R_0 = 200 \Omega$.
- 3) Using a Zener diode with $|V_{BR}| = 15 \text{ V}$ and $R_Z = 25 \Omega$ in the simple voltage regulator shown below, having $V_{CC} = 30 \text{ V}$, calculate the load voltage, V_{Load} , when

(a) $I_{Load} = 0$

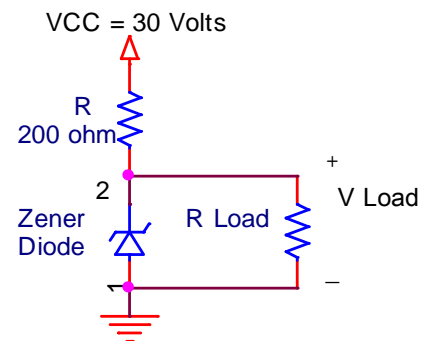
(b) $I_{Load} = 1 \text{ mA}$

(c) $I_{Load} = 10 \text{ mA}$

(d) $I_{Load} = 70 \text{ mA}$

(e) What is the maximum possible current that can be drawn by the load before the Zener diode stops providing any regulation?

(f) If the 30 V supply, V_{CC} , has a ripple, $\Delta v_{CC} = 0.1 \text{ V}$, what is the ripple seen at the load when 50 mA is being drawn?



- 4) Text problem 3.91, page 139
For part (a) assume that $R = \infty$, since R is not given.
For part (b) use $R = 50 \Omega$ in place of the given 0.5Ω .
Use these values of R and C for the remainder of the problem.
For part (c) give the *minimum* PIV rating for the diode.
For part (e) find the *peak* amplitude of the repetitive current.
- 5) Text problem 3.95, pages 139 & 140
- 6) A diode is represented by a dc model with $V_0 = 0.60 \text{ V}$ and $R_0 = 10 \Omega$, and an ac model having $r = 2 \Omega$. If the diode is in parallel with a 50Ω resistor and this combination is in series with a 1Ω resistor and a voltage source, $v_s = 8 + 0.1 \cos(1000t)$ volts, find the total voltage across the diode as a function of time. Assume that the source is connected such that it provides forward bias to the diode.

- 7) For each of the following statements, determine whether it applies to (normal) active-region operation, of an *npn* transistor, a *pnp* transistor, both, or neither.
- (a) $V_{EB} = 0.6\text{ V}$
 - (b) $I_C > I_E$
 - (c) $|I_C| > |I_E|$
 - (d) $I_E > I_B$
 - (e) $V_{CE} > V_{CB}$
 - (f) $|V_{CE}| > |V_{CB}|$
- 8) The active region model for an *npn* transistor contains $V_0 = 0.55\text{ V}$, $\beta_{dc} = 125$, and $I_{CE0} = 2\mu\text{ A}$. Find I_C when
- (a) $I_B = 200\mu\text{ A}$
 - (b) $|I_E| = 3\text{ mA}$
 - (c) Find V_{BE} when $I_C = 2\text{ mA}$
- 9) Text problem 5.82 (parts a & b), pages 269 & 270
- 10) Text problem 5.82 (parts c & d), pages 269 & 270