Review materials include:

Reading Assignments & Homework

Topics

Zener Diodes
Rectification
Transformer Calculations (Turns, Current, Voltage, Impedance, Power, Phase Dots)
Power Supplies (Calculate power supply current, voltage, component values)

Course Notes

Diode & Zener Diode Circuits, Examples, and Problems
Ideal Transformers
Power Supplies (Rectifiers)

Diode Specifications: Practical Electronics for Inventors, 3ed & 4ed

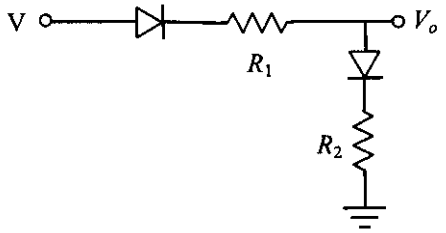
Simple Diodes	Table 4.1, p 411
LED Specifications:	Table 5.1, pp 503 - 504
Zener Diode Specifications:	Table 4.2, p 422

Review Problems

Additional Review Problems (Zeners, LED Applications) - See pages 2 - 4.

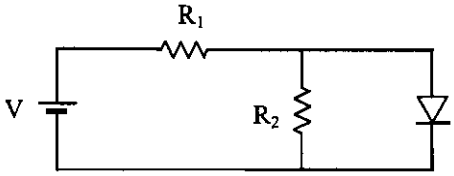
Types of possible exam questions and problems:
Calculate Zener circuit current and voltage values (V_{Zener}, I_{Zener}, V_{Load}, I_{Load}, I_{Total})
Calculate current limiting resistor values for simple LED circuits
Calculate minimum input voltage to activate LED voltage-level indicator circuits
Apply Transformer Equations (Turns, Input/Output Voltages, Currents, Power)
Solve Power Supply Design Problems (Output Voltages)

1. Given:
   D_1 and D_2 silicon diodes
   V = 18 volts
   R_1 = 1800 Ω
   R_2 = 470 Ω



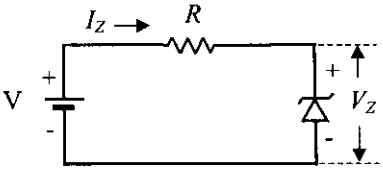
   Calculate:
   Diode Currents
   V_0

2. Given:
   D_1 silicon diode
   V = 14 volts
   R_1 = 220 Ω
   R_2 = 750 Ω



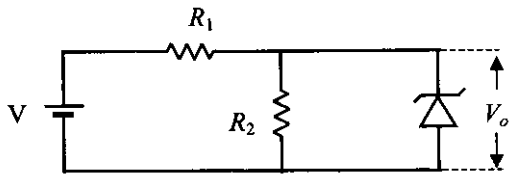
   Calculate:
   Diode Current
   V_{R1}
   V_{R2}
   I_{R1}
   I_{R2}

3. Given:
   V = 18 volts
   V_Z = 15.1 volts
   R = 620 Ω



   Calculate:
   I_Z
   V_R

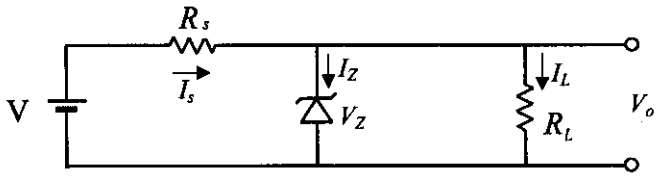
4. Given:
   V = 24 volts
   V_Z = 3.3 volts
   R_1 = 680 Ω
   R_2 = 200 Ω



   Calculate:
   V_o
   I_{R1}
   I_{R2}
   I_Z
   I_{Total}

5. Given:

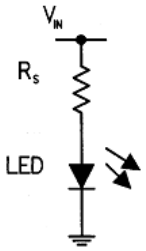
V = 9 volts
V_Z = 3.3 volts
R_S = 180 Ω
R_L = 220 Ω



Calculate:

V_o
I_L
I_Z
I_S

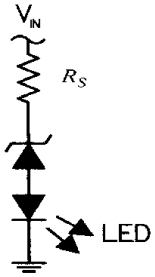
6. Current Limiting Resistor



Calculate Rs for

V_{in} = 3 V
V_{LED} = 1.2 V
I_{LED} = 15 mA

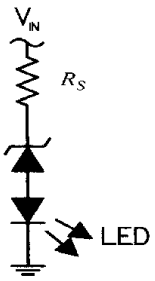
7. Voltage Indicator



Calculate Minimum Input Voltage

Rs = 470
V_{Zener} = 3.3 V
V_{LED} = 1.2 V
I_{LED} = 10 mA

8. Voltage Indicator



Rs = 220
V_{LED} = 2.7 V
I_{LED} = 15 mA

Determine the required Zener Diode (i.e., V_{Zener}) such that the LED is lite at V_{in} = 11.5 V
After determining the theoretical value for V_{Zener}, check your textbook or on-line for a real-world Zener diode value and recalculate the turn-on voltage.
Would Rs need to be increased or decreased to achieve Vin = 11.5 goal using the real-world Zener diode?

1. Diode Circuit
   Diode Currents = 7.3 mA
   V_0 = 4.1 V

2. Diode Circuit
   Diode Current = 59.5 mA
   V_{R1} = 13.3 V
   V_{R2} = 0.7 V
   I_{R1} = 60.4 mA
   I_{R2} = 0.93 mA

3. Zener Circuit
   I_Z = 4.7 mA
   V_R = 2.9 V

4. Zener Circuit
   V_o = 3.3 V
   I_{R1} = 30.4 mA
   I_{R2} = 16.5 mA
   I_Z = 13.9 mA
   I_{Total} = 30.4 mA

5. Zener Circuit
   V_o = 3.3 V
   I_L = 15 mA
   I_Z = 16.7 mA
   I_S = 31.7 mA

6. Current Limiting Resistor
   Rs = 120 Ω

7. LED Voltage Indicator
   V_{in} = 9.2 V

8. LED Voltage Indicator
   V_{Zener} (theoretical) = 5.5 V
   V_{Zener} (real world) = 5.6 V
   Rs = V_{Rs} would need to be adjusted from (0.15 x 220 - 3.3) to 3.2 volts;
   so adjusted Rs = 3.2 / 0.015 = 213 Ω.