Review materials include:

Reading Assignments & Homework

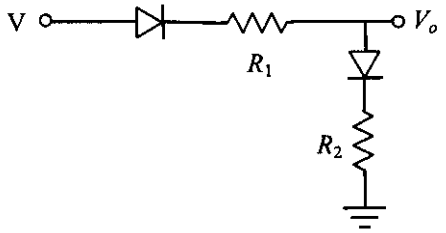
Course Notes
- *Diode Characteristics*
- *Diode Circuits, Examples, and Problems*
- *Zener Diode Circuits, Examples, and Problems*
- *Optoelectronics (LEDs, PhotoResistors, PhotoDiodes, PhotoTransistors, Diode Logic Gates)*

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

Types of possible exam questions and problems:
- Sketch diode characteristic voltage/current curves including barrier voltage values
- Sketch forward and reversed biased diode circuits including mechanical switch analogs
- Calculate diode circuit current and voltage values (including voltage drops across series diodes)
- 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
- Calculate voltage drops, current draws, and power consumption for LEDs in series and parallel configurations

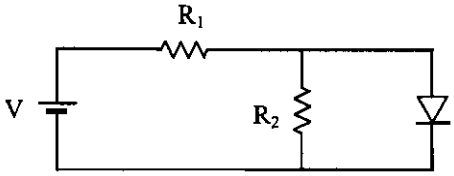
1. Given:
   D_1 and D_2 silicon diodes
   V = 18 volts
   R_1 = 1800 Ω
   R_2 = 470 Ω

   Calculate:
   Diode Currents
   V_0



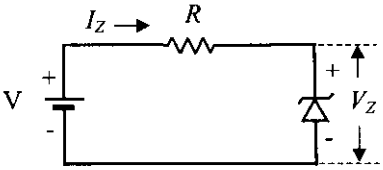
2. Given:
   D_1 silicon diode
   V = 14 volts
   R_1 = 220 Ω
   R_2 = 750 Ω

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



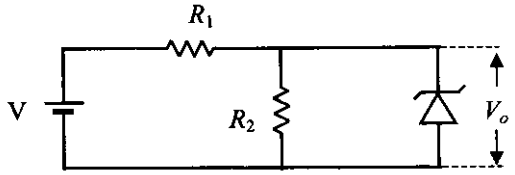
3. Given:
   V = 18 volts
   V_Z = 15.1 volts
   R = 620 Ω

   Calculate:
   I_Z
   V_R



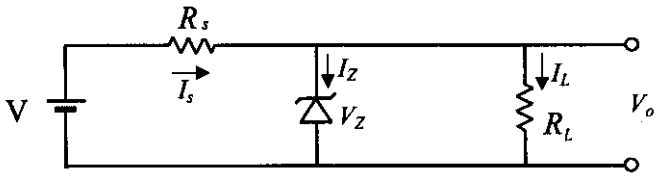
4. Given:
   V = 24 volts
   V_Z = 3.3 volts
   R_1 = 680 Ω
   R_2 = 200 Ω

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



5. Given:

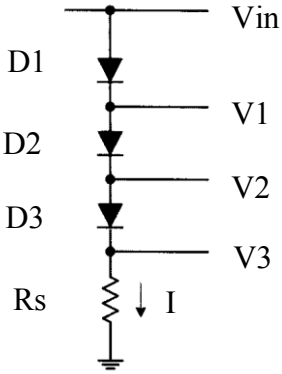
$V = 9$ volts
$V_Z = 3.3$ volts
$R_S = 180\ \Omega$
$R_L = 220\ \Omega$



Calculate:

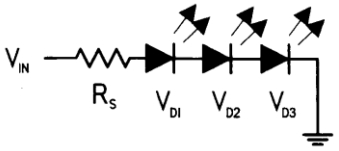
V_o
I_L
I_Z
I_S

6. **Diode Voltage Divider**



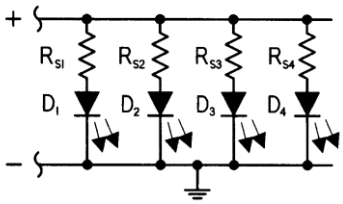
Calculate Rs for
$V_{in} = 9$ V
$V_D = 0.7$ V
$I = 7$ mA

7. **LEDs in Series**



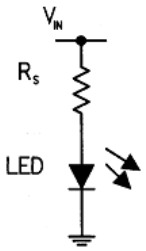
Calculate R_S for
$V_{in} = 12$ V
$V_{LED} = 1.5$ V
$I_{LED} = 20$ mA

8. **LEDs in Parallel**



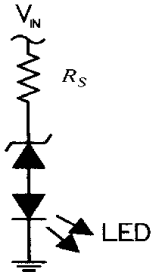
Calculate R_{Si} for
$V_{in} = 9$ V
$V_{LED1} = 1.2$ V $I_{LED} = 20$ mA
$V_{LED2} = 1.8$ V $I_{LED} = 20$ mA
$V_{LED3} = 2.4$ V $I_{LED} = 24$ mA
$V_{LED4} = 3.0$ V $I_{LED} = 15$ mA

9. **Current Limiting Resistor**



Calculate Rs for
$V_{in} = 3$ V
$V_{LED} = 1.2$ V
$I_{LED} = 15$ mA

10. **Voltage Indicator**



Calculate Minimum Input Voltage
$R_S = 470$
$V_{Zener} = 3.3$ V
$V_{LED} = 1.2$ V
$I_{LED} = 10$ mA

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. Diode Voltage Divider
   Rs = 986 Ω

7. LEDs in Series
   Rs = 375 Ω

8. LEDs in Parallel
   R_{S1} = 390 Ω R_{S2} = 360 Ω
   R_{S3} = 275 Ω
   R_{S4} = 400 Ω

9. Current Limiting Resistor
   Rs = 120 Ω

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