

Review materials include:

Reading Assignments & Homework

Course Notes

*Diode Characteristics*

*Diode Circuits, Examples, and Problems*

*Optoelectronics (LEDs, PhotoResistors, PhotoDiodes)*

Review Problems (See pages 2 & 3 below)

*Additional Review Problems (Diodes and 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)

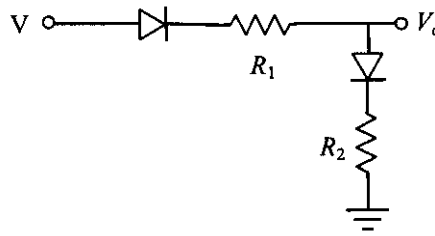
Calculate current limiting resistor values for simple LED circuits

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
- $R_1 = 1800 \Omega$
- $R_2 = 470 \Omega$

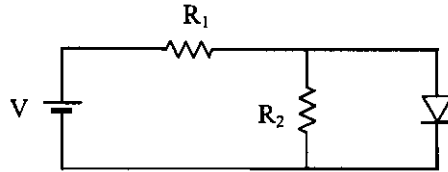


Calculate:

- Diode Currents ( $D_1$  &  $D_2$ )
- $V_o$

2. Given:

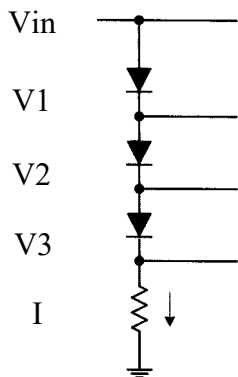
- $D_1$  silicon diode
- $V = 14$  volts
- $R_1 = 220 \Omega$
- $R_2 = 750 \Omega$



Calculate:

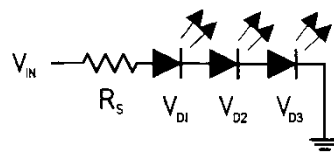
- Diode Current
- $V_{R1}$
- $V_{R2}$
- $I_{R1}$
- $I_{R2}$

3. Diode Voltage Divider



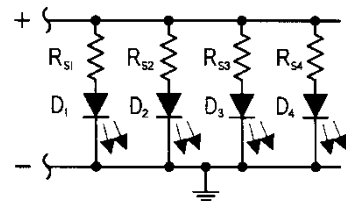
- Calculate  $R_s$  for
- $V_{in} = 9$  V
- $V_D = 0.7$  V
- $I = 7$  mA

4. LEDs in Series



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

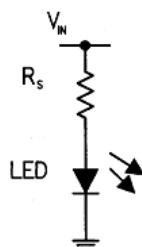
5. LEDs in Parallel



- Calculate  $R_{s_i}$  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

6. Current Limiting Resistor

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



## 1. Diode Circuit

Diode Currents = 7.3 mA

 $V_0 = 4.1 \text{ V}$ 

## 2. Diode Circuit

Diode Current = 59.5 mA

 $V_{R1} = 13.3 \text{ V}$  $V_{R2} = 0.7 \text{ V}$  $I_{R1} = 60.4 \text{ mA}$  $I_{R2} = 0.93 \text{ mA}$ 

## 3. Diode Voltage Divider

 $R_s = 986 \Omega$ 

## 4. LEDs in Series

 $R_s = 375 \Omega$ 

## 5. LEDs in Parallel

 $R_{S1} = 390 \Omega$  $R_{S2} = 360 \Omega$  $R_{S3} = 275 \Omega$  $R_{S4} = 400 \Omega$ 

## 6. Current Limiting Resistor

 $R_s = 120 \Omega$