Diode Exercises

Question 1

Draw the symbol for a diode, an LED and a zener diode

Question 2

What do the following terms mean when applied to diodes

a) Reverse bias

b) Forward bias

c) Anode

d) Cathode

e) Zener voltage

Question 3

State and explain three uses for a regular silicon diode

Question 4

An LED has a forward voltage of 2.5 volts and requires a current of 15 mA to operate

The LED is powered from a 15 V power supply

Calculate the value of the series resistor required

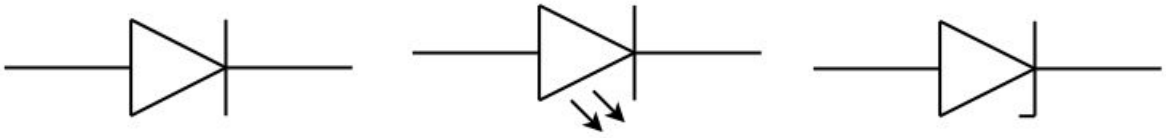
Question 5

A 5.1 V zener diode in series with a 33 Ω resistor is connected to a D.C. power supply that varies between 9 V and 10 V.

What is the minimum power rating of the zener diode?

Diode Exercise Answers

Question 1



Diode | Light Emitting Diode | Zener Diode

Question 2

a) Reverse bias: Connected so that current does not flow

b) Forward bias: Connected so that current can flow (given sufficient voltage)

c) Anode: The anode is connected to the positive side of the battery to make current flow through the diode. Current flows from the anode, through the diode and out of the cathode

d) Cathode. The cathode is connected to the negative side of the battery when current flows through the diode

Question 3

1. Preventing current flow in one direction, for instance in logic circuits
2. Protecting devices such as bipolar transistors and MOSFETs when they are used with an inductive load (one that contains a coil)
3. Rectifying A.C. to produce D.C.
4. Creating a fixed voltage reference of 0.7 volts

Question 4

Voltage drop across resistor:	$15 - 2.5 = 12.5\,V$
Current through resistor	$15\,mA = 0.015\,A$
Resistance, R = V / I	$R = 12.5 / 0.015 = 830\,\Omega$

Question 5

Worst case is when power supply is 10 V and all current flows through zener diode

In this case the voltage across the resistor is $10 - 5.1 = 4.9$ V

Therefore the current through the resistor is $I = V / R = 4.9 / 33 = 0.15$ A

And so the current through the zener diode is also 0.15 A

The power dissipated by the zener diode is $P = V \times I = 5.1 \times 0.15 = 0.77$ W

Therefore the minimum power rating of the zener diode is about 0.8 W