

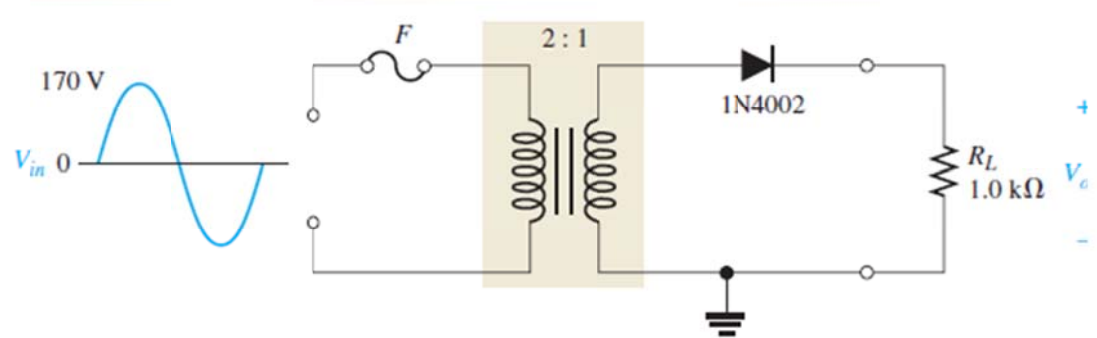
# Electronic Circuits I - Tutorial 03

## Diode Applications I

T & F

#	Question	
1	A diode can conduct current in two directions with equal ease.	F
2	When reverse-biased, a diode ideally appears as a short.	F
3	A basic half-wave rectifier consists of one diode.	T
4	The diode in a half-wave rectifier conducts for half the input cycle.	T

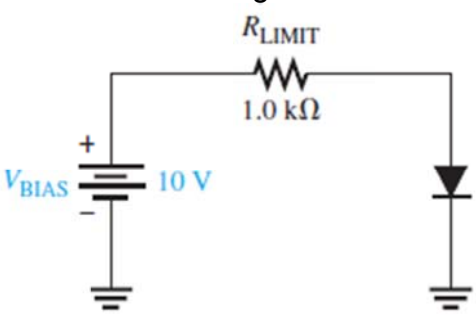
MCQ1

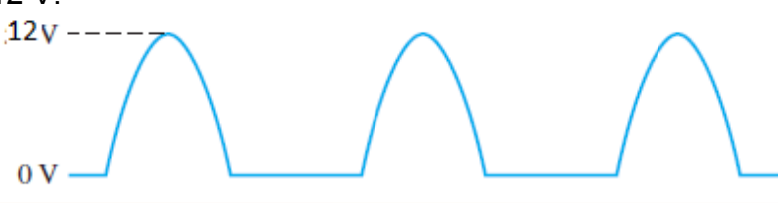
#	Question	
1	When a diode is forward-biased and the bias voltage is increased, the forward current will <b>(a) increase (b) decrease (c) not change</b>	a
2	When a diode is reverse-biased and the bias voltage is increased, the reverse current (assuming the practical model) will <b>(a) increase (b) decrease (c) not change</b>	c
3	When a diode is forward-biased and the bias voltage is increased, the voltage across the diode (assuming the complete model) will <b>(a) increase (b) decrease (c) not change</b>	a
4	If the forward current in a diode is decreased, the diode voltage (assuming the complete model) will <b>(a) increase (b) decrease (c) not change</b>	b
5	If the input voltage in Figure 2-28 is increased, the peak inverse voltage across the diode will  <b>(a) increase (b) decrease (c) not change</b>	a

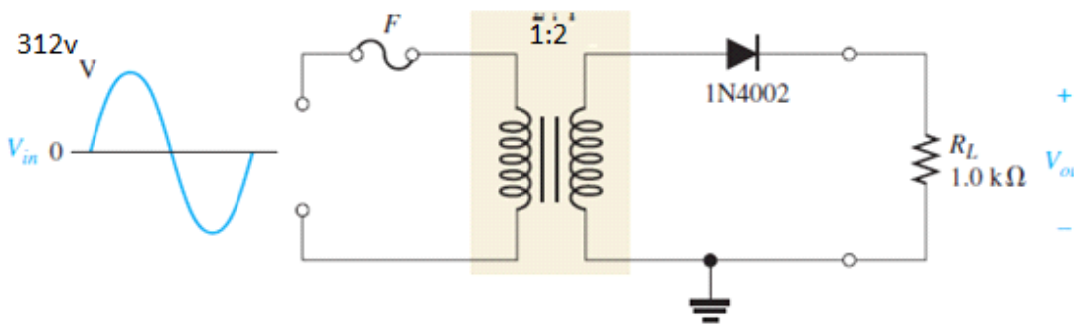
MCQ 2

#	Question	Answer
1	1. The term <i>bias</i> means (a) the ratio of majority carriers to minority carriers (b) the amount of current across a diode (c) a dc voltage is applied to control the operation of a device (d) neither (a), (b), nor (c)	c
2	When a diode is forward-biased, (a) the only current is hole current (b) the only current is electron current (c) the only current is produced by majority carriers (d) the current is produced by both holes and electrons	d
3	For a silicon diode, the value of the forward-bias voltage typically (a) must be greater than 0.3 V (b) must be greater than 0.7 V (c) depends on the width of the depletion region (d) depends on the concentration of majority carriers	b
4	A diode is normally operated in (a) reverse breakdown (b) the forward-bias region (c) the reverse-bias region (d) either (b) or (c)	d
5	The $V-I$ curve for a diode shows (a) the voltage across the diode for a given current (b) the amount of current for a given bias voltage (c) the power dissipation (d) none of these	a
6	In the practical diode model, (a) the barrier potential is taken into account (b) the forward dynamic resistance is taken into account (c) none of these (d) both (a) and (b)	a
7	The average value of a half-wave rectified voltage with a peak value of 200 V is (a) 63.7 V (b) 127.2 V (c) 141 V (d) 0 V	a
8	The peak value of the input to a half-wave rectifier is 10 V. The approximate peak value of the output is (a) 10 V (b) 3.18 V (c) 10.7 V (d) 9.3 V	d

Problems

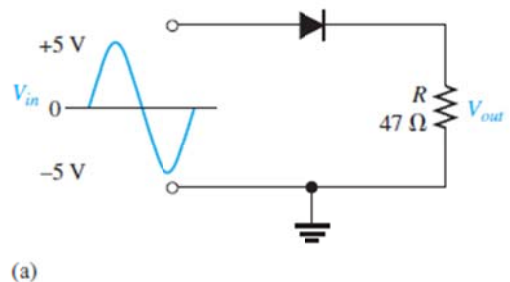
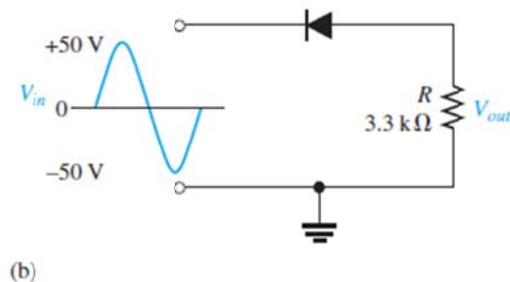
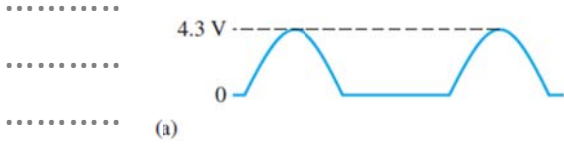
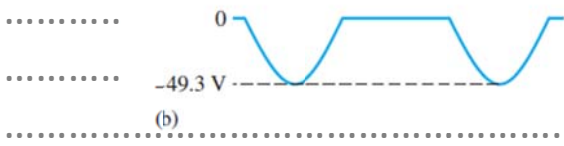
<p>Problem 1</p>	<p>Assume that the diode in Figure 2–18(a) fails open. What is the voltage across the diode and the voltage across the limiting resistor?</p> 
<p>Answer 1</p>	<p><math>V_d=10V, V_{Rlimit}=0;</math></p>

<p>Problem 2</p>	<p>Determine the average value of the half-wave voltage if its peak amplitude is 12 V.</p> 
<p>Answer 2</p>	<p>3.82 V</p>

<p>Problem 3</p>	<p>(a) Determine the peak value of the output voltage for Figure 2–28 if <math>n = 2</math> and <math>V_{p(in)} = 312 \text{ V}</math>.</p> <p>(b) What is the PIV across the diode?</p> <p>(c) Describe the output voltage if the diode is turned around.</p> 
<p>Answer 3</p>	<p>(a) 623.3 V    (b) 624 V    (c) negative half-cycles rather than positive half cycles</p>

<p>Q4</p>	<p>To forward-bias a diode, to which region must the positive terminal of a voltage source be connected?</p>
<p>Sol 4</p>	<div style="border: 1px solid black; width: 400px; height: 60px; margin-bottom: 5px;"></div> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

<p>Q5</p>	<p>Explain how to generate the forward-bias portion of the characteristic curve.</p>
<p>Sol 5</p>	<div style="border: 1px solid black; width: 400px; height: 100px; margin-bottom: 5px;"></div> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

Q6	<p>Draw the output voltage waveform for each circuit in Figure and include the voltage values</p> <div style="display: flex; justify-content: space-around;"> <div>  <p>(a)</p> </div> <div>  <p>(b)</p> </div> </div>
Sol 6	<div style="display: flex; justify-content: space-around;"> <div>  <p>(a)</p> </div> <div>  <p>(b)</p> </div> </div>

Q7	<p>Calculate the average value of a half-wave rectified voltage with a peak value of 200 V.</p>
Sol 7	<div style="border: 1px solid black; width: 400px; height: 60px; margin: 0 auto;"></div>