

Electronic Circuits – Assignment

03

Diode Applications I

#	Student ID	Student Name	Grade (10)
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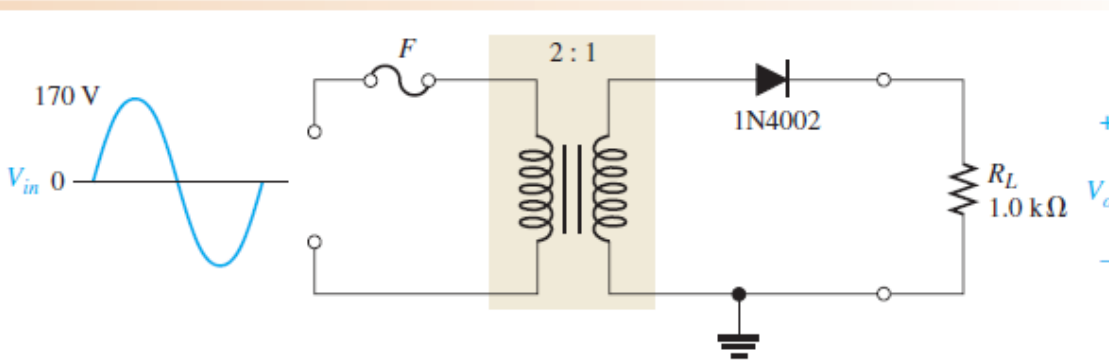
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١. يتم تسليم التمرين محلولا في خلال أسبوع من تاريخ التمرين، و يتم حذف درجتين من التمرين عن كل أسبوع تأخير
٢. يتم التسليم لمعيد المقرر مباشرة
٣. تتم أجابه التمرين في نفس ورق الأسئلة

T & False questions

#	Question	Answer
1	The two regions of a diode are the anode and the collector.	
2	A diode conducts current when forward-biased.	
3	Two types of current in a diode are electron and hole.	
4	The output frequency of a half-wave rectifier is twice the input frequency.	
5	PIV stands for positive inverse voltage.	
6	The output frequency of a full-wave rectifier is twice the input frequency.	

MCQ

#	Question	Answer
1	When a diode is forward-biased and the bias voltage is increased, the voltage across the diode (assuming the practical model) will (a) increase (b) decrease (c) not change	
2	When a diode is reverse-biased and the bias voltage is increased, the reverse current (assuming the complete model) will (a) increase (b) decrease (c) not change	
3	If the forward current in a diode is increased, the diode voltage (assuming the practical model) will (a) increase (b) decrease (c) not change	
4	If the barrier potential of a diode is exceeded, the forward current will (a) increase (b) decrease (c) not change	
5	If the turns ratio of the transformer in Figure 2-28 is decreased, the forward current through the diode will  (a) increase (b) decrease (c) not change	



6	<p>If the PIV rating of the diodes in Figure 2–36 is increased, the current through R_L will</p> <p>(a) increase (b) decrease (c) not change</p>	
7	<p>To forward-bias a diode,</p> <p>(a) an external voltage is applied that is positive at the anode and negative at the cathode (b) an external voltage is applied that is negative at the anode and positive at the cathode (c) an external voltage is applied that is positive at the p region and negative at the n region (d) answers (a) and (c)</p>	
8	<p>Although current is blocked in reverse bias,</p> <p>(a) there is some current due to majority carriers (b) there is a very small current due to minority carriers (c) there is an avalanche current</p>	
9	<p>When forward-biased, a diode</p> <p>(a) blocks current (b) conducts current (c) has a high resistance (d) drops a large voltage</p>	
10	<p>The dynamic resistance can be important when a diode is</p> <p>(a) reverse-biased (b) forward-biased (c) in reverse breakdown (d) unbiased</p>	
1	<p>Ideally, a diode can be represented by a</p> <p>(a) voltage source (b) resistance (c) switch (d) all of these</p>	
1	<p>In the complete diode model,</p> <p>(a) the barrier potential is taken into account (b) the forward dynamic resistance is taken into account (c) the reverse resistance is taken into account (d) all of these</p>	
13	<p>When a 60 Hz sinusoidal voltage is applied to the input of a half-wave rectifier, the output frequency is</p> <p>(a) 120 Hz (b) 30 Hz (c) 60 Hz (d) 0 Hz</p>	



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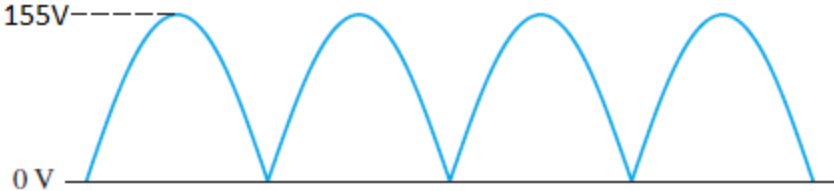
14	For the circuit in Question 15, the diode must be able to withstand a reverse voltage of (a) 10 V (b) 5 V (c) 20 V (d) 3.18 V	
15	When a 60 Hz sinusoidal voltage is applied to the input of a full-wave rectifier, the output frequency is (a) 120 Hz (b) 60 Hz (c) 240 Hz (d) 0 Hz	
16	When the peak output voltage is 100 V, the PIV for each diode in a center-tapped full-wave rectifier is (neglecting the diode drop) (a) 100 V (b) 200 V (c) 141 V (d) 50 V	



Problems

Problem 1	<p>Determine the peak output voltages for the rectifiers in Figure 2-24 if the peak input in part (a) is 3 V and the peak input in part (b) is 50 V.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(a)</p> </div> <div style="text-align: center;"> <p>(b)</p> </div> </div>
Answer 1	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>



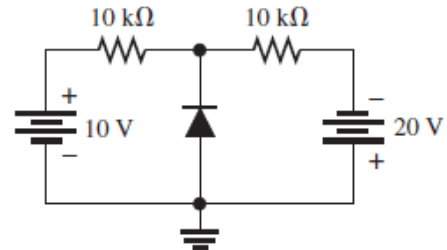
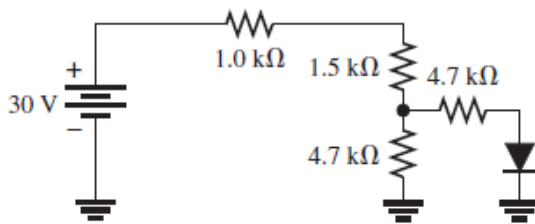
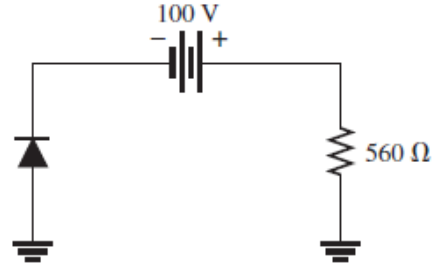
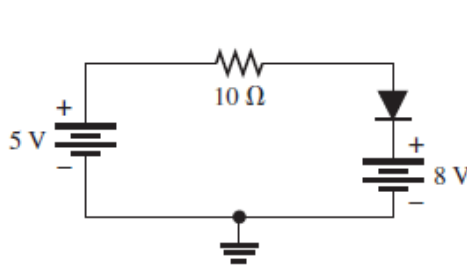
Problem 2	<p>Find the average value of the full-wave rectified voltage if its peak is 155 V.</p> 
Answer 2	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>



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Q4	What would cause the barrier potential of a silicon diode to decrease from 0.7 V to 0.6 V?
Sol 4	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

Q5 Determine the voltage across each diode in Figure, assuming the practical model.



Sol 5

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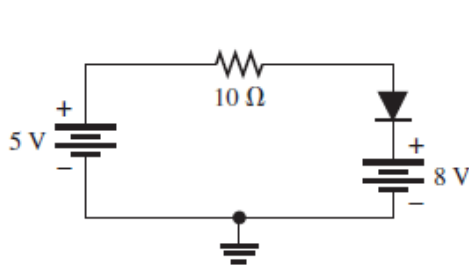
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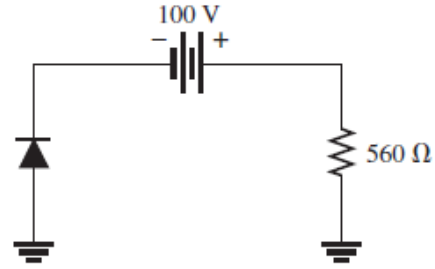
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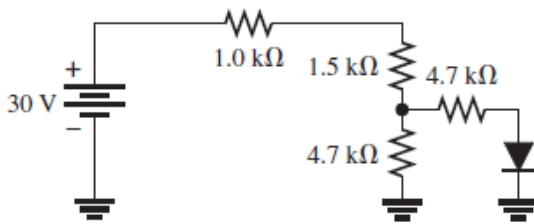
Q6 Determine the voltage across each diode in Figure, using the complete diode model with $r_f = 10 \Omega$ and $r_r = 100 \text{ MA}$.



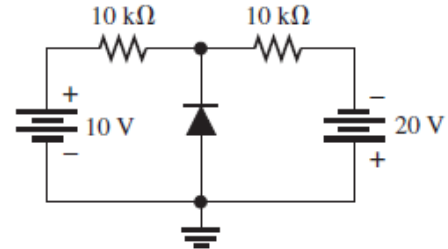
(a)



(b)



(c)

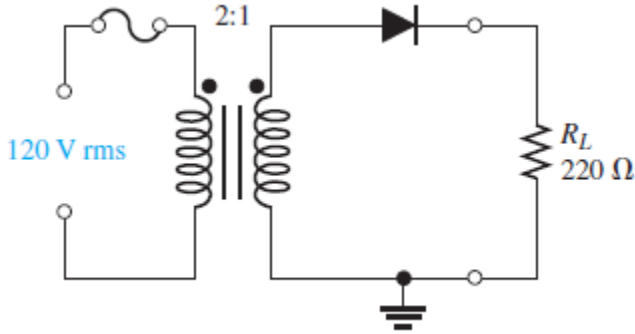


(d)

Sol 6
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Q9 Determine the peak and average power delivered to R_L in Figure



Sol
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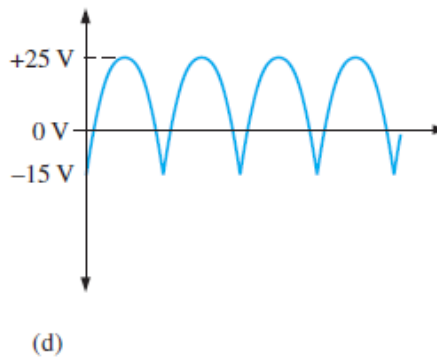
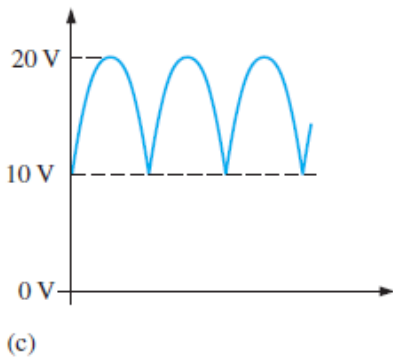
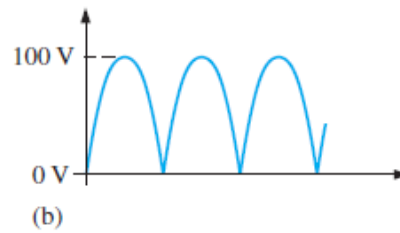
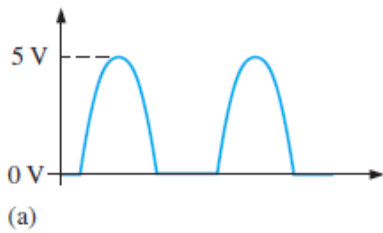
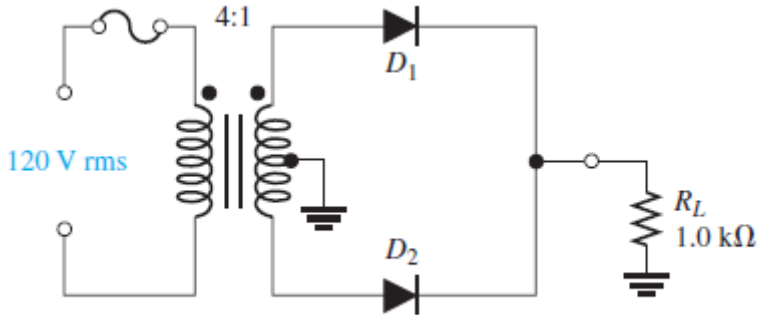


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Q10

Consider the circuit in Figure.

- (a) What type of circuit is this?
- (b) What is the total peak secondary voltage?
- (c) Find the peak voltage across each half of the secondary.
- (d) Sketch the voltage waveform across R_L .
- (e) What is the peak current through each diode?
- (f) What is the PIV for each diode?



Sol
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