Electronic Circuits – Assignment 06

Special Purpose Diodes II

#	Student ID	Student Name	Grade (10)
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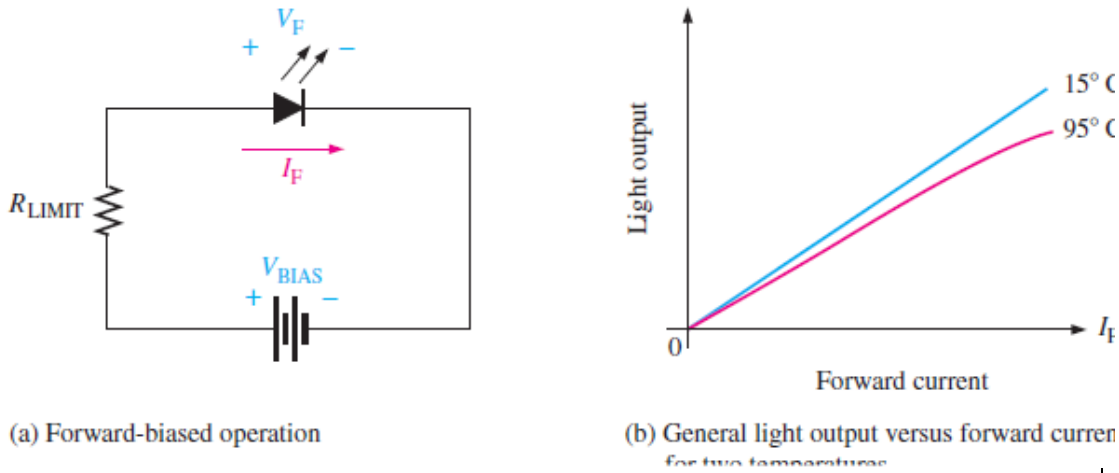
Delivery Date	

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 & F

#	Question	
1	The LED is based on the process of electroluminescence.	
2	OLED stands for operational light-emitting diode.	
3	The reverse current of a photodiode increases as the incident light increases.	

MCQ

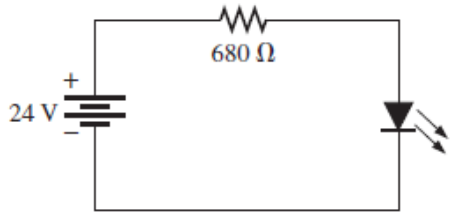
#	Question	
1	 (a) Forward-biased operation (b) General light output versus forward curren If the bias voltage in Figure 3–30 is reversed, the light output of the LED will **(a)** increase **(b)** decrease **(c)** not change **(b)**	
2	A varactor diode exhibits **(a)** a variable capacitance that depends on reverse voltage **(b)** a variable resistance that depends on reverse voltage **(c)** a variable capacitance that depends on forward current **(d)** a constant capacitance over a range of reverse voltages	
3	Compared to a visible red LED, an infrared LED **(a)** produces light with shorter wavelengths **(b)** produces light of all wavelengths **(c)** produces only one color of light **(d)** produces light with longer wavelengths	
4	An OLED differs from a conventional LED in that it **(a)** requires no bias voltage **(b)** has layers of organic material in the place of a *pn* junction **(c)** can be implemented using an inkjet printing process **(d)** both (b) and (c)	

5	The internal resistance of a photodiode **(a)** increases with light intensity when reverse-biased **(b)** decreases with light intensity when reverse-biased **(c)** increases with light intensity when forward-biased **(d)** decreases with light intensity when forward-biased	
	A diode that has a negative resistance characteristic is the **(a)** Schottky diode **(b)** tunnel diode **(c)** laser diode **(d)** hot-carrier diode	

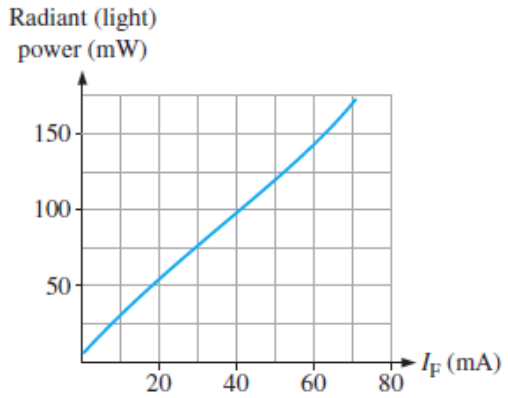
Problems:

1

The LED in Figure 3–73(a) has a light-producing characteristic as shown in part (b). Neglecting the forward voltage drop of the LED, determine the amount of radiant (light) power produced in mW.



(a)



(b)

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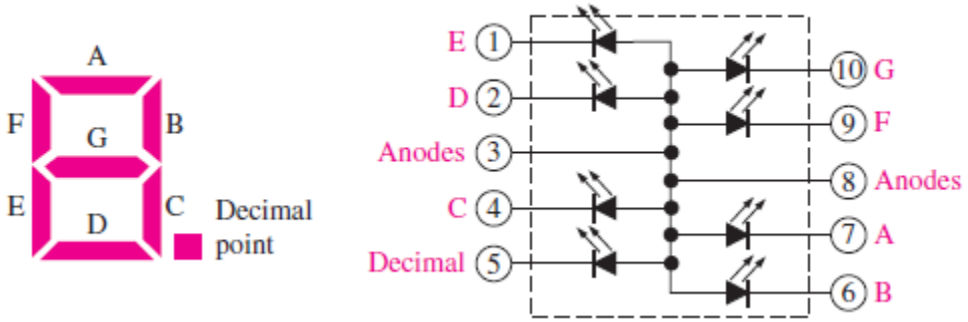
Determine how to connect the seven-segment display in Figure 3–74 to display "5." The maximum continuous forward current for each LED is 30 mA and a +5 V dc source is to be used.



	Specify the number of limiting resistors and their value for a series-parallel array of 48 red LEDs using a 9 V dc source for a forward current of 20 mA.
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	Develop a yellow LED traffic-light array using a minimum number of limiting resistors that operates from a 24 V supply and consists of 100 LEDs with $I_F = 30$ mA and an equal number of LEDs in each parallel branch. Show the circuit and the resistor values.
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	For a certain photodiode at a given irradiance, the reverse resistance is 200 kΩ and the reverse voltage is 10 V. What is the current through the device?
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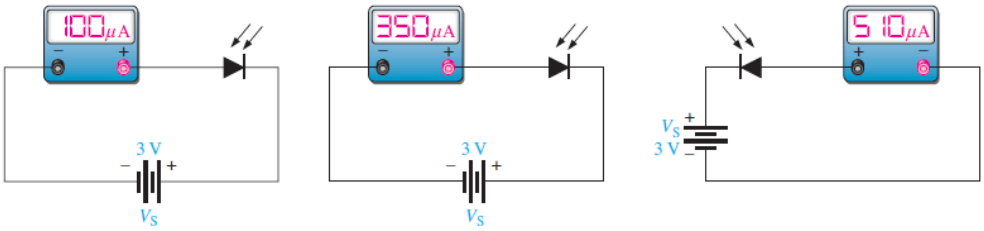
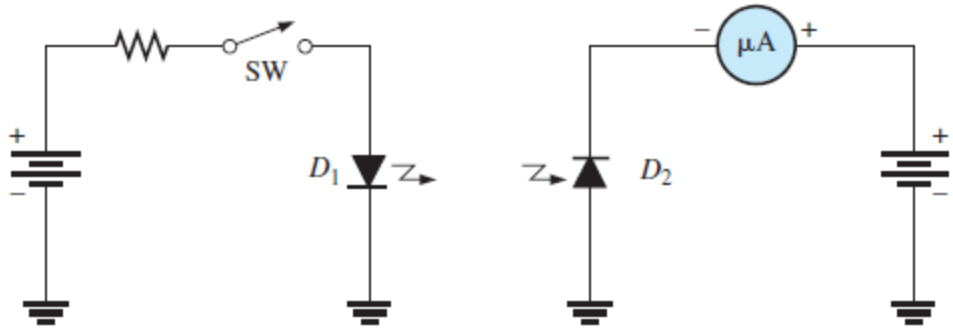


What is the resistance of each photodiode in Figure 3–75?

When the switch in Figure 3–76 is closed, will the microammeter reading increase or decrease? Assume D_1 and D_2 are optically coupled.