

Power Electronics

3rd Year

2023 / 2024

**Chapter 2-2
DIODE LOGIC GATES**

Prepared by:

Dr. Zeyad Taha Yaseen



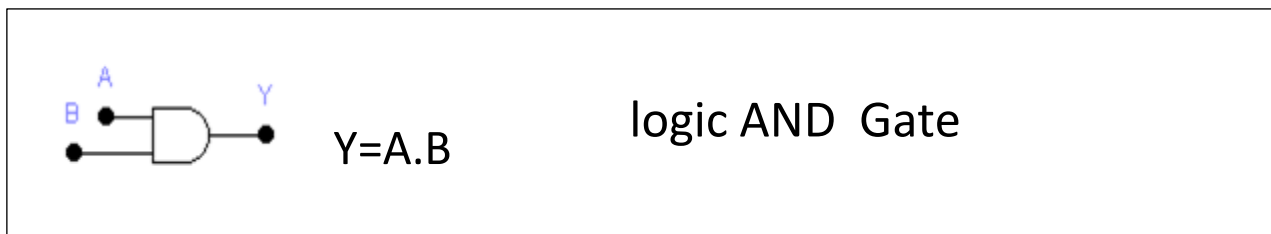
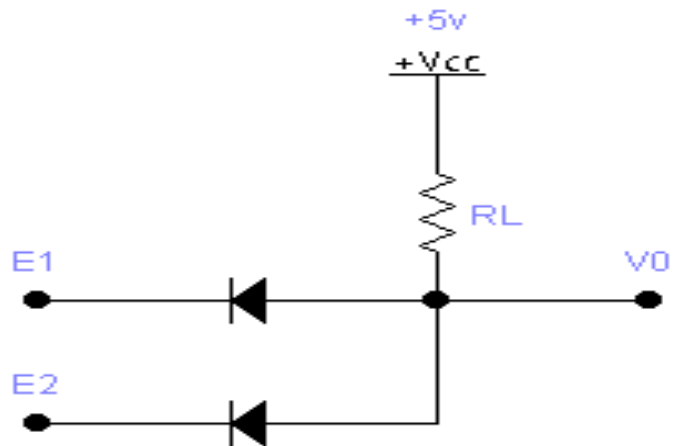
7. DIODE LOGIC GATES

Diode can be used to form logic gates, which perform some of the logical operations required in digital computers.

7.1- AND Gate

Truth table

E_2	E_1	V_0
0V	0V	0V
0V	+5V	0V
+5V	0V	0V

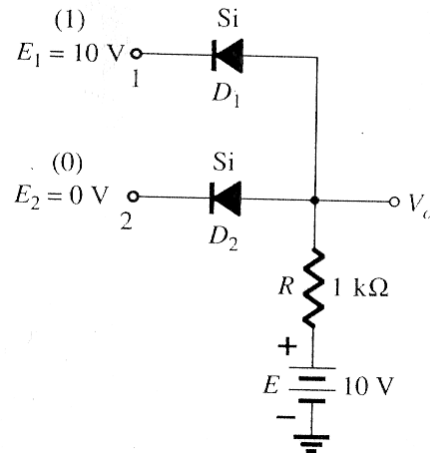


The output of AND Gate becomes 5V only when all input are equal to 5V

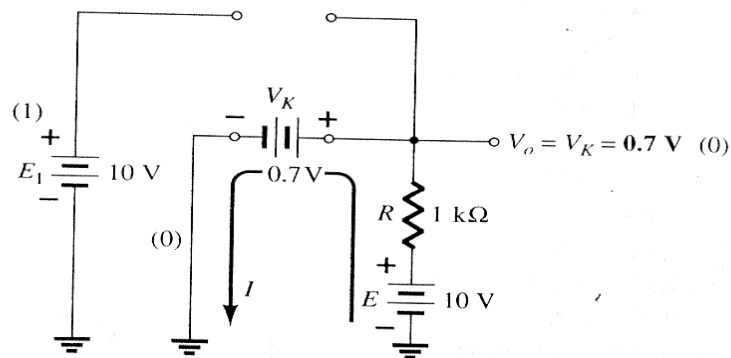


EXAMPLE 7.1

Determine V_o and I for the logic AND gate of Fig.(7-1)



SOLUTION



$$V_o = V_K = 0.7V$$

$$I = \frac{V_R}{R} = \frac{E - V_K}{R}$$

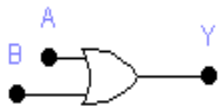
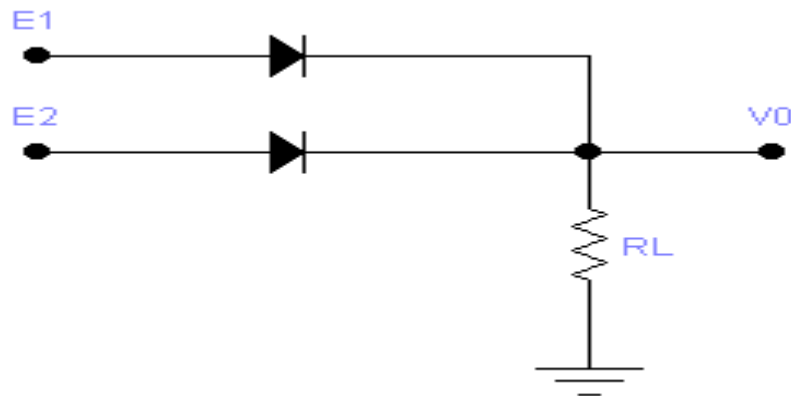
$$I = \frac{10 - 0.7}{1 \times 10^3} = 9.3mA$$



7.2 OR Gate

Truth table

E_2	E_1	V_0
0 V	0 V	0 V
0V	+5V	+5V
+5V	0V	+5V



$$Y=A+B$$

logic OR Gate

The output of OR Gate becomes 5V if one or both inputs are 5V.



EXAMPLE 7.2

Determine V_o and I for the network of Fig.(7-2)

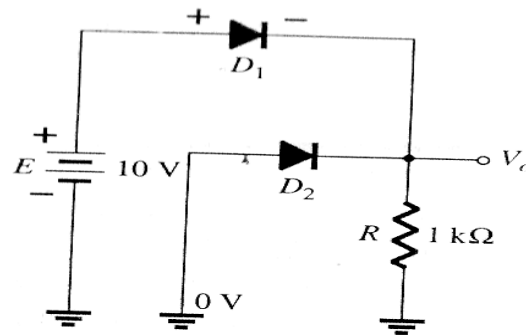
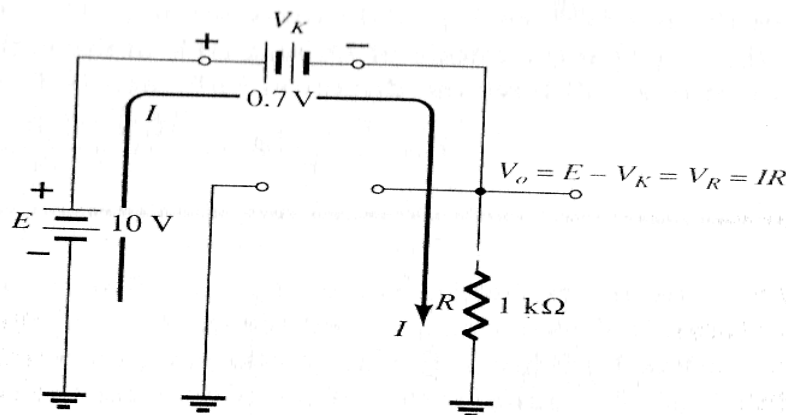


Fig.(7-2)

SOLUTION



$$V_o = E - V_K = 10 - 0.7 = 9.3V$$

$$I = \frac{V_o}{R} = \frac{9.3}{1 \times 10^3} = 9.3mA$$