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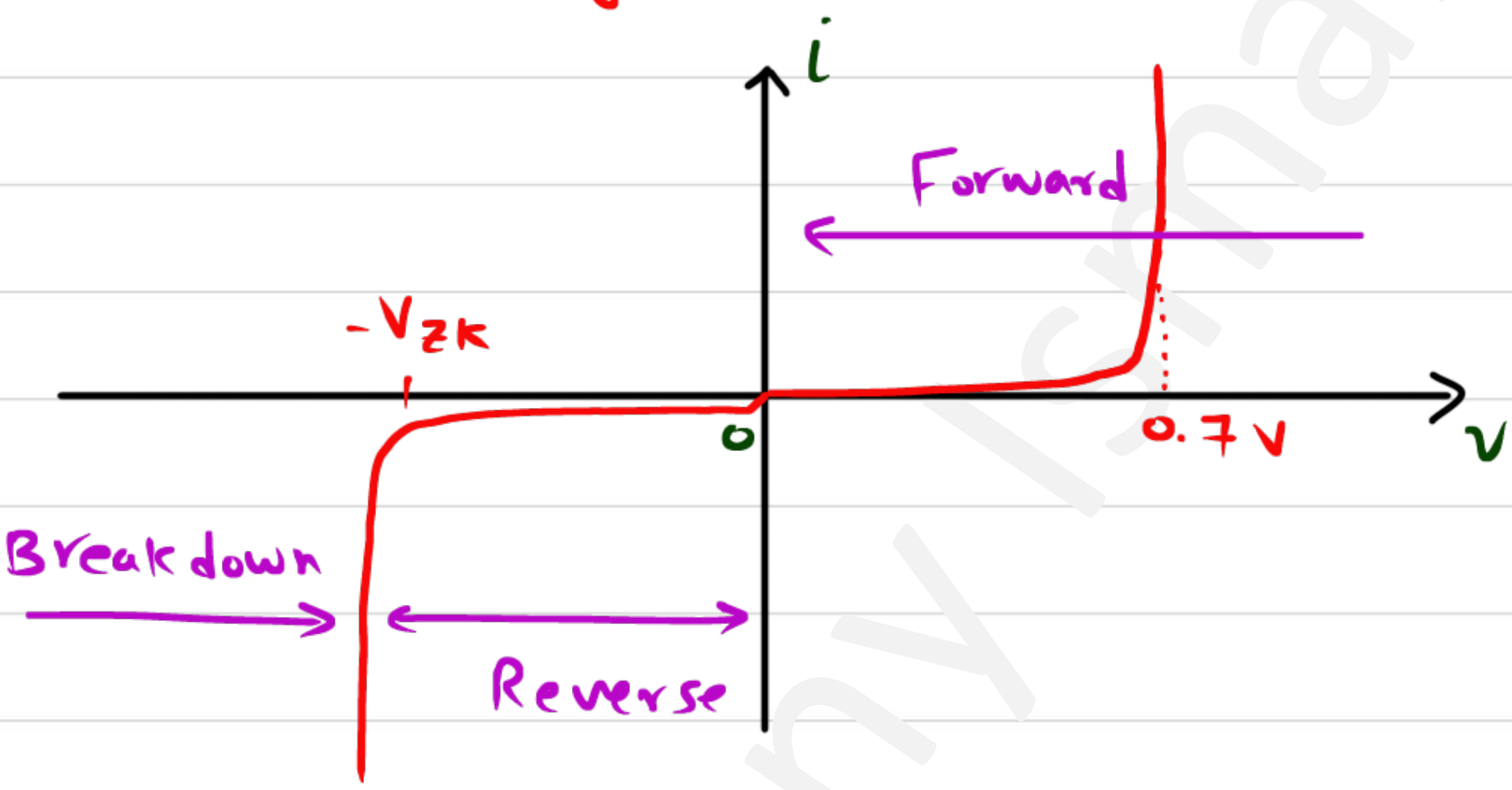
فالكم A

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Lecture 1 → Diode



* Characteristic of junction Diodes:



* Diode current equation:

$$i = I_s\left(e^{\frac{v}{nV_T}} - 1\right) \quad , \quad V_T = \frac{kT}{q}$$

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* Diode operation types:

① ideal diode model .

Forward
يستبدل الدايود بـ
Short circuit
ON

Reverse
يستبدل الدايود بـ
open circuit
off

② Voltage drop model .

Forward
يستبدل الدايود بـ
بطارية قيمتها 0.7 =
ON

Reverse
يستبدل الدايود بـ
open circuit
off

$k \longrightarrow \times 10^{3}$

$M \longrightarrow \times 10^{6}$

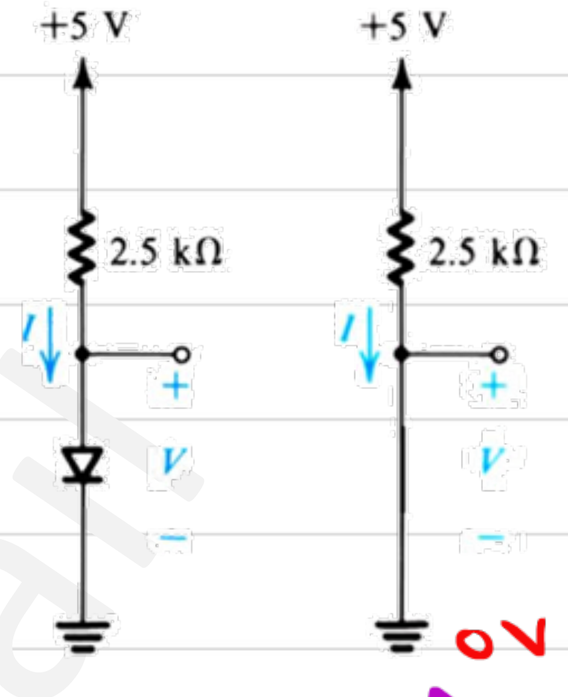
$m \longrightarrow \times 10^{-3}$

$\mu \longrightarrow \times 10^{-6}$

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Question (1): Find the value of *I* and *V* in the circuits shown. Use the ideal diode model.



Solution:

assume the diode is ON (short circuit)

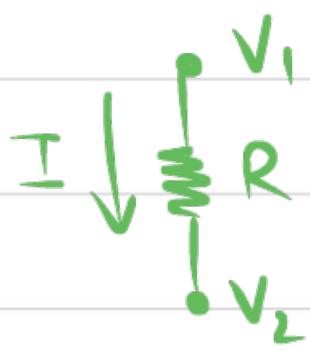
$\therefore I = \frac{5 - 0}{2.5 \times 10^3} = 2 \text{ mA}$

$\therefore I > 0$

$\therefore$ The assumption is correct

(Diode is ON)

$\therefore V = 0$



$I = \frac{\text{البداية} - \text{النهاية}}{R}$

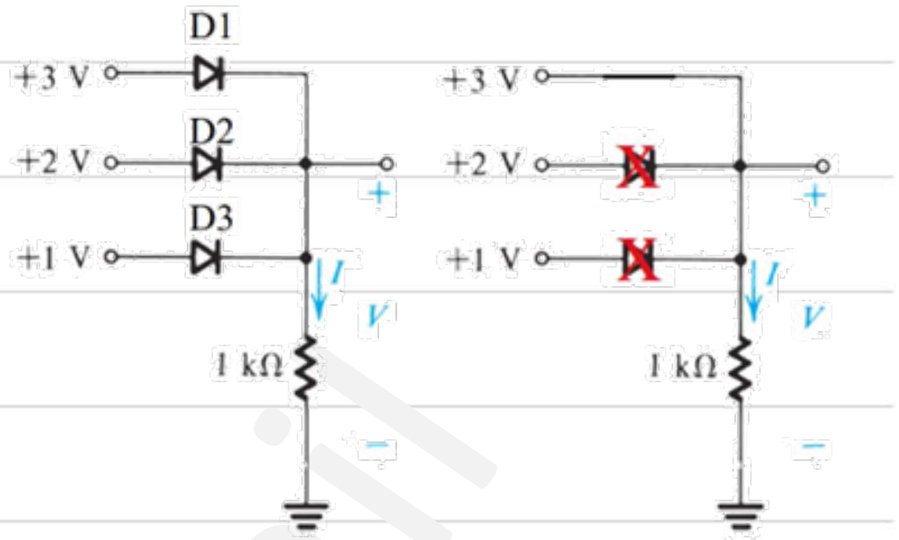
$= \frac{V_1 - V_2}{R}$

* ملحوظة:

Zero = Short circuit على الفولت

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Question (2): Find the value of *I* and *V* in the circuits shown. Use the ideal diode model.



Solution

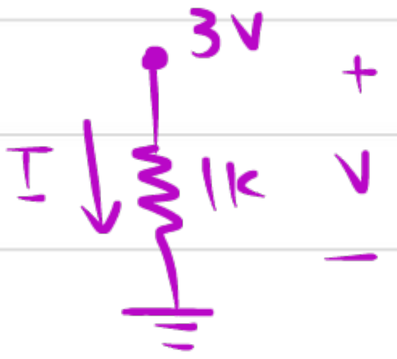
The given circuit is OR gate

∴ D_1 is ON

D_2 and D_3 are off

$$I = \frac{3-0}{1\times10^3} = 3\ mA$$

$$V = 3\ V$$



ملحوظه:

* فى حالة OR gate ← الدايود المتصل بالقولت الأكبر يكون ON والباقى يكون off

* فى حالة AND gate ← الدايود المتصل بالقولت الأقل يكون ON والباقى يكون off