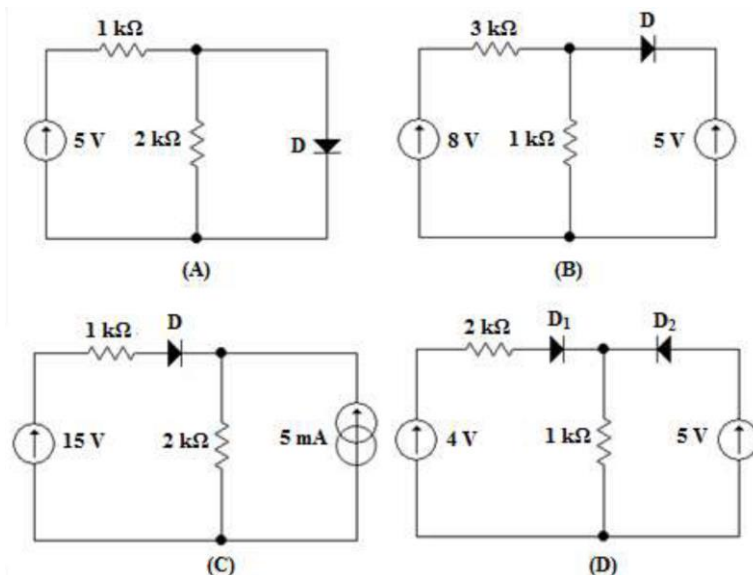


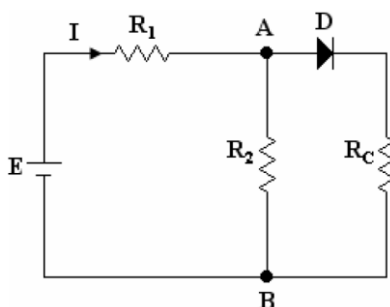
TD N°1

Exercise 1: For each of the following circuits, determine the state of the diode (assumed ideal) and calculate the current flowing through it.



Exercise 2:

Consider the following circuit:



I – Replace the circuit seen between points A and B with its **Thevenin equivalent**, and calculate E_{Th} and R_{Th} .

II – Calculate the current **I** in the following three cases:

1. The diode is **ideal**.
2. The diode has a **threshold voltage** ($V_D = 0.7 V$).
3. The diode has a **threshold voltage** and a **series resistance** R_D .

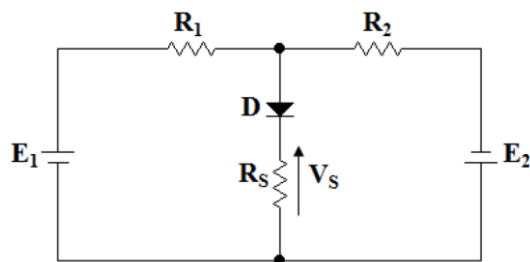
Given: $E=12 V$, $R_1 = 6 k\Omega$, $R_2 = 3 k\Omega$, $R_C = 1 k\Omega$, and $R_D = 100 \Omega$

Exercise 3:

Study the following electrical circuit in the two cases below:

Case 1: $E_1 = 3 V$ and $E_2 = 4 V$

Case 2: $E_1 = 15 V$ and $E_2 = 10 V$

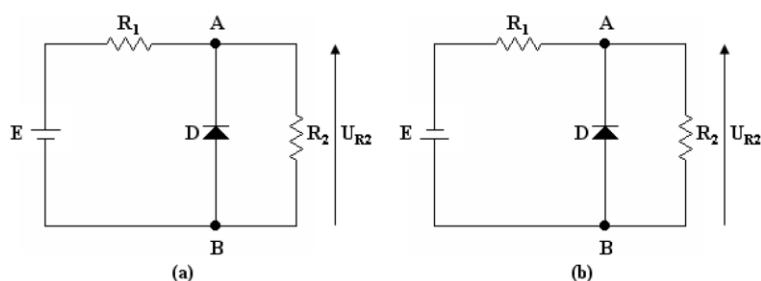


Use the ideal and real diode models to calculate the voltage V_S across the resistor R_S .

Given: $R_1 = R_2 = R_D = 1\Omega$, $R_S = 2\Omega$ and $V_D = 0.6 V$

Exercise 4:

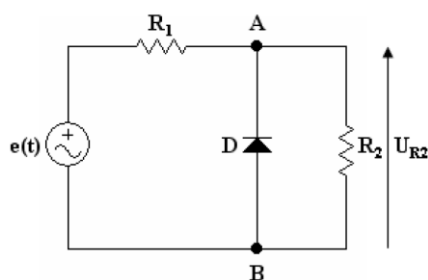
I – Consider the following diagrams:



$V_D = 0.6 V$ and $R_1 = R_2 = 1k\Omega$

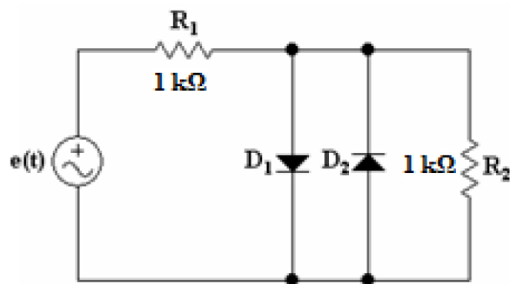
- With $E = 5 V$, calculate the voltage across R_2 (U_{R_2}).
- Replace the DC voltage source E with an AC voltage source:

$$e(t) = 5 \sin\left(\frac{2\pi}{T} t\right), \text{ and } T = 20 \text{ ms}$$



Determine the voltage across R_2 (U_{R_2}).

For the following circuit:



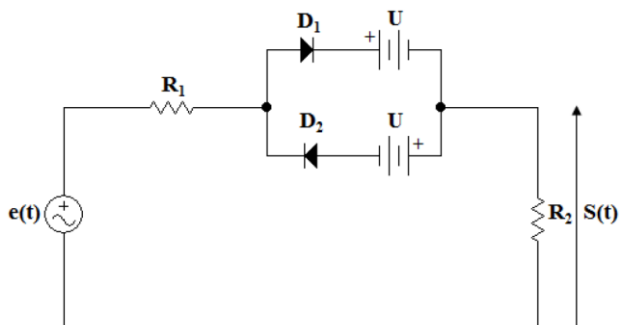
$e(t) = 5 \sin\left(\frac{2\pi}{T}t\right)$, and: $T = 20 \text{ ms}$. $V_{D_1} = V_{D_2} = 0.6 \text{ V}$ and $R_1 = R_2 = 1 \text{ k}\Omega$

Determine the voltage across R_2 (U_{R_2}).

Exercise 5:

Consider the circuit shown in the figure below where $e(t) = E \sin(\omega t)$.

Let D_1 and D_2 be real diodes. Both diodes have a threshold voltage V_0 , a dynamic resistance R_d in the forward direction, and an infinite resistance in the reverse direction.



Calculate $S(t)$ for the following cases:

1. D_1 conducts and D_2 is blocked.
2. D_2 conducts and D_1 is blocked.
3. Both diodes are blocked at the same time.