

PRÁTICA 2 – CIRCUITOS COM DIODO

Revisão

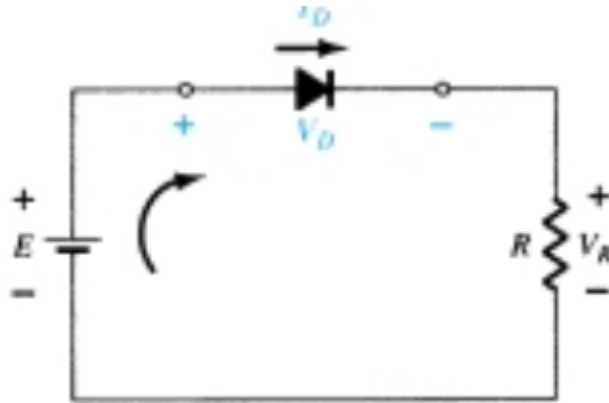
SEL0610 - LABORATÓRIO DE CIRCUITOS ELETRÔNICOS

Engenharia de Computação – 6º Período Letivo

Conteúdo

- Reta de Carga
- Diodo em série (análise DC)
- Diodo em série (análise AC)
 - Retificador de Meia Onda
- Tensão de Pico Reversa
- Referência

Reta de Carga



Lei das Tensões de Kirchhoff

$$E - V_D - V_R = 0$$

$$E = V_D + I_D R$$

Para $V_D = 0 \text{ V}$

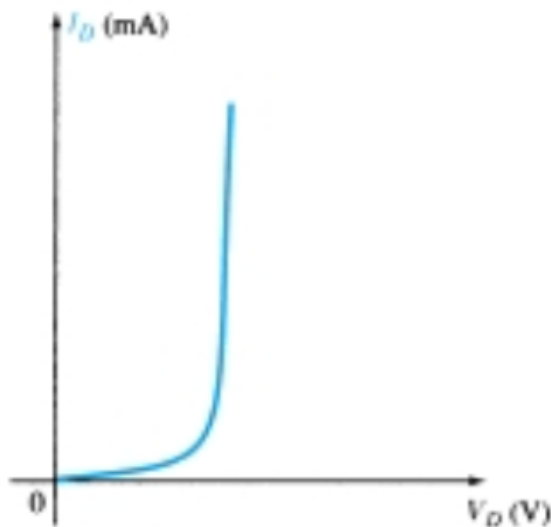
$$\begin{aligned} E &= V_D + I_D R \\ &= 0 \text{ V} + I_D R \end{aligned}$$

$$I_D = \frac{E}{R} \Big|_{V_D=0 \text{ V}}$$

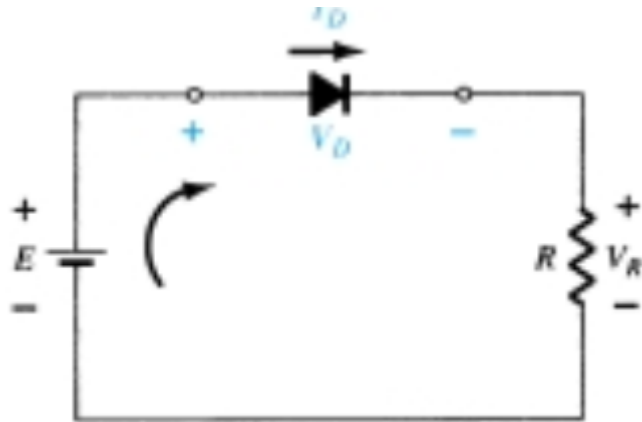
Para $I_D = 0 \text{ A}$

$$\begin{aligned} E &= V_D + I_D R \\ &= V_D + (0 \text{ A}) R \end{aligned}$$

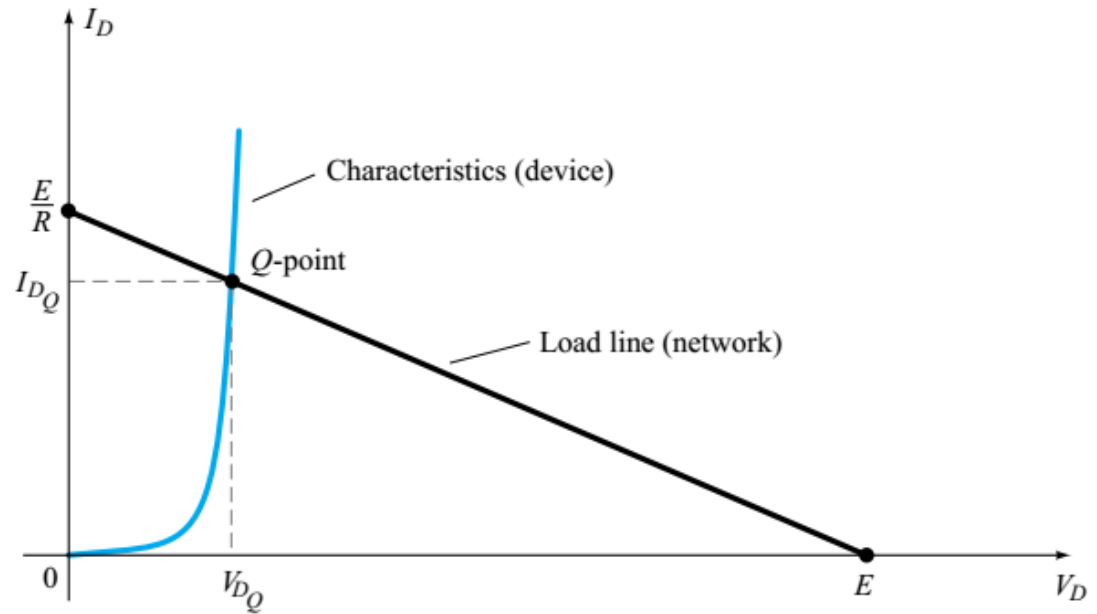
$$V_D = E \Big|_{I_D=0 \text{ A}}$$



Reta de Carga



Reta de Carga e Ponto de Operação



Para $V_D = 0 \text{ V}$

$$\begin{aligned} E &= V_D + I_D R \\ &= 0 \text{ V} + I_D R \end{aligned}$$

$$I_D = \frac{E}{R} \Big|_{V_D=0 \text{ V}}$$

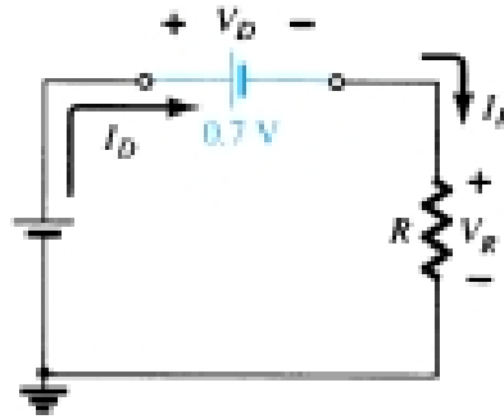
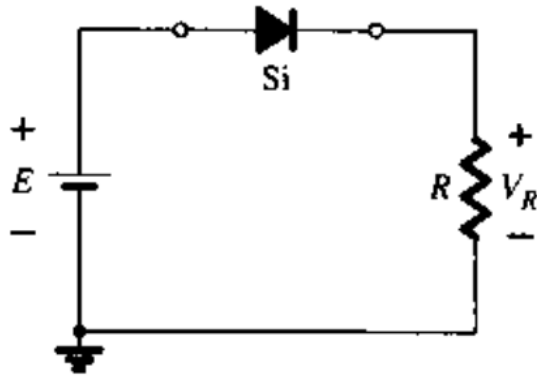
Para $I_D = 0 \text{ A}$

$$\begin{aligned} E &= V_D + I_D R \\ &= V_D + (0 \text{ A}) R \end{aligned}$$

$$V_D = E \Big|_{I_D=0 \text{ A}}$$

Diodo em série (análise DC)

Polarização Direta

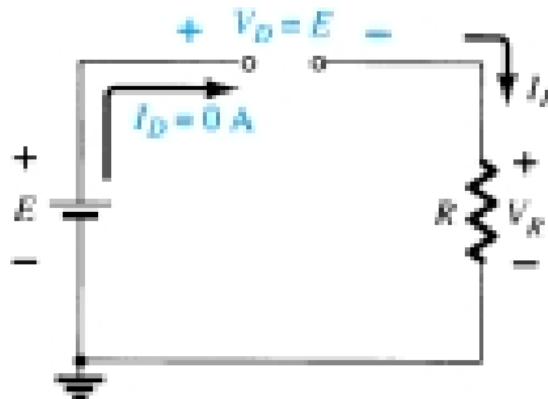
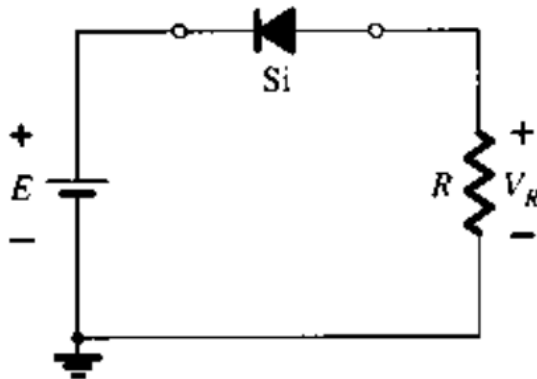


$$V_D = V_T$$

$$V_R = E - V_T$$

$$I_D = I_R = \frac{V_R}{R}$$

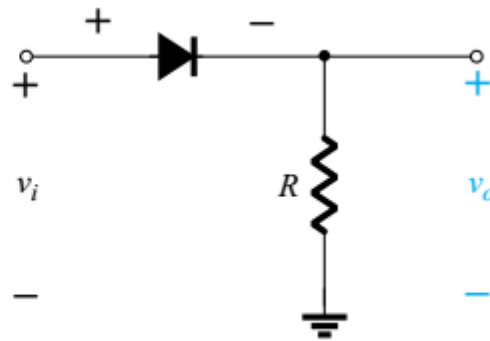
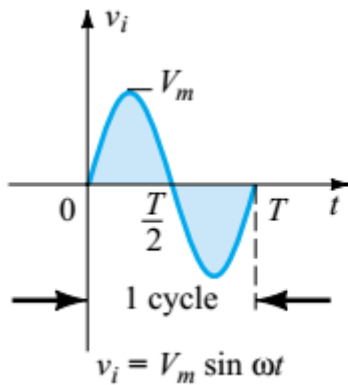
Polarização Reversa



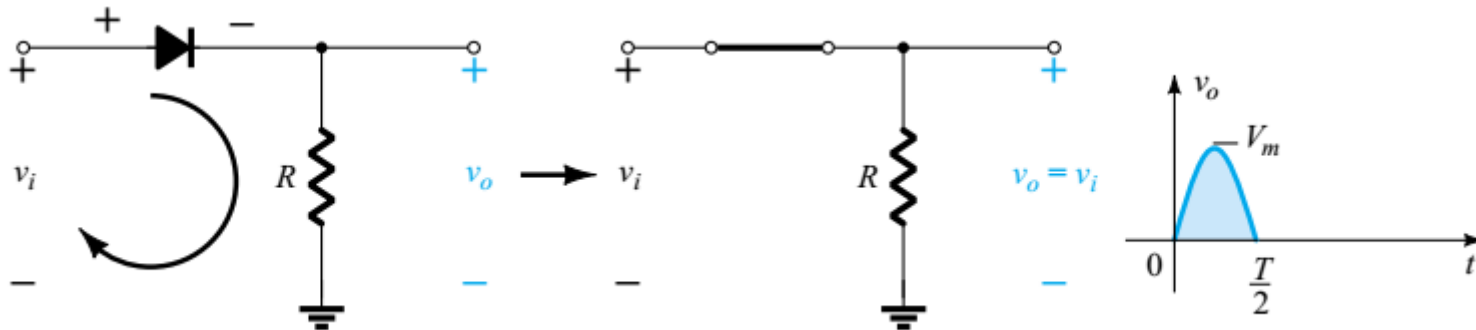
$$V_R = I_R R = I_D R = (0 \text{ A}) R = 0 \text{ V}$$

Diodo em série (análise AC)

■ Retificador de Meia Onda

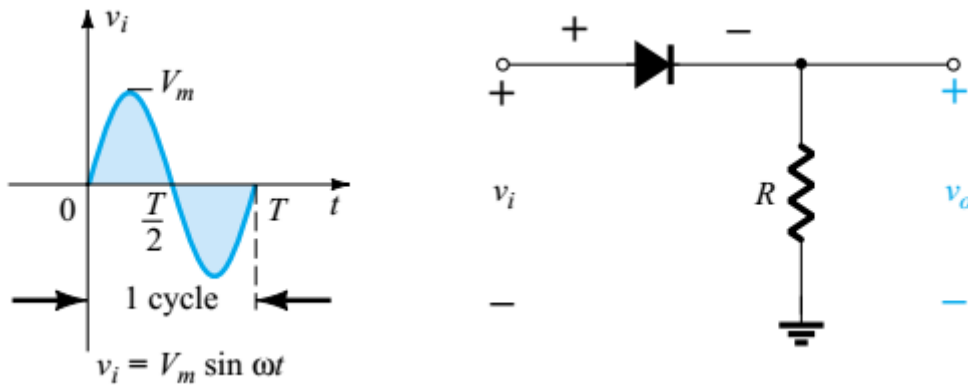


Polarização Direta

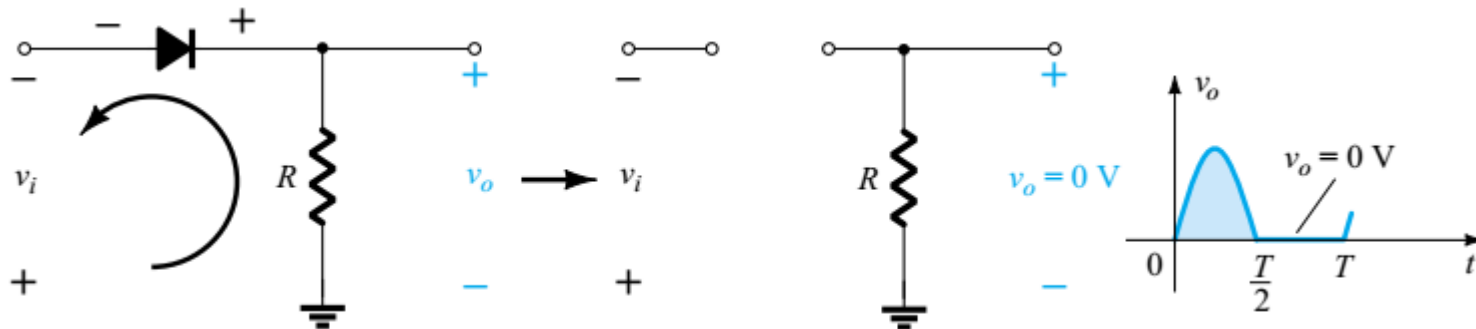


Diodo em série (análise AC)

■ Retificador de Meia Onda

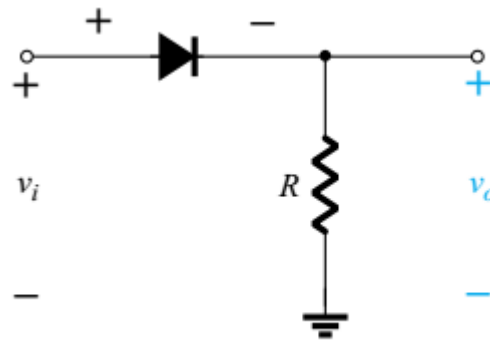
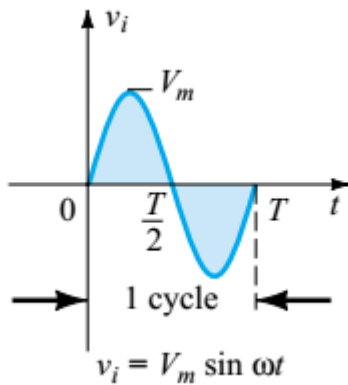


Polarização Reversa

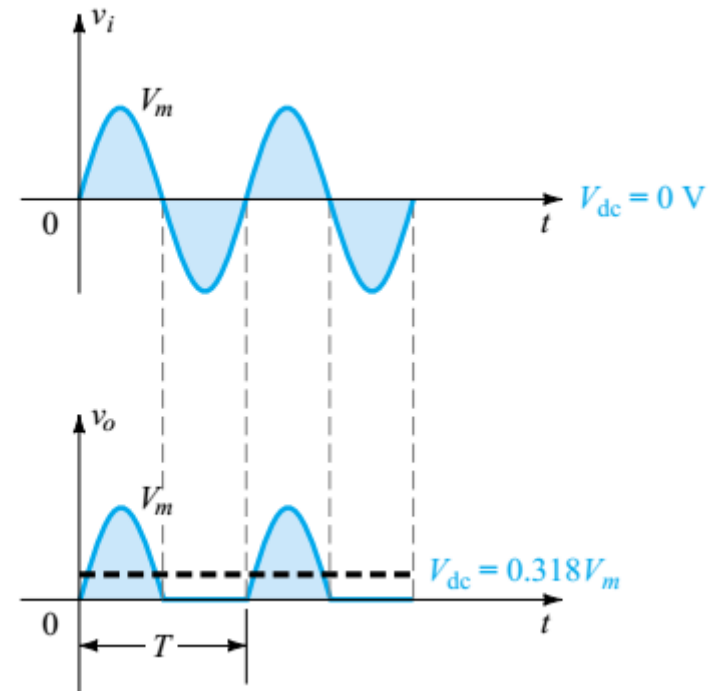


Diodo em série (análise AC)

■ Retificador de Meia Onda



Tensão de saída completa

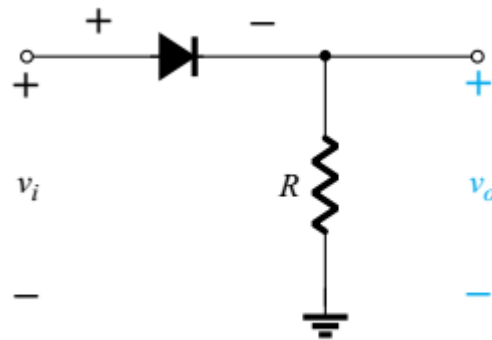
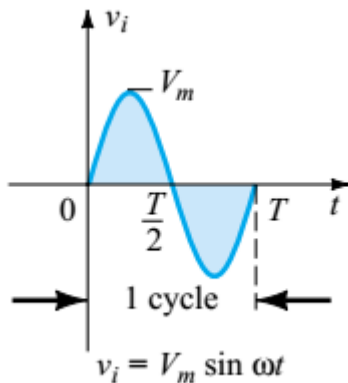


$$V_{dc} = 0.318 V_m \quad \text{half-wave}$$

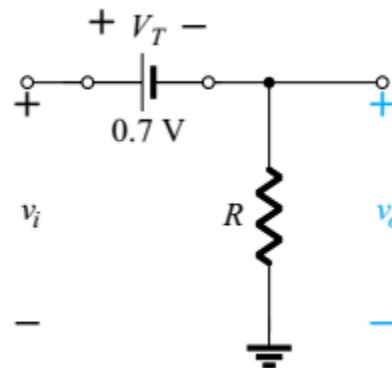
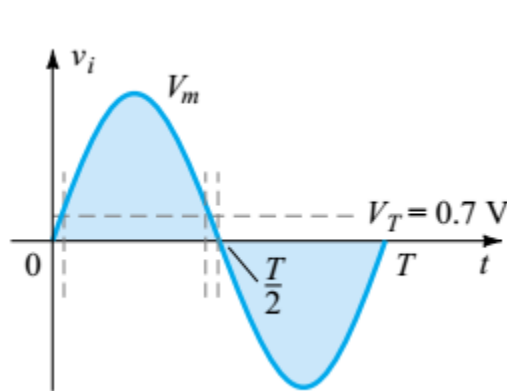
Boa aproximação para $V_m \gg V_T$

Diodo em série (análise AC)

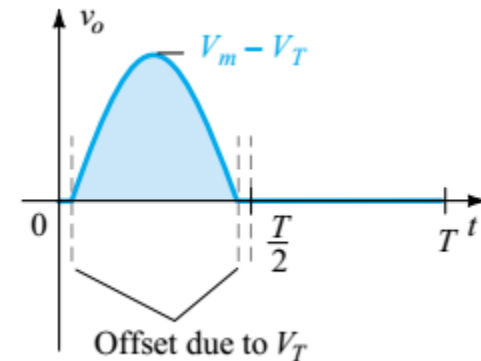
■ Retificador de Meia Onda



Tensão de saída completa considerando V_T

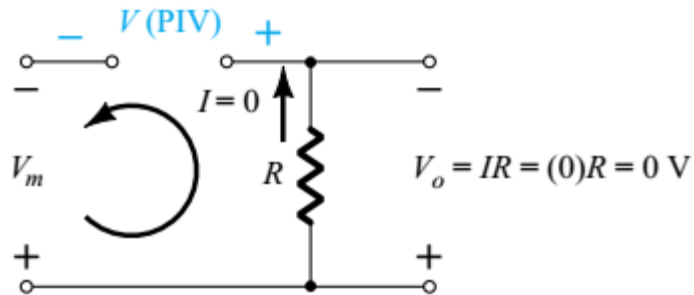


$$V_{dc} \cong 0.318(V_m - V_T)$$



Tensão de Pico Reversa

- PIV (*Peak Inverse Voltage*) ou PRV (*Peak Reverse Voltage*)



$$\text{PIV rating} \geq V_m$$

half-wave rectifier

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	1N4001	1N4002	1N4003	1N4004	1N4005	1N4006	1N4007	UNIT
Maximum repetitive peak reverse voltage	V_{RRM}	50	100	200	400	600	800	1000	V

Referência

Boylestad, R. L., Nashelsky, L. Dispositivos Eletrônicos e teoria de circuitos, 8ª. Edição, Pearson.