PRÁTICA 3 – REGULADORES E FONTES CC

Revisão

SEL0610 - LABORATÓRIO DE CIRCUITOS ELETRÔNICOS

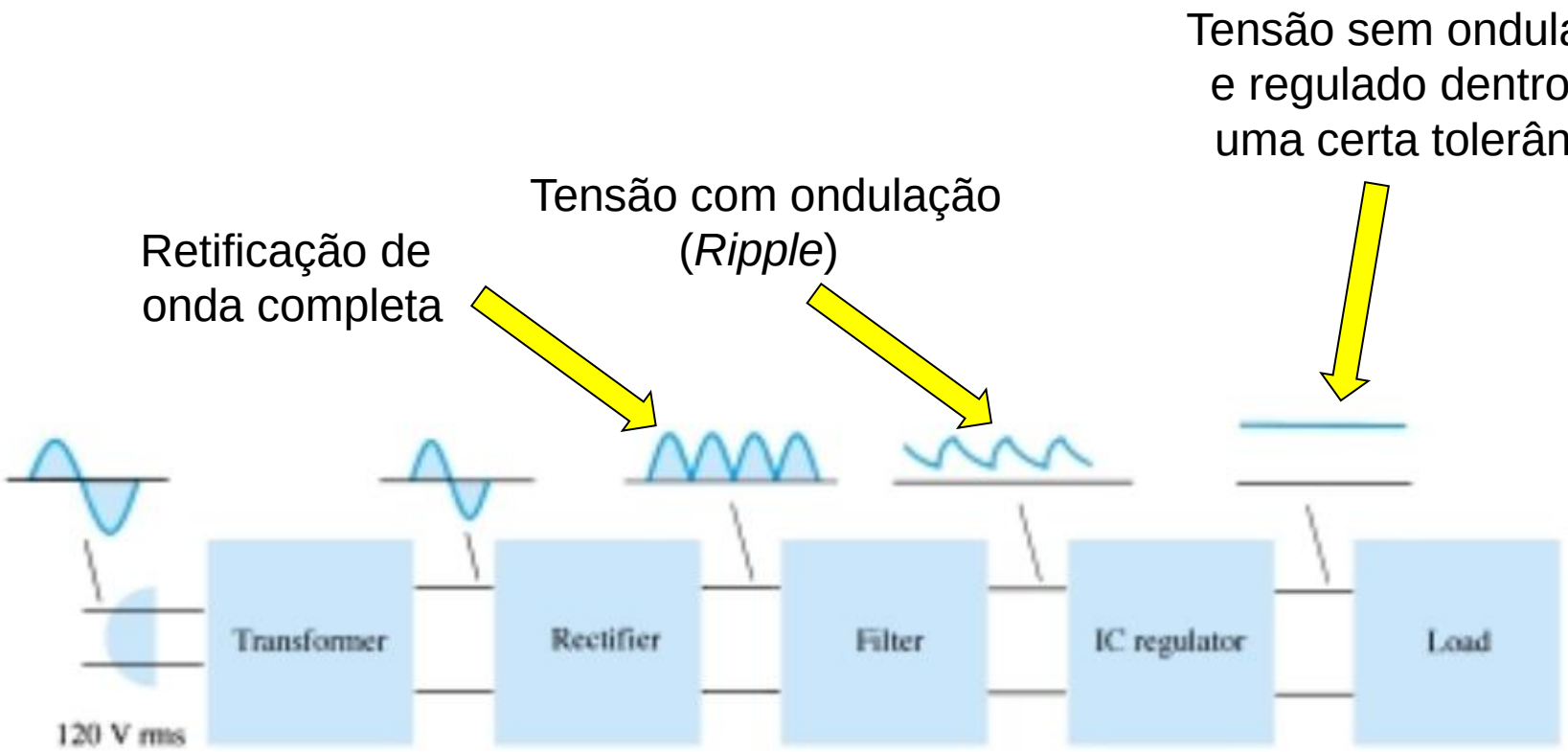
Engenharia de Computação – 6° Período Letivo

Conteúdo

- Fonte de Tensão
- Retificação de Meia Onda
- Retificação de Onda Completa
- Tensão de Ondulação
- Filtro a Capacitor
- Referência

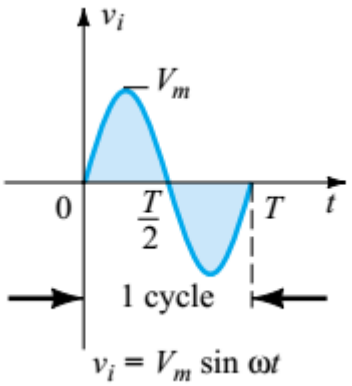
Fonte de Tensão

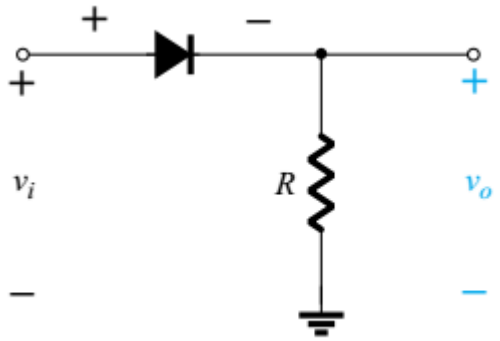
Diagrama em blocos de uma fonte de tensão



Retificação de Meia Onda

- Retificador de Meia Onda

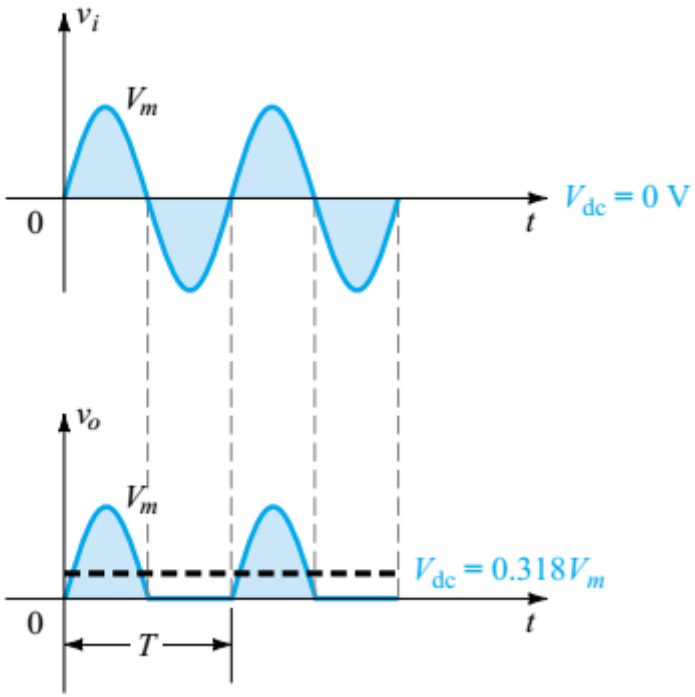




$$V_{dc} = 0.318 V_m$$ half-wave

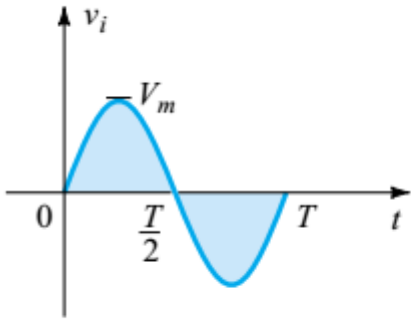
Boa aproximação para $V_m >> V_T$

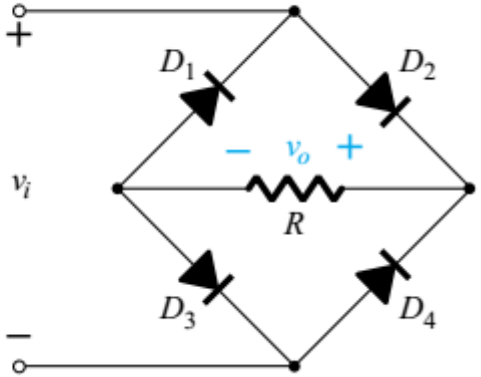
Tensão de saída completa

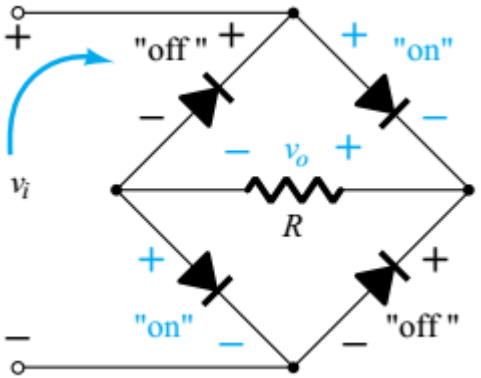


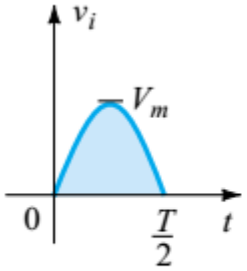
Retificação de Onda Completa

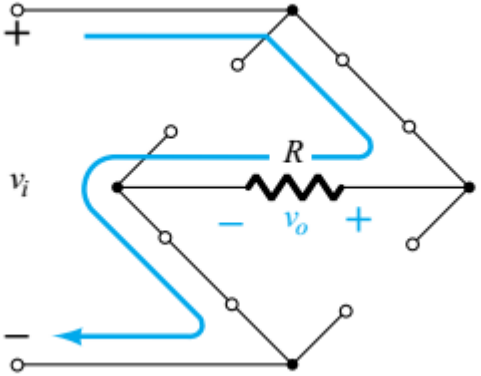
- Retificador em Ponte de Onda Completa

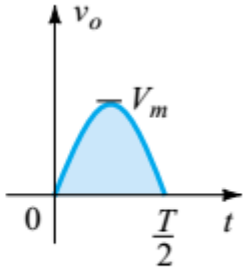












Retificação de Onda Completa

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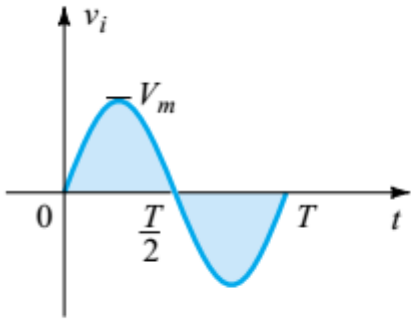

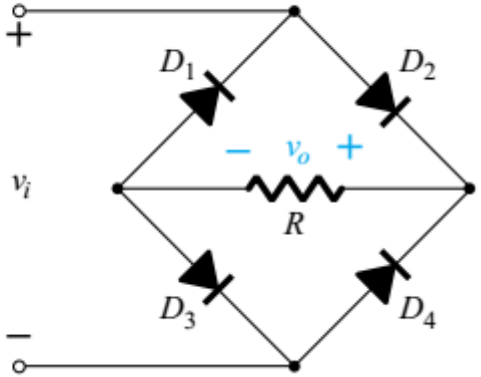

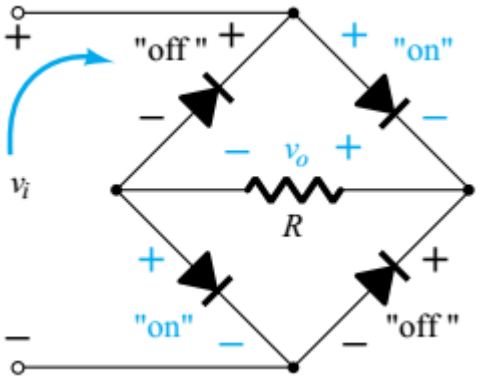

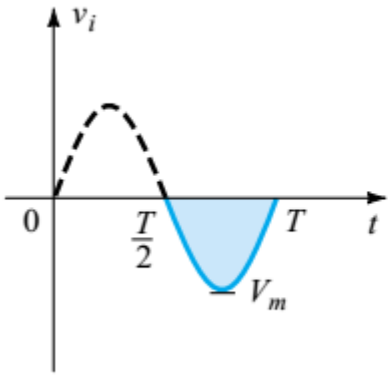

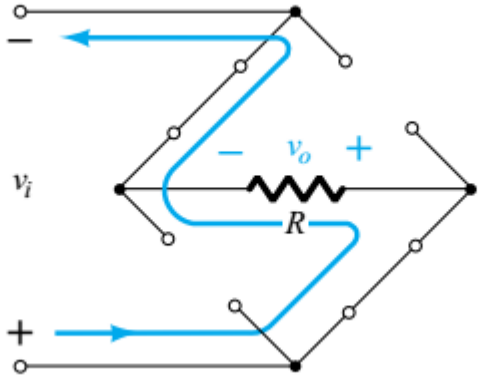

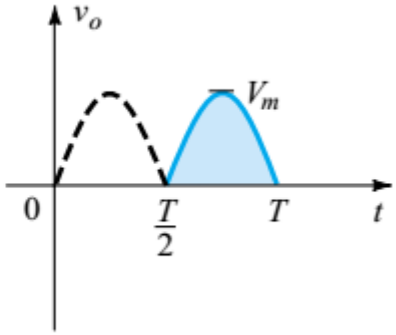

Retificação de Onda Completa

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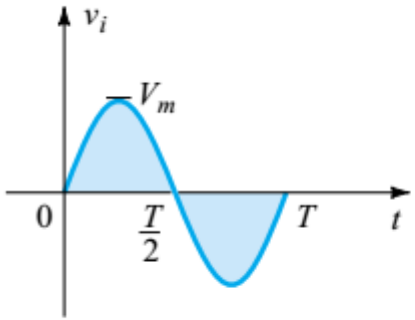
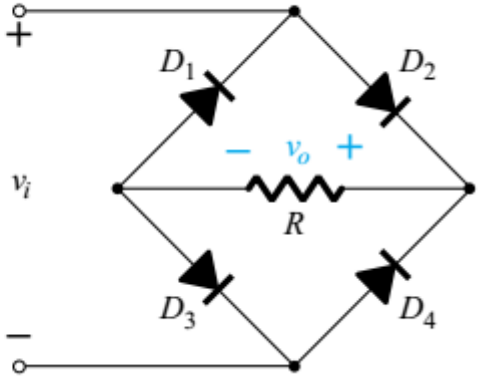


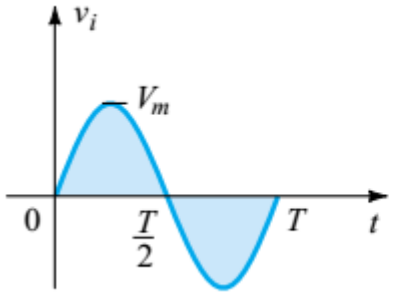


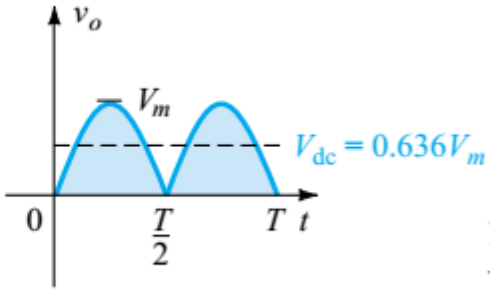
$$V_{dc} = 0.636V_m$$ full-wave

Boa aproximação para $V_m >> V_T$

$$PIV \geqq V_m$$

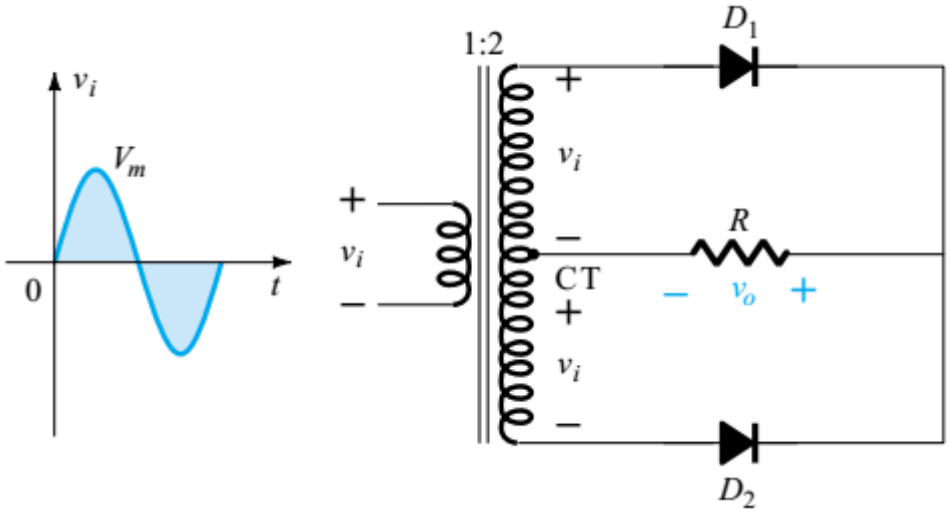
Tensão de saída completa





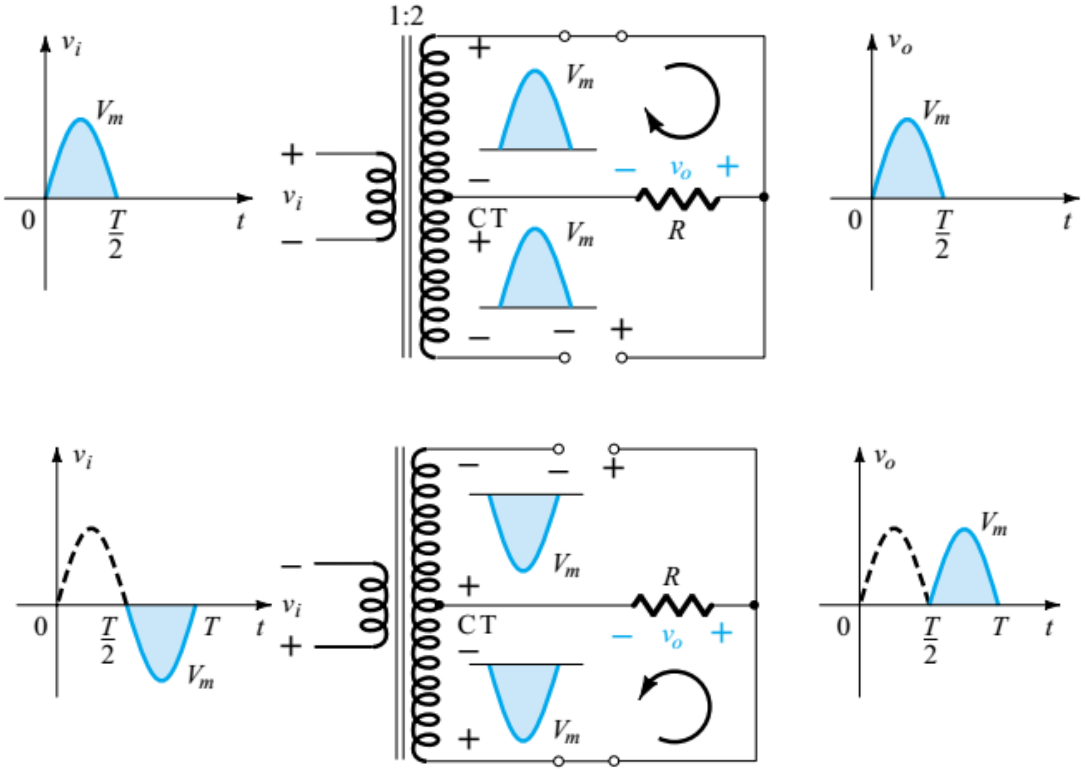
Retificação de Onda Completa

- Retificador de Onda Completa com Transformador com derivação central



Retificação de Onda Completa

- Retificador de Onda Completa com Transformador com derivação central



Tensão de Ondulação

Fator de Ondulação do Sinal Retificado (sem filtro)

$$r = \frac{\text{ripple voltage (rms)}}{\text{dc voltage}} = \frac{V_r(\text{rms})}{V_{dc}} \times 100\%$$

Meia onda

$V_{dc} = 0{,}318V_m$

$V_r(\text{rms}) = 0{,}385V_m$

$r = 121\%$

Onda Completa

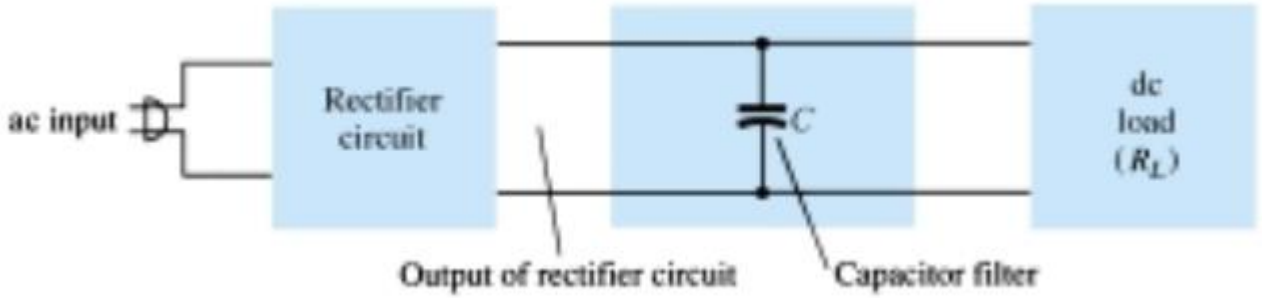
$V_{dc} = 0{,}636V_m$

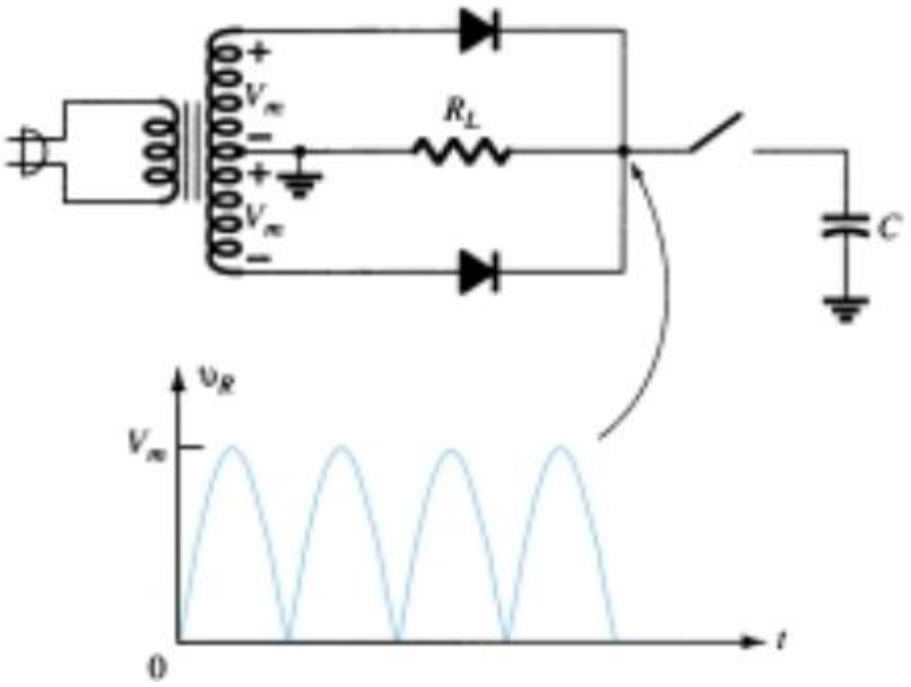
$V_r(\text{rms}) = 0{,}308V_m$

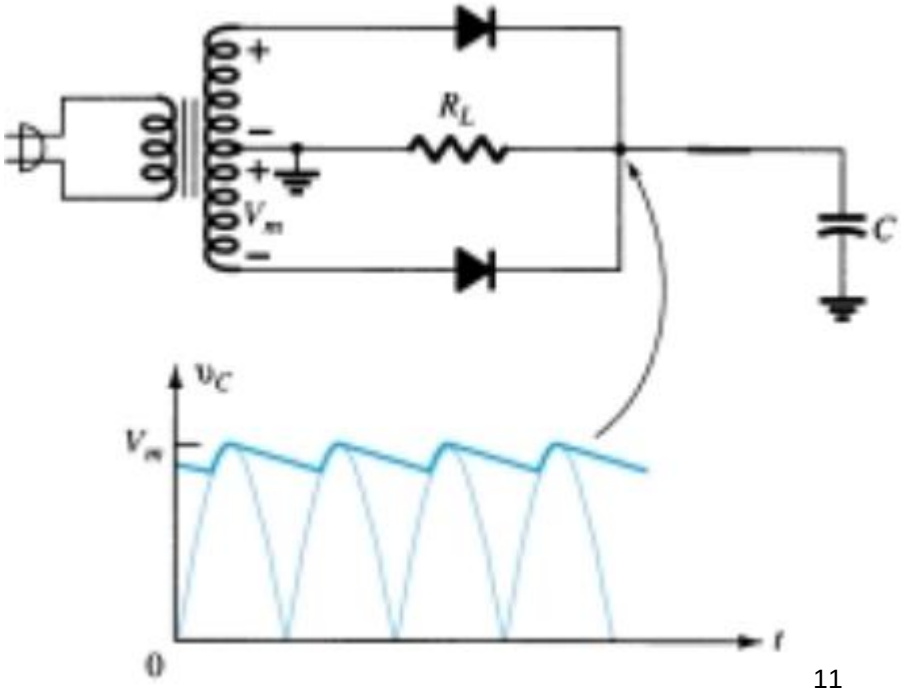
$r = 48{,}7\%$

Filtro a Capacitor

Diagrama em blocos de filtro com capacitor único

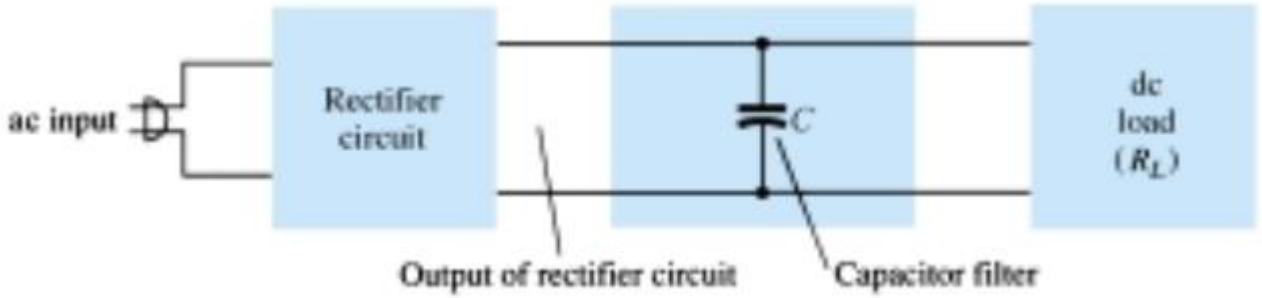


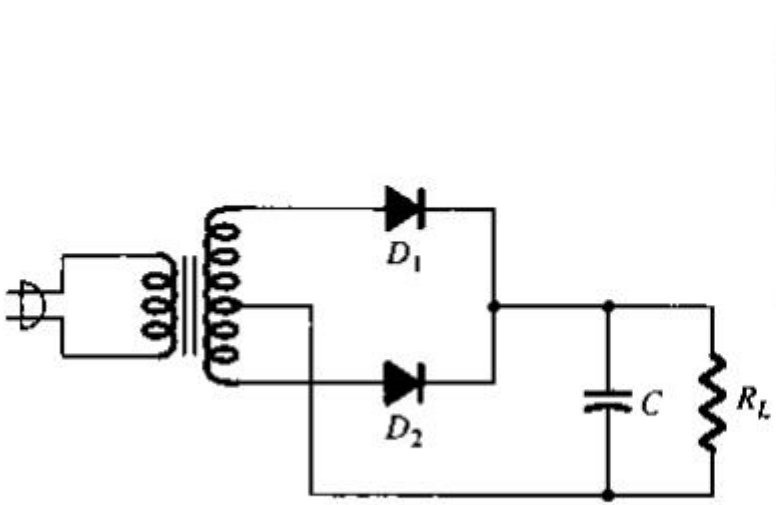




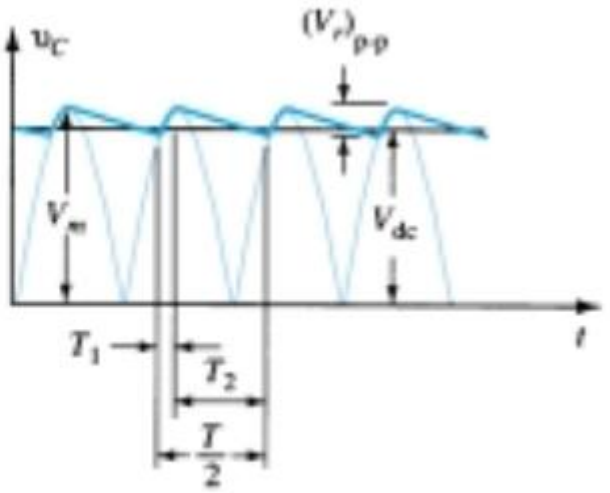
Filtro a Capacitor

Diagrama em blocos de filtro com capacitor único





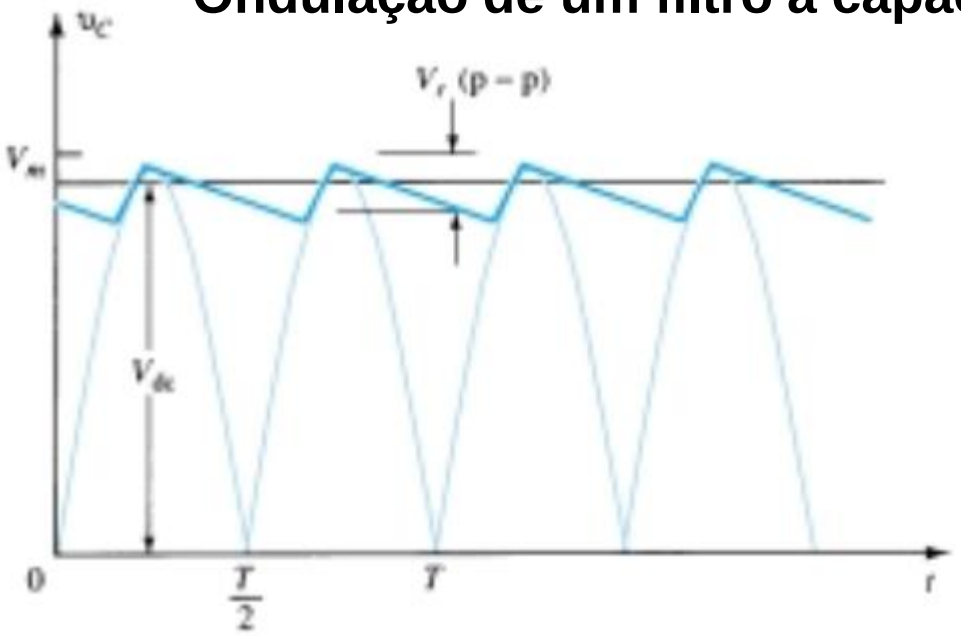
(a)



(b)

Filtro a Capacitor

Ondulação de um filtro a capacitor



$$V_{dc} = V_m - \frac{I_{dc}}{4fC} = V_m - \frac{4.17 I_{dc}}{C}$$

$$V_r\,(\text{rms}) = \frac{I_{dc}}{4\sqrt{3}\,fC} = \frac{2.4\,I_{dc}}{C} = \frac{2.4 V_{dc}}{R_L C}$$

$$r = \frac{V_r(\text{rms})}{V_{dc}} \times 100\% = \frac{2.4\,I_{dc}}{C V_{dc}} \times 100\% = \frac{2.4}{R_L C} \times 100\%$$

C – capacitância do filtro [µF]

I_{dc} - corrente na carga [mA]

R_L - resistência da carga [kΩ]

Considerando $V_{dc} \approx V_m$

Referência

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