2.2 Controlled Single phase halfwave rectifier

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2.2.1 Resistive load

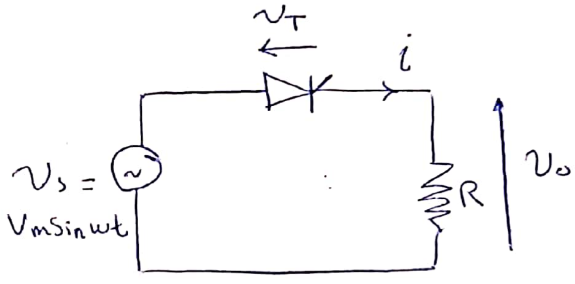
$$V_o = \frac{1}{2\pi}\int_{\alpha}^{\pi} V_m \sin\omega t \, d\omega t$$

$$= \frac{V_m}{2\pi}\left(-\cos\omega t\right)_{\alpha}^{\pi}$$

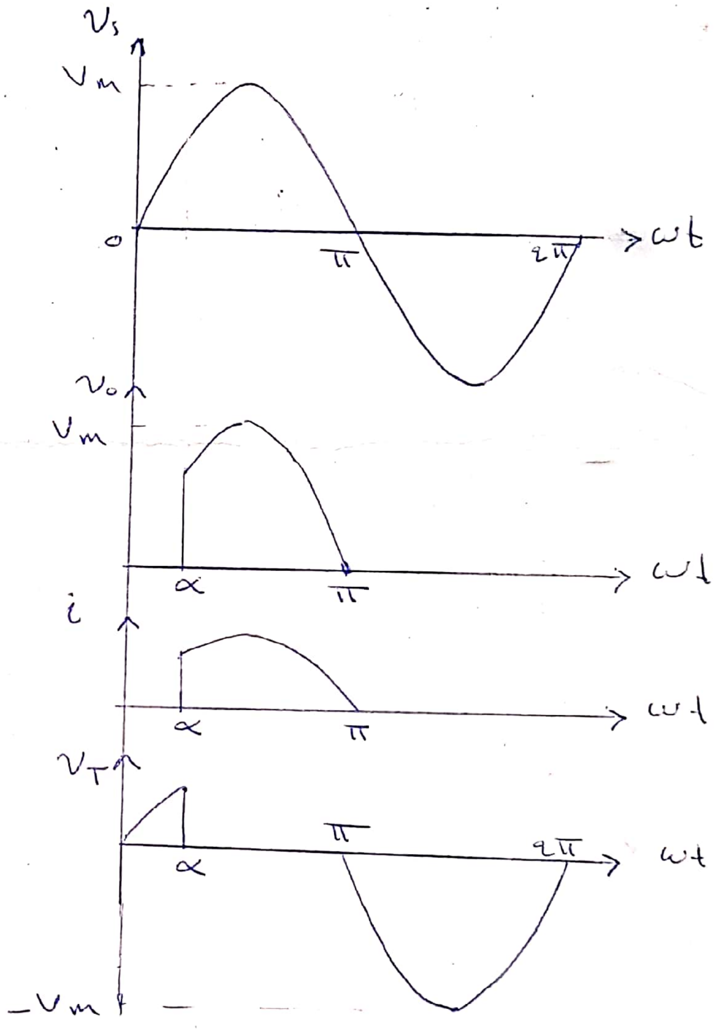
$$= \frac{V_m}{2\pi}\left(1 + \cos\alpha\right) \quad \text{---- (2-8)}$$

$$I_o = \frac{V_o}{R}$$

$$i = \frac{V_m}{R}\sin\omega t \qquad \alpha \le \omega t \le \pi \quad \text{---- (2-9)}$$



(a)



(b)

Fig. (2-5)

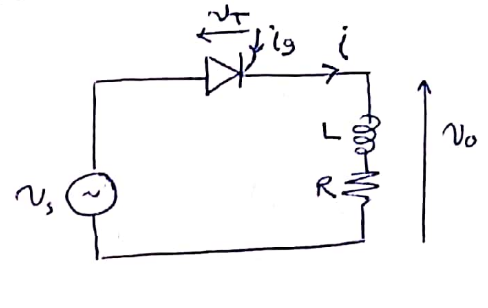
2.2.2 Inductive load

$$V_o = \frac{1}{2\pi} \int_{\alpha}^{\phi} V_m \sin \omega t \, d\omega t$$

$$= \frac{V_m}{2\pi} \left(-\cos \omega t \right)_{\alpha}^{\phi}$$

$$= \frac{V_m}{2\pi} \left(\cos\alpha - \cos\phi \right) \quad \text{---(2.10)}$$

$$I_o = \frac{V_o}{R}$$



(a)

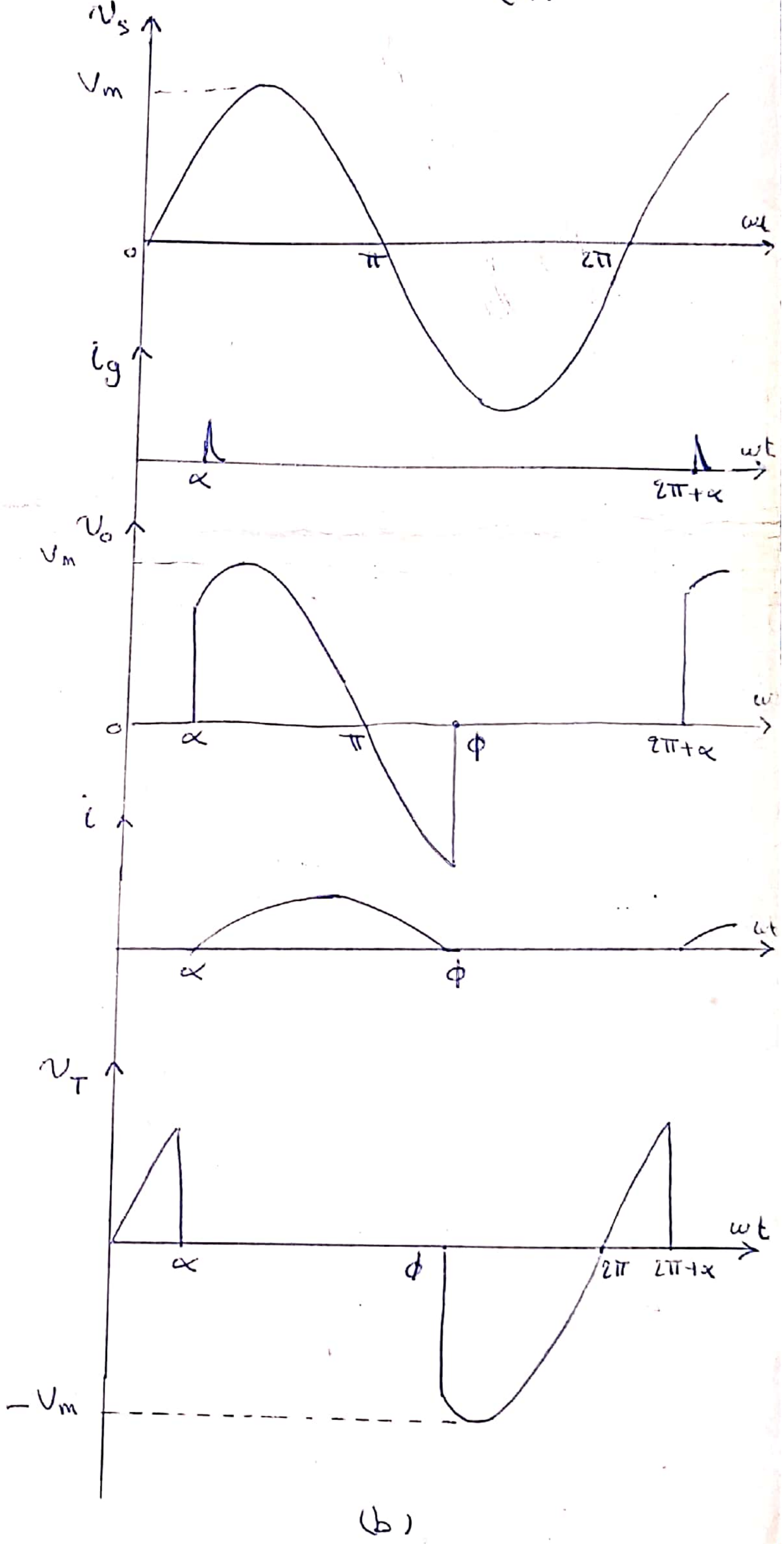


Fig. (2.6)

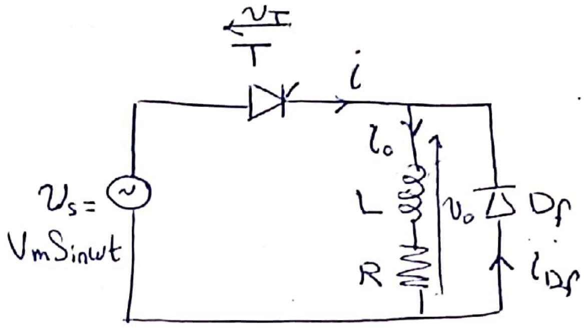
(b)

2-2-3 Inductive load with freewheeling diode

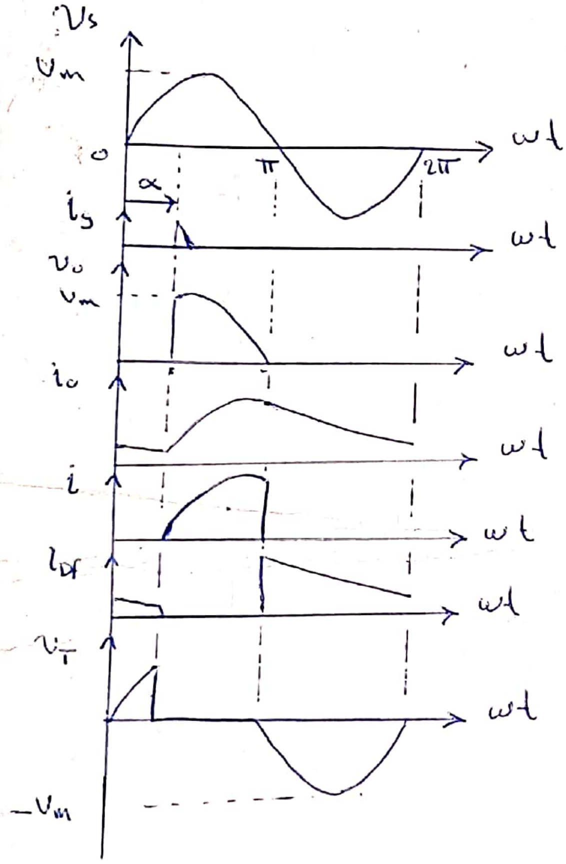
$$V_o = \frac{1}{2\pi}\int_{\alpha}^{\pi} V_m \sin\omega t \, d\omega t$$

$$= \frac{V_m}{2\pi}\left(-\cos\omega t\right)_{\alpha}^{\pi}$$

$$= \frac{V_m}{2\pi}\left(1+\cos\alpha\right) \quad \text{---- } (2.11)$$

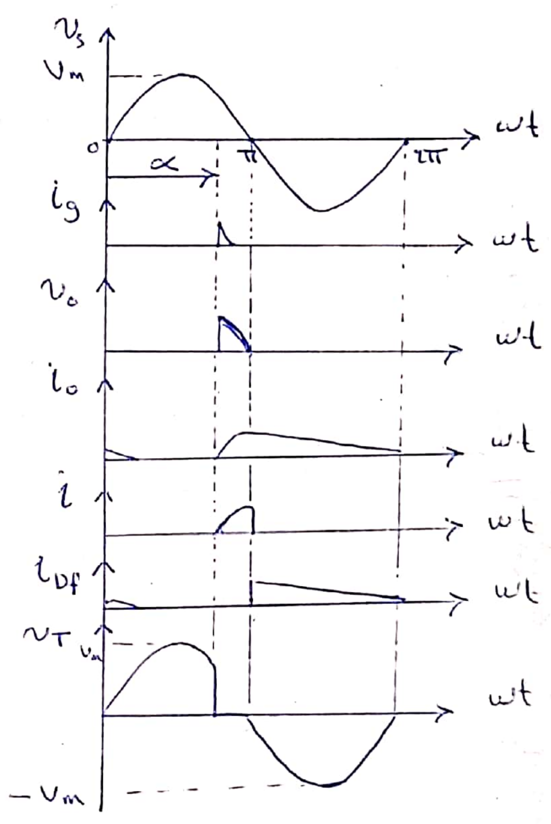


(a)



(b)

Small firing delay angle & continuous current



(c)

Large firing delay angle & discontinuous current

Fig. (2-7)