

A.Ü. GAMA MYO. Elektrik ve Enerji Bölümü

GÜÇ ELEKTRONİĞİ

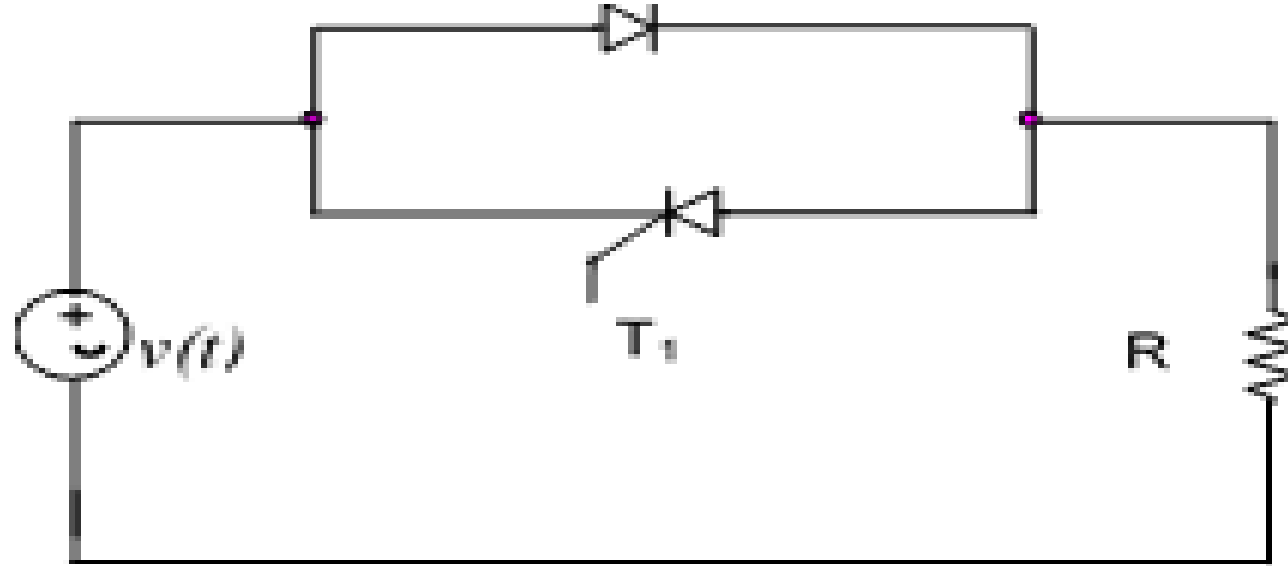
12. HAFTA

İçindekiler

Güç Elektroniđi Örnek Devreleri

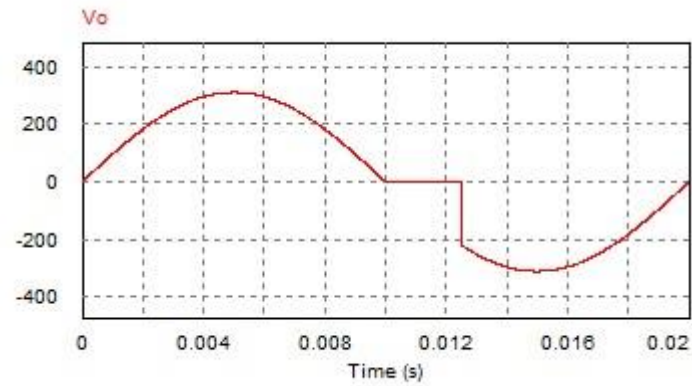
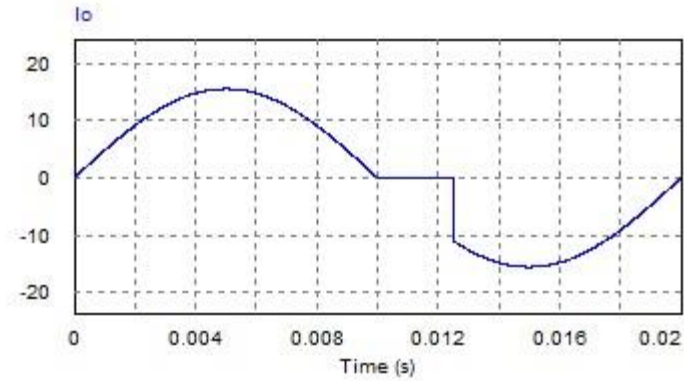
GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

Aşağıdaki şekilde T1 a ($180 < a < 360$) açısıyla tetiklenmektedir. $V(t) = 312 \sin \omega t$, V ve $R = 20 \Omega$ ise $a = 225^\circ$ derece için a) i_0 , ve v_0 grafiklerini çiziniz. b) v_0 'in ortalama değerini ve i_0 'in RMS değerini hesaplayınız.



GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

a)



GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

b)

$$\begin{aligned}V_0 &= \frac{1}{2\pi} \left[\int_0^{\pi} 312 \sin \theta d\theta + \int_{5\pi/4}^{2\pi} 312 \sin \theta d\theta \right] \\&= \frac{312}{2\pi} \left[-\cos \theta \Big|_0^{\pi} - \cos \theta \Big|_{5\pi/4}^{2\pi} \right] \\&= \frac{312}{2\pi} \left[-\cos \pi + \cos 0 - \cos 2\pi + \cos \frac{5\pi}{4} \right] \\&= 14.544 \text{ V}\end{aligned}$$

$$I_m = \frac{V_m}{R} = \frac{312}{20} = 15.6 \text{ A}$$

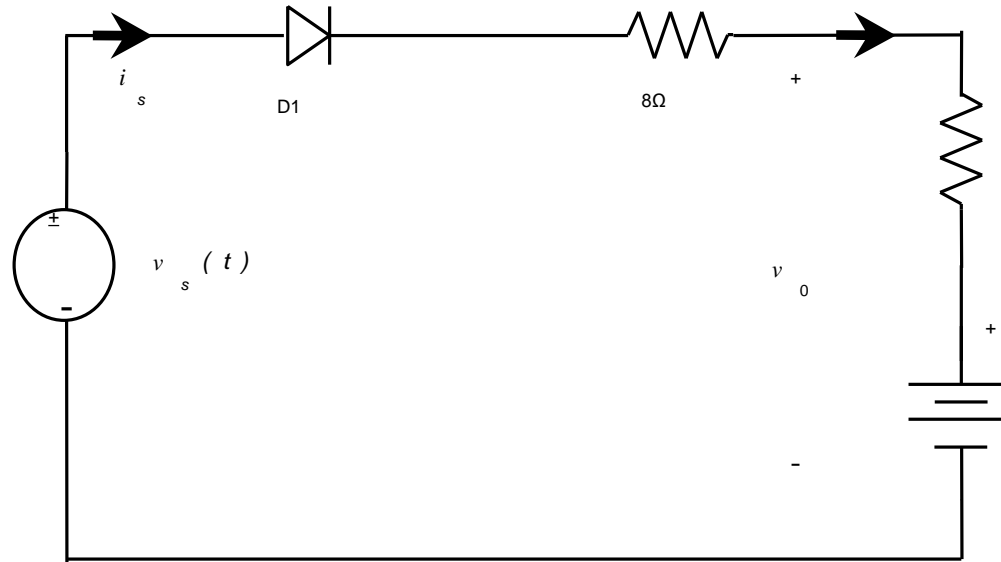
$$\begin{aligned}I_{rms}^2 &= \frac{1}{2\pi} \left[\int_0^{\pi} 15.6^2 \sin^2 \theta d\theta + \int_{5\pi/4}^{2\pi} 15.6^2 \sin^2 \theta d\theta \right] \\&= \frac{15.6^2}{4\pi} \left[\int_0^{\pi} (1 - \cos 2\theta) d\theta + \int_{5\pi/4}^{2\pi} (1 - \cos 2\theta) d\theta \right] \\&= \frac{15.6^2}{4\pi} \left[\theta \Big|_0^{\pi} - \frac{\sin 2\theta}{2} \Big|_0^{\pi} + \theta \Big|_{5\pi/4}^{2\pi} - \frac{\sin 2\theta}{2} \Big|_{5\pi/4}^{2\pi} \right] \\&= \frac{15.6^2}{4\pi} \left[\pi - 0 + \frac{3\pi}{4} + \frac{1}{2} \right] \\&= 15.6^2 \cdot 0.4773 \\I_{rms} &= 10.778 \text{ A}\end{aligned}$$

GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

$v(t_s) = 120\sin\omega t$ ise

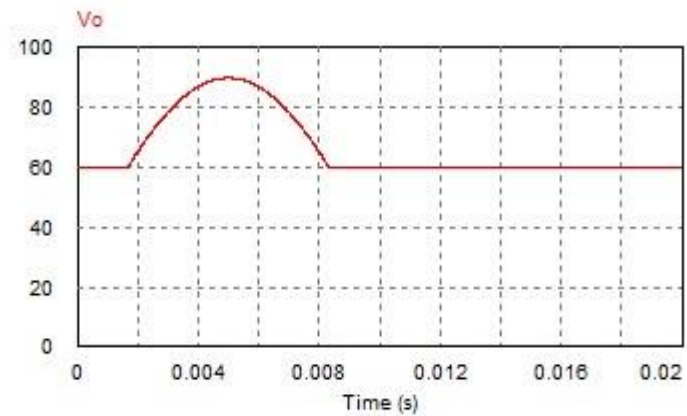
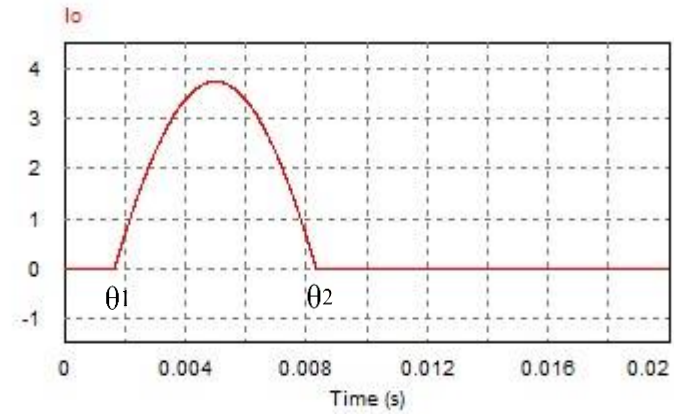
a) i_o , ve v_o grafiklerini çiziniz.

b) v_o 'in ortalama değerini hesaplayınız.



GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

a)



GÜÇ ELEKTRONİĞİ ÖRNEK DEVRELERİ

b)

$$\theta_1: 120 \sin \theta_1 = 60 \Rightarrow \sin \theta_1 = 0.5 \Rightarrow \theta_1 = 30^\circ \Rightarrow \theta_1 = \frac{\pi}{6}$$

$$\text{simetriden dolayı } \theta_2 = 150^\circ \Rightarrow \theta_2 = \frac{5\pi}{6}$$

Diyot iletimdeyken çıkış akımı $\theta_1 \leq \theta \leq \theta_2$ aralığında

$$-v_s + 16i_0 + 60 = 0$$

$$-120 \sin \theta + 16i_0 + 60 = 0$$

$$i_0 = 7.5 \sin \theta - 3.75$$

Çıkış gerilimi $\theta_1 \leq \theta \leq \theta_2$ aralığında

$$v_0 = 60 + 8i_0 = 30 + 60 \sin \theta$$

$$\begin{aligned} V_0 &= \frac{1}{2\pi} \left[\int_0^{\pi/6} 60 d\theta + \int_{\pi/6}^{5\pi/6} (30 + 60 \sin \theta) d\theta + \int_{5\pi/6}^{2\pi} 60 d\theta \right] \\ &= \frac{1}{2\pi} \left[60\theta \Big|_0^{\pi/6} + (30\theta - 60 \cos \theta) \Big|_{\pi/6}^{5\pi/6} + 60\theta \Big|_{5\pi/6}^{2\pi} \right] \\ &= \frac{1}{2\pi} \left[10\pi + 20\pi - 60 \cos \frac{5\pi}{6} + 60 \cos \frac{\pi}{6} + 70\pi \right] \\ &= \frac{1}{2\pi} [100\pi + 60 \cdot .866 + 60 \cdot .866] \\ &= 66.54 \text{ V} \end{aligned}$$

Kaynakça

<https://cms.inonu.edu.tr/tr/cms/muslum.arkan/icerik/3198>