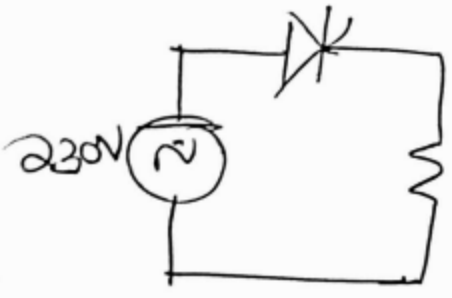
Power Electronics.

1. Thyristor is connected in series with 100Ω resistor to a 230V sinusoidal supply. If the thyristor is controlled to switch on at a firing angle of 30°, determine the average current in the thyristor.



Given

$\alpha = 30^\circ$

$V_{rms} = 230\ V.$

$R = 100\ \Omega.$

$I_o = ?$

$$V_{rms} = \frac{V_m}{\sqrt{2}}$$

$$V_m = V_{rms} \times \sqrt{2}$$

$$= 230 \times \sqrt{2}$$

$$V_m = 325.26\ V.$$

$$I_o = \frac{V_{dc}}{R} = \frac{V_m (1+\cos\alpha)}{R \cdot 2\pi}$$

$$= \frac{325.26\ (1+\cos 30^\circ)}{100 \times 2 \times 3.142}$$

$$\boxed{I_o = 0.96558\ A}$$

2. A SCR fully controlled bridge rectifier is connected in series with a 200Ω resistor to a 230V sinusoidal supply. If the SCR is controlled to switch on at a firing angle of 60°. determine the average output current.

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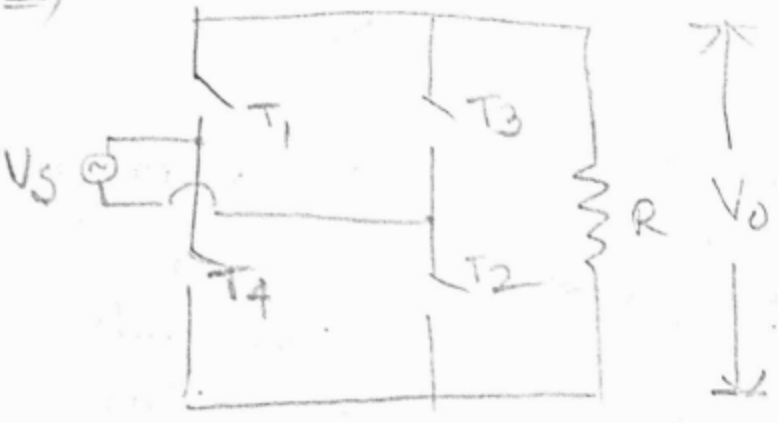

$R = 200\Omega$

$V_{rms} = 230\ V_{rms}$

$\alpha = 60^\circ$

$I_o = ?$

$V_m = V_{rms} \times \sqrt{2}$

$= 230 \times \sqrt{2}$

$V_m = 325.26V$

$$I_o = \frac{V_o}{R} = \frac{V_m}{\pi R}(1+\cos\alpha) = \frac{325.26\,(1+\cos 60)}{\pi \times 200}$$

$$\boxed{I_o = 0.776A}$$