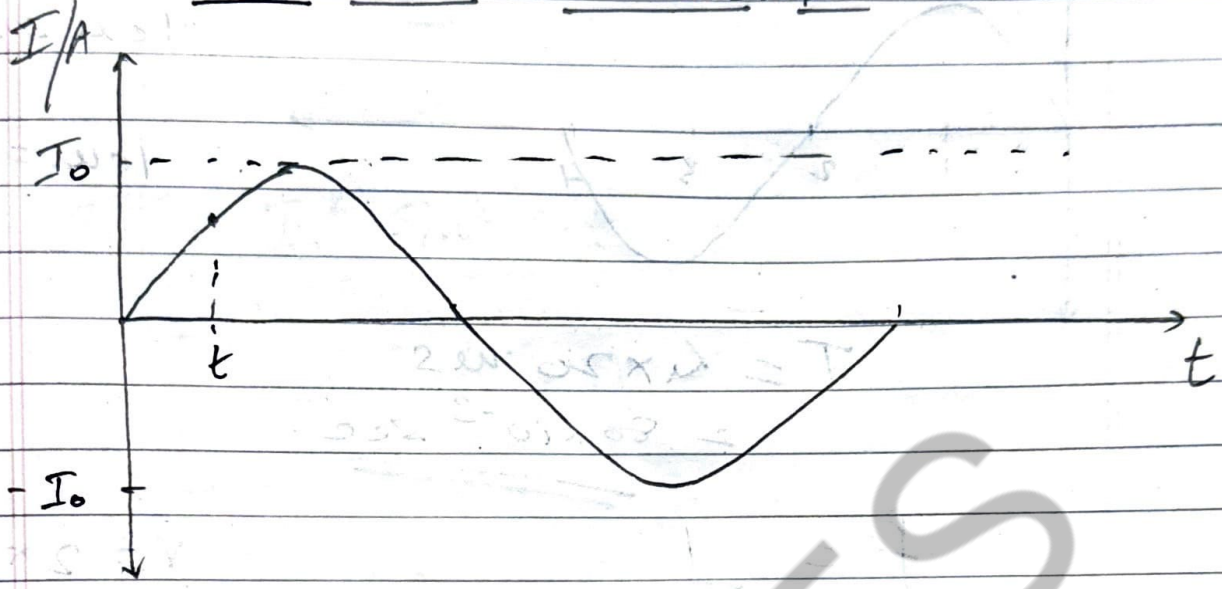
ALTERNATING CURRENT



$$I = I_0 \sin \omega t$$

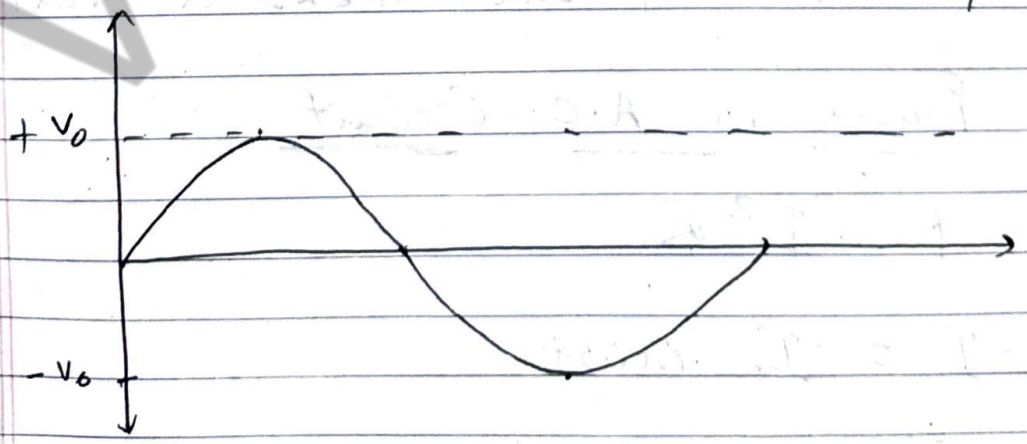
ω - Angular freq

$$\omega = \frac{2\pi}{T} \text{ or } 2\pi f.$$

$$I = I_0 \sin 2\pi \frac{t}{T}$$

V & I are in phase

$$V = V_0 \sin \omega t \quad \text{or} \quad V_0 \sin 2\pi \frac{t}{T}.$$



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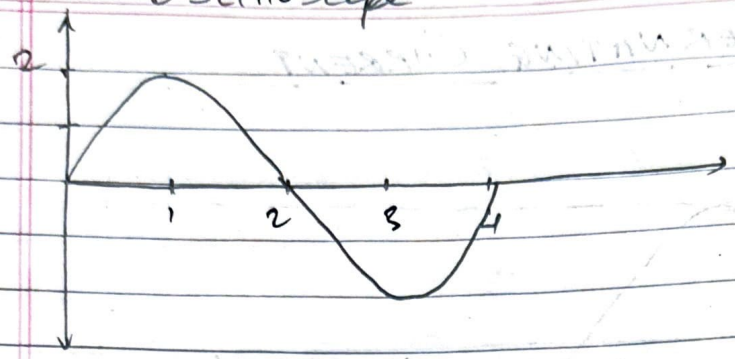
Oscilloscope -



Time base
1 cm = 20 ms
1 cm = 5 mV

$T = 4 \times 20$ ms
$= 80 \times 10^{-3}$ sec.

$f = \frac{1}{T}$

$= \frac{1}{80 \times 10^{-3}}$

$= \frac{1000}{80}$

$= 12.5$ Hz.

$V = 2 \times 5 \times 10^{-3}$
$= 0.01$ V.

general formula
T = no. of block × time base

V = no. of vertical blocks × vertical gain

Power in A.C. Circuit.

$P = I^2 R$

$I = I_0 \sin \omega t$

$I^2 = I_0^2 \sin^2 \omega t$.

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average Power.

$I = I_0 \sin \omega t$.

$I^2 = I_0^2 \sin^2 \omega t$.

$\langle I^2 \rangle = \frac{1}{2} \langle I_0^2 \rangle$

$\sqrt{\langle I^2 \rangle} = \frac{I_0}{\sqrt{2}}$

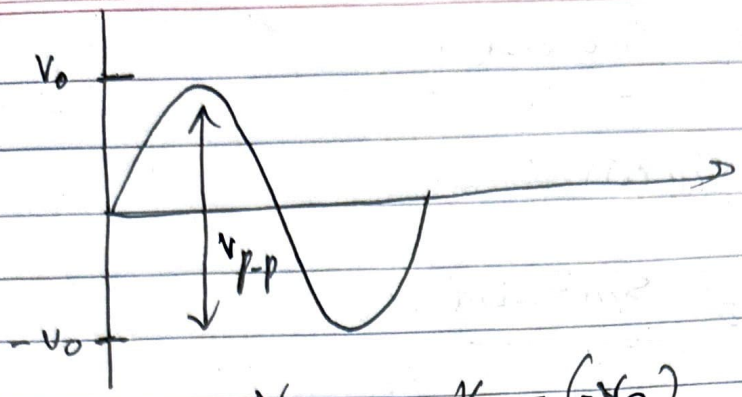
$I_{rms} = \frac{I_0}{\sqrt{2}}$

$V_{rms} = \frac{V_0}{\sqrt{2}}$

$P_{av} = I_{rms} \times V_{rms}$

$= \frac{V_0}{\sqrt{2}} \times \frac{I_0}{\sqrt{2}}$

$= \frac{P_0}{2}$.



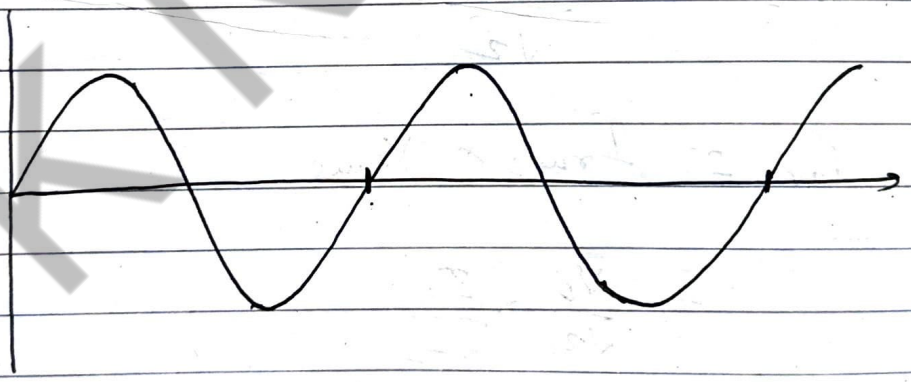
$$V_{p-p} = V_0 - (-V_0)$$

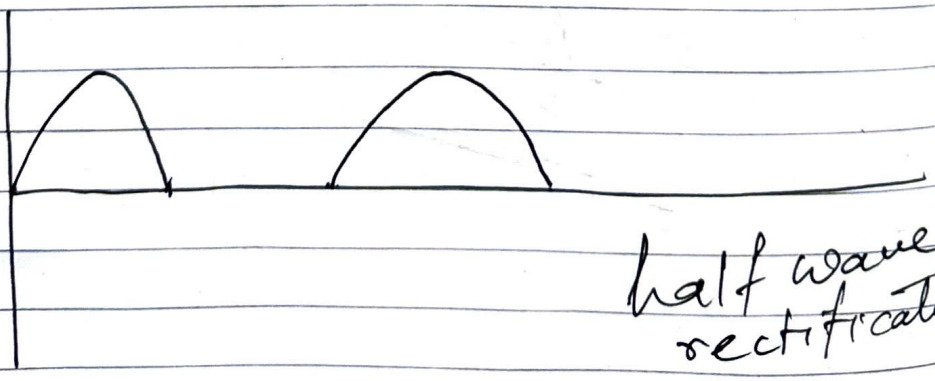
$$V_{p-p} = 2V_0.$$

$$V_0 = \frac{V_{p-p}}{2}.$$

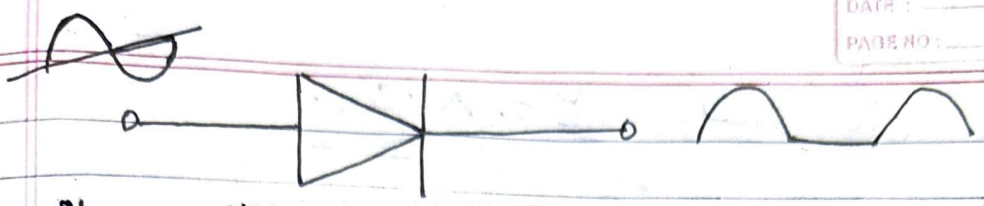
V_0 is half of peak to peak.

Rectification & Smoothing.





half wave rectification



it only lets positive cycle pass
blocks the negative cycle

positive cycle = 0 resistance | forward bias
negative cycle = max resistance | backward bias.

Full wave Rectifier