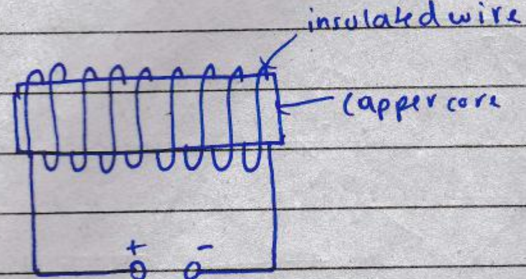
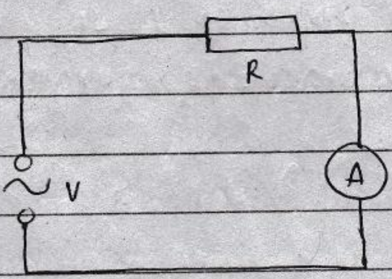
MAGNETIC FIELD...



If the voltage is DC, temp. of core dosen't rise as DC provides steady current, so flux linked with core dosen't change and no emf is induced.

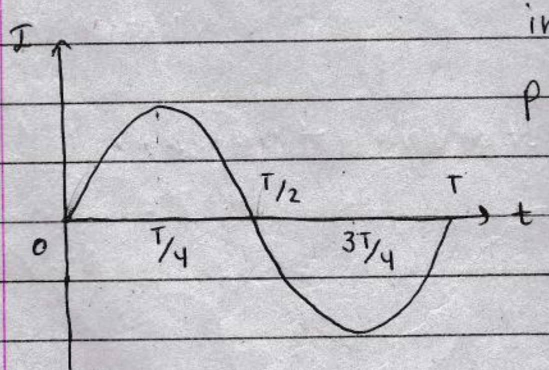
But in AC, current is changing so emf is induced as flux linked with core changes, and core is heated.
This is due to eddy currents.

ALTERNATING CURRENT

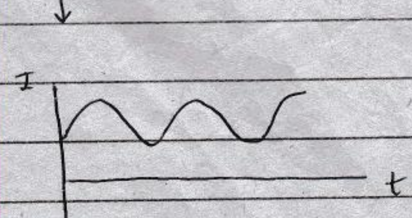


$V \rightarrow$ alternating / sinusoidal source.

Unlike in capacitors where Voltage and current have phase difference $\pi/2$, in AC current, V and I are in phase. i.e. when ~~V is~~ $V = V_{max}$, $I = I_{max}$
$V = V_{min}$ $I = I_{min}\,(0)$.



In AC current, direction must change i.e. graph must pass through x-axis.



This is not AC current.
not alternating, but direct current which is pulsating / fluctuating

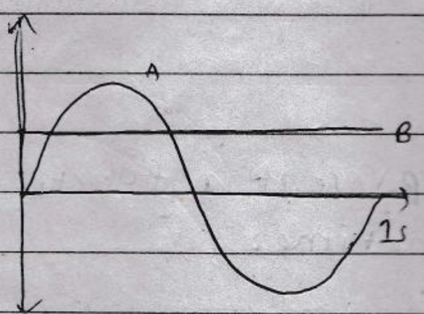
Root mean square (RMS)

RMS value of alternating current is ~~the square root of~~ defined as that steady current which would dissipat heat at the same rate in a given resistance.

If the wave form is sinusoidal

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

240 V in standard circuits is V_{rms}. so ~~Ma~~ U_{max} from circuits is $240\sqrt{2}$ V.

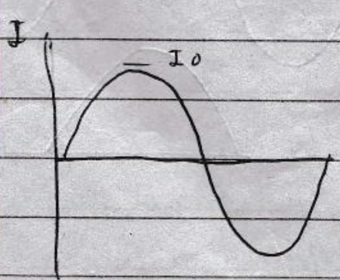


If ~~wave A~~ current A dissipates 10J in ~~one~~ 1s, rms current is just simply ~~the~~ another current that dissipates the same heat but is stead current B.

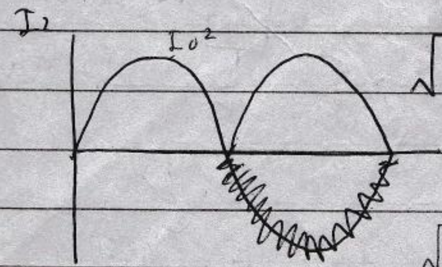
The avg. power an alternating current delivers to a resistor 'R' is: $P_{avg} = I_{rms}^2 . R$

Whatever be the wave form, at any instant power is given by $P_{inst} = I^2 R$, instantaneous power

P_{avg} = Avg. value of $(I_2 R) = I_{rms}^2 R$



$I_{avg} = 0$

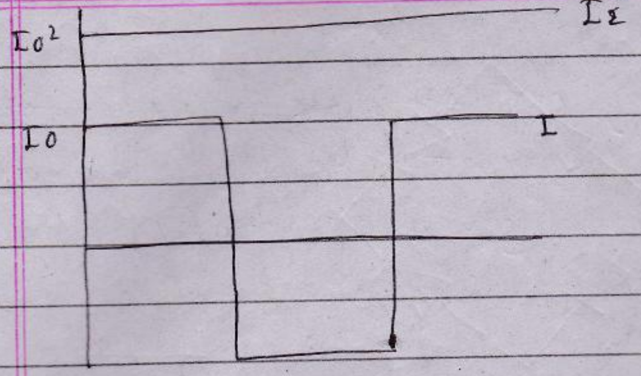


$$\sqrt{(I^2_{avg})} = I_{rms}$$

$$I^2_{avg} = {I_0}^2/2$$

$$\sqrt{(I^2_{avg})} = \sqrt{{I_0}^2/2}$$

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



$I_{rms}^2 = \langle I^2 \rangle$

$I_{rms}^2 = I_0^2$

$\therefore I_{rms} = I_0$

For sinusoidal ac,

$I_{rms} = \frac{I_0}{\sqrt{2}}$, $V_{rms} = \frac{V_0}{\sqrt{2}}$, ~~$x = x_0 \sin \omega t$~~

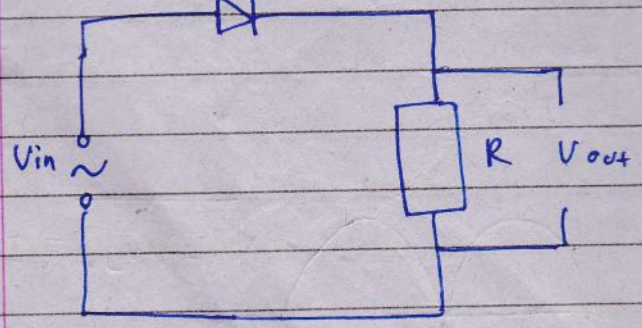
$x = x_0 \sin \omega t$ - $\omega = 2\pi f$

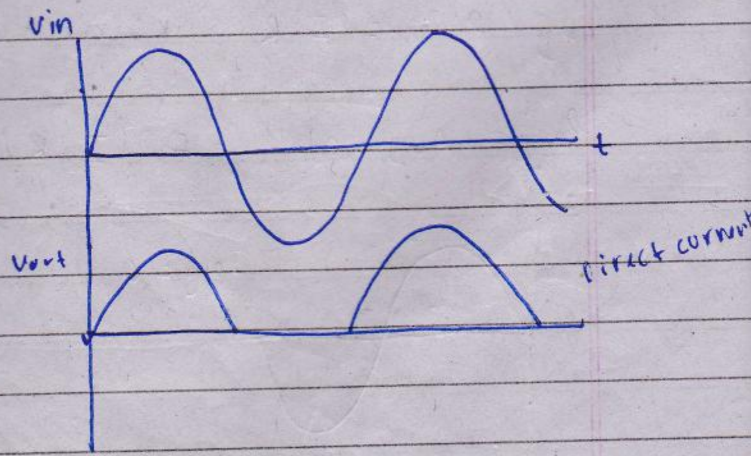
This is a gereral formula to represent a function that follows sinusoidal nature with time.

$\langle P \rangle = I_{rms}^2 R$

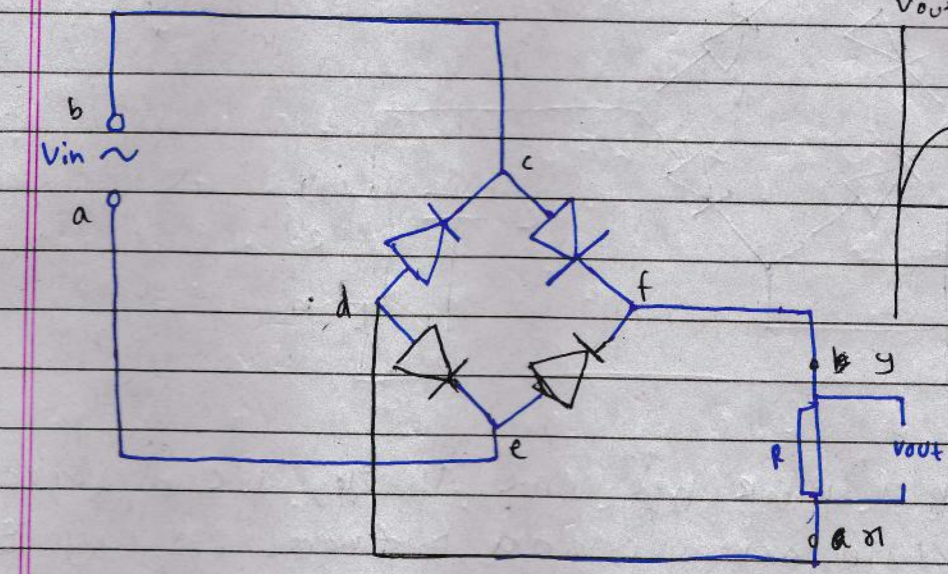
Rectifier

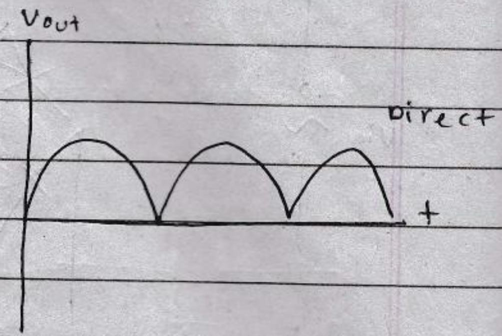
A device that converts ac to dc





Bridge rectifier

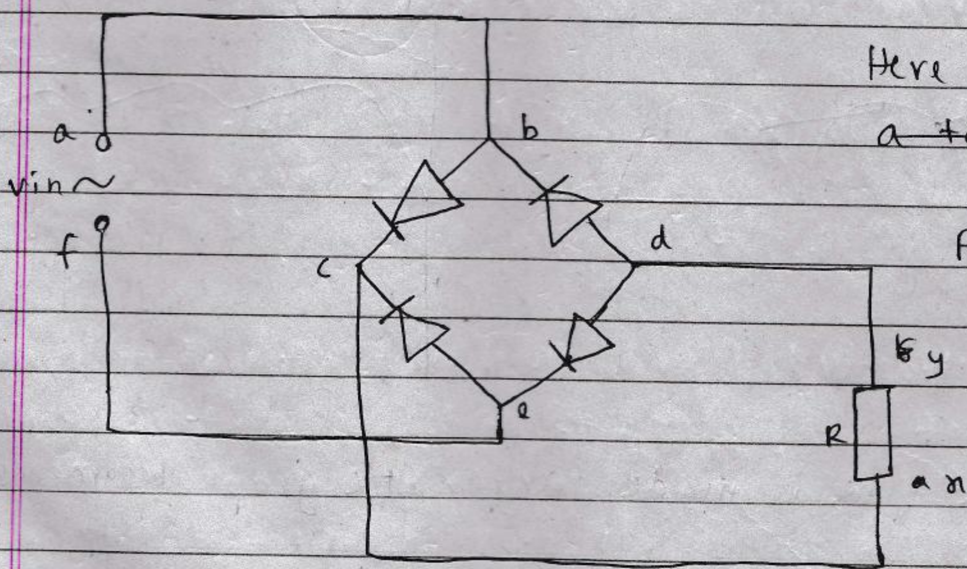




b c f y n d e a

a e f y n d c b

Here in both cycles of alternating V. current will flow from ~~b to a~~ y to n



Here current flows from ~~a to b.~~ n to y.

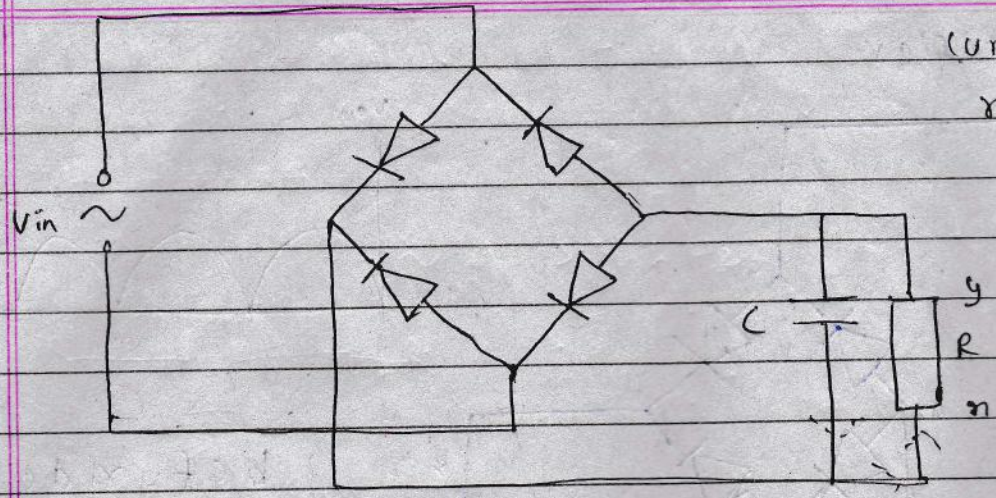
For first half cycle, path of current is

a b c n y d e f

For second half cycle, path is, f e c n y d b a

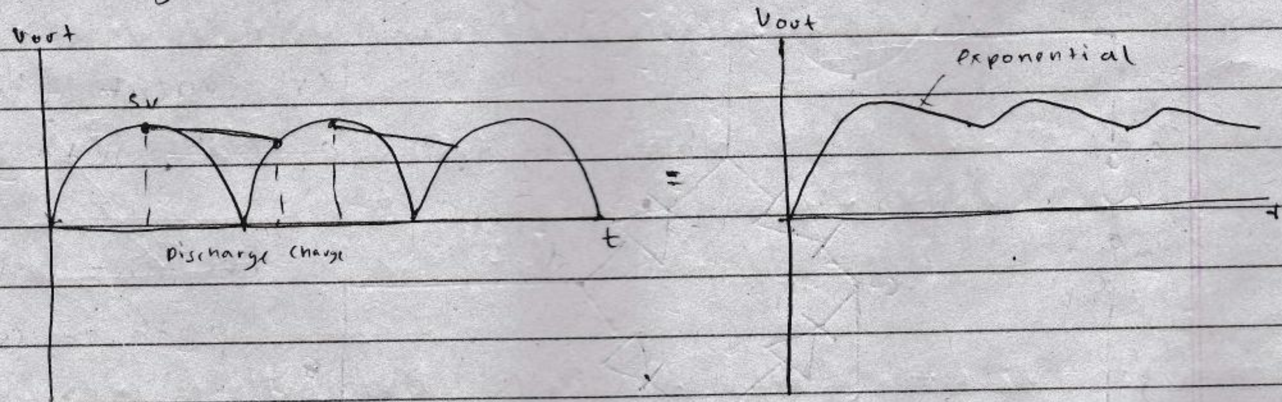
This rectifier follows principle that current flows from high to low potential.

This DC current is still pulsating.

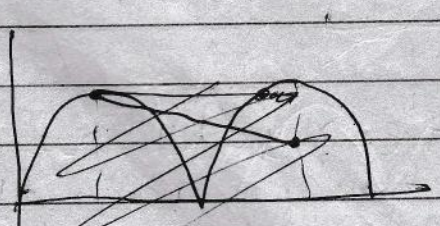


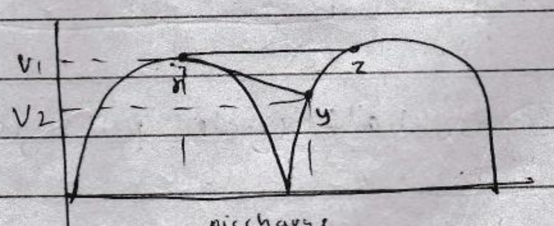
current flows from x to y.

pd across both C and R are same as they are in parallel. As the pd decreases across C and R from lets say 5V to 4.9V, the charged capacitor discharges to compensate for decrease in potential in R, and as the capacitor discharges, another pulse comes and charges capacitor.



If discharge time is made larger, the graph becomes smoother.





$\langle V \rangle = \frac{V_1 + V_2}{2}$

$\Delta V = V_1 - V_2$

Avg. DC voltage $= \frac{V_1 + V_2}{2}$

If t discharge is made large by making RC larger graph is smoother.