or $\frac{dq(t)}{q(t)} = -\frac{dt}{RC} \Rightarrow$ Integrating we have, $\ln q - \ln q_0 = -t/RC$

or $\boxed{q = q_0 e^{-t/RC}}$

Thus the capacitor discharges through a load R, ~~expon~~ and its charge ~~gets~~ decays exponentially.

Now, Def^n of time constant for a system relaxing exponentially ~~will be given by~~, is the time it takes to decay some quantity (q here) from its initial value and becomes $\frac{1}{e}$ of that initial value.

Thus time constant or relaxation time $\tau = RC$ (here)

• So what happens in ~~a~~ case of a capacitor filter while its input is given by the output of a full wave rectifier circuit will be like this:- The charge being proportional to applied voltage, initially for the rising part of the input voltage the capacitor gets charged and q reaches its peak value q_m at $V = V_m$. Then ~~as the~~ no more charging happens and now if a load is connected across the capacitor, it will start to discharge through the load until the input voltage becomes equal or greater than instantaneous voltage of the capacitor. Then again it