**Ques:**

**a) Consider the circuit in the figure. How much energy is absorbed by electrons from the initial state of no current to the state of drift velocity?**

**b) Electrons give up energy at the rate of RI2 per second to the thermal energy. What time scale would one associate with energy in problem a) n = no of electron/volume = 1029/m3, length of circuit = 10 cm, cross-section = A = 1mm2**

Timeline

Description automatically generated

**Ans:**

a) Current is given as I = V/R from the Ohm’s law

Therefore, I = 1A

But, I = neAvd

vd = I/neA

When the values for the above parameters are substituted, vd = 1/1.6 × 10-4 m/s

The KE = (KE of one electron)(no.of electrons) = 2 × 10-17J

b) Power loss, P = I2R = 6 J/s

P = E/t

E = Pt

t = E/P = 10-17 s