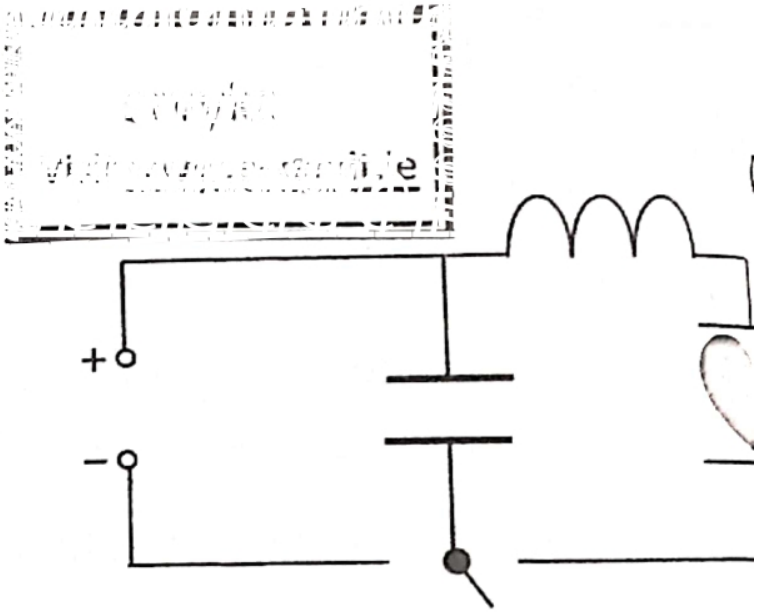
(c) Define capacitance and state its unit.

A capacitor is an important component of a defibrillator. A simple defibrillator circuit is shown.



Each plate of a parallel plate capacitor in a defibrillator stores a charge of 0.11 C when a potential difference of 4.0 kV is applied across it.

Calculate the energy stored in the capacitor.

What is the net charge of the capacitor when it stores this energy?

The capacitor discharges in a time of 15 ms. Calculate the average current flowing as the capacitor discharges.

Draw a diagram of the electric field between the charged plates of a parallel plate capacitor.

2018 Q12(c) Capacitance

$$\text{Capacitance} = \frac{q}{V}$$

q = charge (Coulombs)

V = Voltage (Voltage)

$q = 0.11\,C$

$V = 4 \times 10^3\,V$

$W = 220\,J$

$$W = \frac{1}{2}CV^2$$

$$= \frac{1}{2}(0.11)(4000)$$

$$= 220\,J$$

The net charge is zero as the amount of positive charge on one plate is equal to the negative on the other plate.

$t = 15 \times 10^{-3}\,s$

$Q = 0.11\,C$

$$I = \frac{q}{t}$$

$$I = \frac{0.11}{15 \times 10^{-3}}$$

$$I = \frac{22}{3}\ \text{Amps}$$

Electric Field between parallel plate capacitor