Q- Consider the circuit below which has been connected for a long time.



(a) Calculate the voltage across the capacitor.

Here in the circuit two series of two resistors each and one capacitor are connected in parallel. Initially the current will flow through all the three branches and the capacitor will be charging. After some time the circuit will become stable, the current in the resistors become constant and the capacitors is fully charged and no charging current through it will be there.

As the internal resistance of the battery not given it is considered negligible and the potential difference across the capacitor is same as that between the terminals of the battery and hence the voltage across the capacitor will be 10 V.

(b) Calculate the current through the resistances.

In this situation the voltage across the two series is also 10 V and hence the current in the series of resistances 1Ω and $4\,\Omega\,$ will be

 $I_1 = 10/(1+4) = 2 A$

and the current through the resistances 8 Ω and 2 Ω will be

 $I_2 = 10/(8+2) = 1 A.$

(c) Calculate the charge on the capacitor.

The charge on the capacitor will be

 $Q = CV = (1 \ \mu F)^*(10 \ V) = 10 \ \mu C$