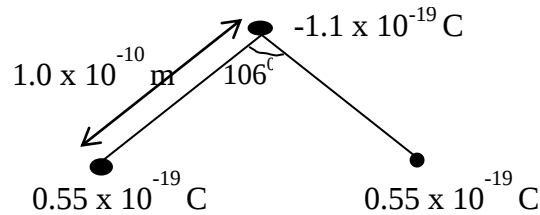


Electricity and Magnetism assignment

1(a) State Coulomb's law of electrostatics.

(b) The figure below shows a simple model of a water molecule. In the model oxygen molecule acts as a point negative charge magnitude $1.1 \times 10^{-19} \text{ C}$ and hydrogen molecule as a point positive charge magnitude $0.55 \times 10^{-19} \text{ C}$. The separation between the oxygen atom and hydrogen atom is $1.0 \times 10^{-10} \text{ m}$.



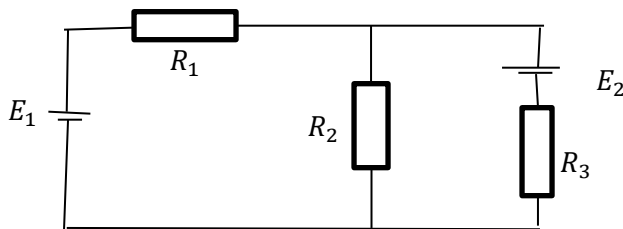
Find

- (i) Magnitude of the force exerted on oxygen atom by a hydrogen atom
- (ii) Net force on the oxygen atom

2(a) Explain in terms of motion of free electrons what happens when an electric current flows through a metallic conductor.

(b)(i) State Kirchhoff's circuit laws.

- (ii) Find the current through R_2 in the circuit below if $E_1 = 6 \text{ V}$, $E_2 = 2 \text{ V}$, $R_1 = 10 \Omega$, $R_2 = 5 \Omega$ and $R_3 = 2 \Omega$.



3(a) Define magnetic flux density

- (b)(i) Find the expression for the magnetic flux density B at a point r from an infinitely long straight wire carrying current I .
- (ii) A and B are parallel straight wires each carrying current I into the plane of the page. Find the magnetic flux at C

