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Chemical Engineering

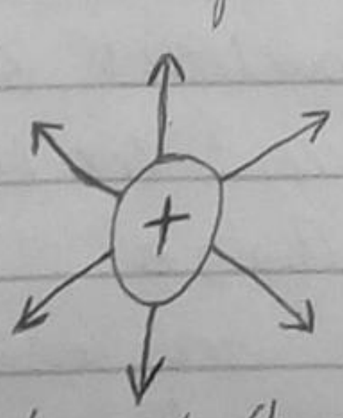
19/ENG01/1010

ENG 221 - Basic Electricity

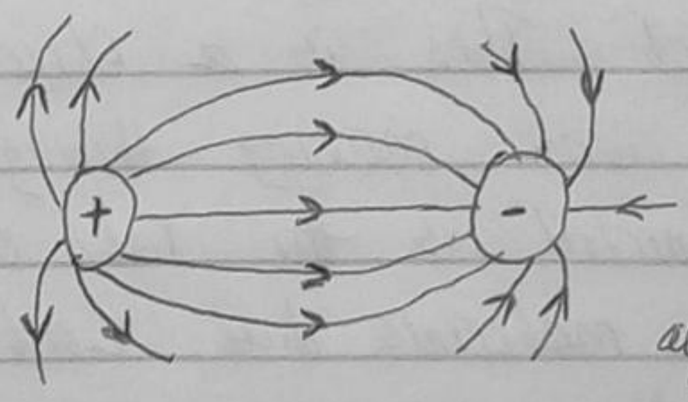
Assignment

R - Electric Field : An electric field is a space surrounding a charged particle where the particle exerts electric force. When a charged particle with a charge q at a point P is acted upon an electric force f. the electric field at that point is defined as $E = F/q$
If a small test charge q is ~~the~~ placed at a field point P at a distance r from source point, magnitude of the force is given by $F = \frac{k|qq_0|}{r^2}$

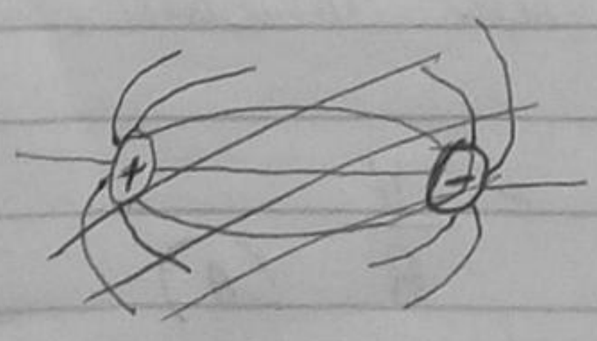
The electric field is defined at each point in space as the force that would be experienced by a vanishingly small positive test charge if held at that point

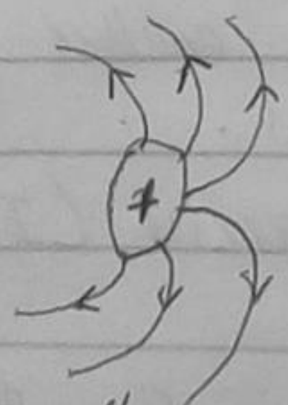


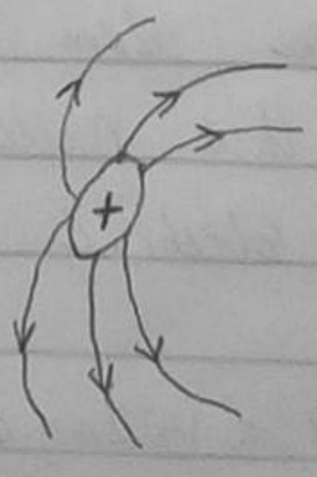
Isolated point charge



adjacent charges of opposite polarity

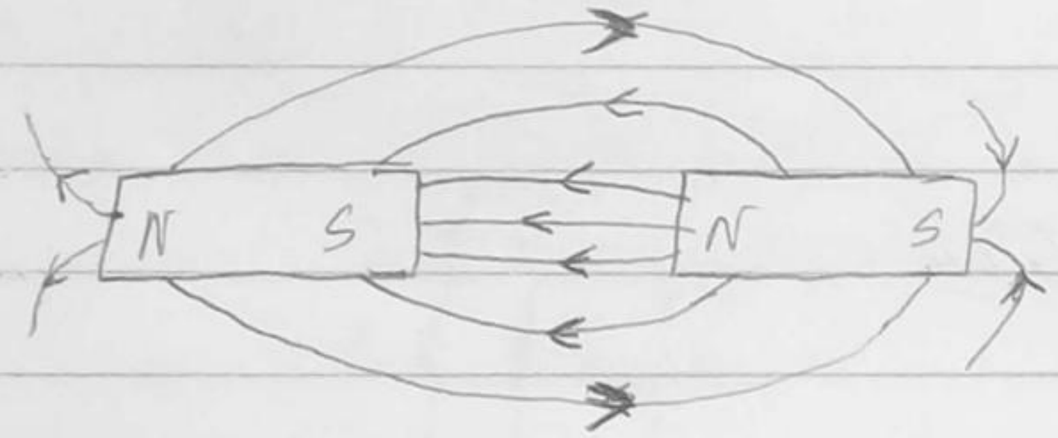


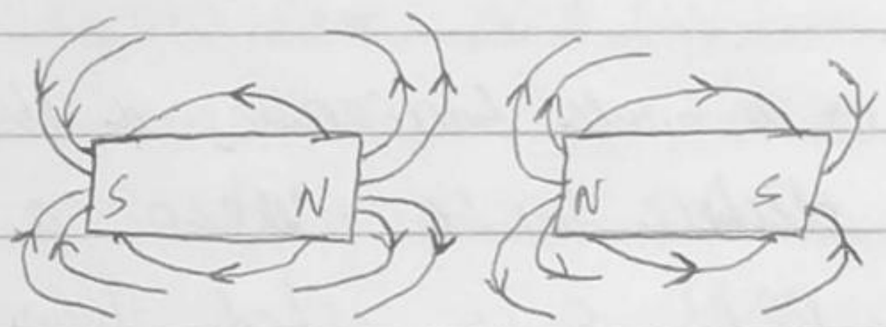




Opposite charges of like polarity

- Magnetic Field : This is a vector field that describes the magnetic influence on moving electric charges, electric currents and magnetized materials. A charge that is moving in a magnetic field experiences a force perpendicular to its own velocity and the magnetic field. All moving charged particles creates a magnetic field and all moving charged particles can detect magnetic fields resulting in magnetic force.




Magnetic flux is the amount of magnetic field produced by a magnetic source. Magnetic flux density is the amount of flux passing through a defined area perpendicular to the direction of the flux

$$\text{Magnetic flux density} = \frac{\text{magnetic flux}}{\text{Area}} \quad (T)$$

- Electric Current : This is a stream of charged particles such as electrons or ions, moving through an electrical conductor or space. Thus, Current is the rate of movement of charge. Conductors are materials that contain electrons that are loosely connected to the nucleus and can easily move through the material from one atom to another while insulator, electrons are held firmly to their nucleus.

$$\text{Electric Current } (I) = \frac{V}{R} \quad (A)$$

V = Voltage , R = Resistance

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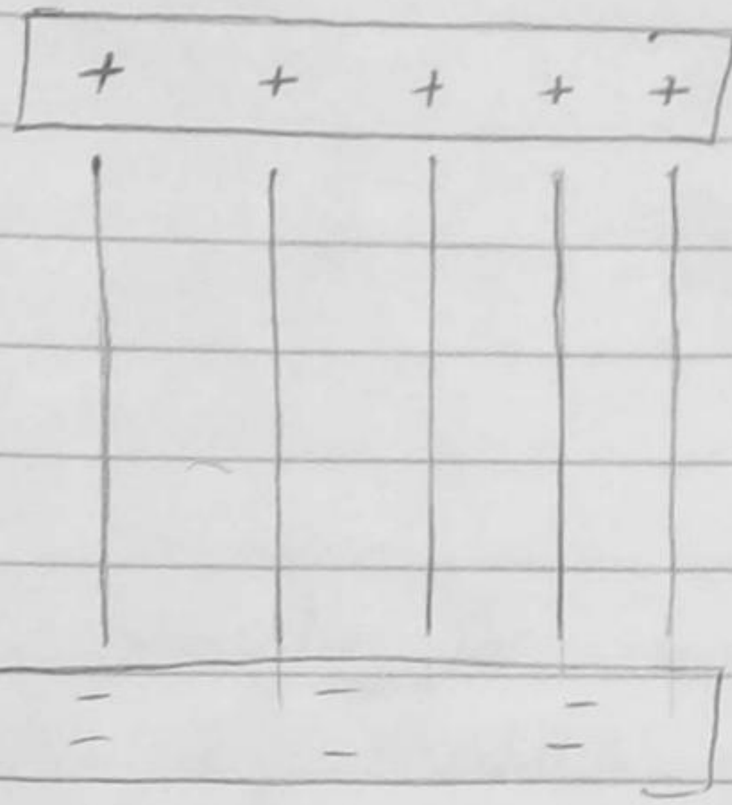


Since the electron is negatively Charged, and Unlike Charges attracts So that it will move to the direction of the positive terminal of the electric field

Therefore, the electron will be acted upon by a force that will be directed opposite to the electric field ie force is downward direction

For Newton Second Law, Force = mass x acceleration

$F = qE$ $F = ma$

$F = eE$

$eE = ma$

$a = \frac{eE}{m}$

Since the Electric field is Uniform, therefore the magnitude and direction of the electric field will be Constant The force will be Constant and the magnitude of the acceleration will be Constant while the direction of acceleration will be downward