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COMPUTER ENGINEERING

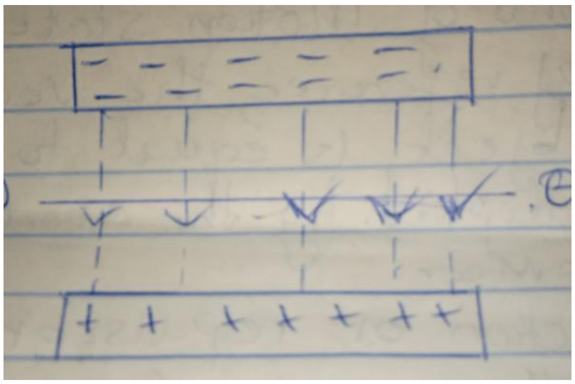
19/ENG02/066

1. Using newton's second law of motion, describe the magnitude and the direction of the acceleration of an electron being shot horizontally into a closed space with a uniform field being directed upwards.

Newton's second law of motion states that in an inertial frame of reference, the vector sum of the forces(F) on an object is equal to the mass(M) of thr object multiplied by the acceleration(a) of the object

There is always a force of attraction or repulsion between two charged particles and it's called an ***ELECTRIC FORCE.*** Like any other force, its effect on charged particles can be described by newton's laws of motion. The electric force F_{elect} **joins** the long list of forces acting on bodies. Newton's laws are applied to analyze the motion (or lack of motion) of object under the influence of such a force or combination of forces. The analysis can be done by constructing a free body diagram in which the type and direction of the individual forces are represented by vector arrows and labelled according to type. The magnitudes of the forces are then added as vectors to get the resultant sum, also known as net force. The net force is then used to determine he acceleration of the object.

Suppose we have a model to help visualize how a charge, or collection of charges, influences the region around it; The concept of electric field is used. Since the electron is negatively charged, and like charges repel each other, the electron will move toward the positive terminal as unlike charges attracts. As a result of this, the electron will be acted upon by a force that is opposite to the electric field in a downward direction as shown below



From Newton's second law;

$$F=Ma \text{ ---------------(1)}$$

$$F=qe \text{ ----------------(2)}$$

Combining equation (1) and equation (2)

$$qE=Ma$$

$$a=qe/M$$

Since the electric field is uniform, the magnitude and direction of the electric field will be constant. The force will be constant as well as well as the magnitude of acceleration, while the direction will be toward the positive point downwards.

2. Describe Electric Field, Magnetic Field and Electric current with respect to charges

Electric field

Electric field is said to exist at a point in space if a charged particle placed at that point experiences a force because of its polarity. This force will not be felt by uncharged particles. A charged particle creates an electric field which acts on another charged objects to produce a charge.

An electric field is defined as the electric force per unit charge. The Direction of the field is taken to be the direction of the force it will exert on a test charge. The electric field is radially outwards from a positive charge and radially inward towards a negative charge.

Magnetic field

Magnetic fields are produced are produced by moving electric charges and intrinsic magnetic moment of elementary particles. Stationary charged particles does not interact with a static magnetic field. A magnetic field 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 forces perpendicular to its own velocity and to the magnetic field.

In electromagnetics, the term magnetic field Is used for two distinct but closely related vector fields.

Electric Current

An electric current is a stream of charged particles such as electrons or ions moving through an electrical conductor space.

A common unit of electric current is the ampere, which is defined as a flow of one coulumb of charge per second. Or 6.2×10^{18} electrons per seconds. If a neutral object loses electron, it becomes more positively charged. If a neutral object gains electrons, it becomes negatively charged. Current is the rate of flow of positive charge. Current is cause by the flow of electrons, ions or other charged particles.

Source: www.hyperphysics,phy-astr.gsu.edu/hbase/electric/elefie/, www.britanica.com, Wikipedia.com

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Basic Elect/Elect 1
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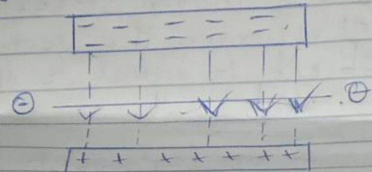
1) Newtons ~~third~~ law ~~of~~ motion States that ~~when~~ one ~~body~~ ~~exerts~~ a

1) Newtons second law of Motion states that In an Inertial frame of reference, the vector sum of the forces F on an object is equal to the mass m of that object multiplied by the acceleration a of the object. " F=Ma.

There is attraction or repulsion between two charged object. There is a force behind this and it is called electric force. like any force, its effects upon the charged particles is described by newtons laws of motion. The electric force ~~field~~ joins the long list of other forces that acts upon object. Newton's laws are applied to analyze the motion (or lack of motion) of objects under the influence of such a force or combination of forces. The analysis can be done by construction of a free body diagram in which the type and direction of the individual forces are represented by vector arrows and labelled according to type. The magnitudes of the forces are then added as vectors in other to determ the resultant sum, also known as the net force. The net force can then be used to determine the acceleration of the object.

Electron, electric force and acceleration

Suppose we have a model to help visualize how a Charge or collection of charges, influences the region around it, The concept of an electric field is Used. Since the electron is negatively Charged, and Unlike Charges attracts, the electron will move toward the Positive terminal as the negative Terminal will repel it. As a result of this, the electron will be acted Upon by a force that is opposite to the electric field in a ~~Sideways~~ ~~upwards~~ downwards direction with respecte to the diagram below



from Newtons Second law,

$F = ma \quad — (1)$

$F = q_e E \quad — (2)$

Combining eqn 1 & 2,

$q_e E = ma$

$a = q_e E / m$

~~Where~~

Since the electric field is Uniform, the magnitude and direction of the electric field will be constant. The force will be constant as well as the magnitude of acceleration while the direction will be toward the positive point, downward.