

Name: Onwuka Ugochukwu Charles

Matric No: 19/ENG05/055

DEPARTMENT: MECHATRONICS

ENG 221 (BASIC) ELECT ASSIGNMENT

① Recall from electric field theory;

$$\vec{F} = q\vec{E} \quad \text{--- (1)}$$

Recall from Newton's second law;

$$F = ma \Rightarrow \text{--- (2)}$$

Comparing equation (1) and (2)

$$ma = qE$$

$$\therefore a = \frac{qE}{m}$$

Recall that  $q =$  charge of an electron  $= 1.6 \times 10^{-19} \text{ C}$

$m =$  mass of an electron  $= 9.11 \times 10^{-31} \text{ kg}$

$$\therefore a = \text{magnitude of acceleration} = \frac{1.6 \times 10^{-19} \times E}{9.11 \times 10^{-31}}$$

$$= 0.176 \times 10^{12} E$$

$$\therefore a = \text{magnitude of acceleration} = 1.76 \times 10^{11} E$$

If the direction of the uniform electric field is upward, and the electron is shot horizontally into it, the direction of its acceleration will be downwards.

2) a) An electric field is a region of space that surrounds each electric charge and exerts force on all other charges in the field. Either attracting or repelling them.

b) Magnetic field can be defined as a region of space around a moving charged particle in which a magnetic force acts on another moving charged particle.

c) An electric current can be defined as the time rate flow of an electric charge, in the direction that a positive moving charge would take and having magnitude equal to the quantity of charge per unit time.