

Course Title: Basic Electrical Engineering I  
Course Code: ENG 221  
Matric No: 19/ENG05/054  
Department: Mechatronics Engineering  
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Questions:

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

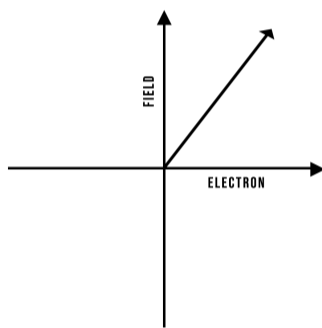
Answer:

There are multiple forces acting on the electron that is being shot into the field. The force that is propelling the electron horizontally, and the upward electric field. Because there are multiple forces acting on the electron, its resultant direction and magnitude of acceleration would be a function of both forces acting on it.

Newton's 2nd law of motion states that when a body is acted on by a force, the body will move with an acceleration proportional to that of the force, and in the same direction. We can think of the electron in the question as a canoe trying to flow horizontally to the opposite side of a river that has an upward current.

Here is a diagram of the resultant force on the electron passing through the field;

The electron's horizontal acceleration and the field's upward acceleration results in an acceleration between the positive y-axis and positive x-axis.



Question 2

Describe electric field, magnetic field and electric current with respect to charges

Answer:

- (i) An electric field is a region of space in which a charge experiences an electrical force.
- (ii) A magnetic field is a vector field caused by the movement of electrical charges where a magnetic force is experienced.
- (iii) An electric current is a stream of charged particles flowing through a conductor like a wire.