JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education & Methodology

Faculty Name	-	JV'n Ms. Harshpreet Cheema
Program	-	B.Sc. III Semester
Course Name	-	Electricity and Electromagnetism
Session No.& Name	-	1. Electrostatic and Electric Current

Academic Day starts with –

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**.

Topic-1 :Scalar and Vector field

We deal with two types of quantities in physics: scalars and vectors.

A scalar is an entity that has simply magnitude and no direction. Scalar quantities include mass, electric charge, temperature, distance, and so on.A vector, on the other hand, is a two-dimensional entity with a magnitude and a direction. Vector quantities include displacement, velocity, magnetic field, and so on.

In general, a field is a vector or scalar quantity that can be described as a function of position anywhere in space. This module exclusively deals with three-dimensional spaces. As a result, a field is defined as a function of the x,y, and z coordinates corresponding to a 3D place.Temperate in three dimensions (a temperature field), for example, can be expressed as T(x,y,z) - a scalar function of location. The electric potential is an example of a scalar field in electromagnetic.

A vector field can be defined similarly as a vectorial function of the location (x,y,z) of any point in space.Each point in a space region has a scalar assigned to it, creating a scalar field. For instance, the temperature at a specific location on the planet is a scalar field. Each point in a region of space is given a set of vectors, which is known as a vector field. Numerous physical parameters, including electric field, gravitational field, and others, have changing values depending on where in space they are. The electric field of a point charge, for instance, is very strong close to the charge and is smaller as we get farther away from it. A continuous function of a point's position in that area of space can be used to represent the electric field, which is a physical property that varies from one point in space to the next.

Scalar Field

Scalar fields can be represented graphically by contours, which are imaginary surfaces traced through all points where the field has the same value. The contours in the temperature field are known as isothermal surfaces or isotherms. In the instance of electrostatics, if we set a point charge anywhere, the electric potential around the point will depend on its position. Because the electric potential is a scalar quantity, the field around the charge is called a scalar potential field. A surface is called an equipotential surface if it connects all such places when potential is constant. These surfaces are also known as level surfaces, and each level surface has its own constant value. Two-level surfaces cannot intersect because scalar values corresponding to both must hold along their common line, which contradicts our concept.

Vector Field

Examples of vector field is the intensity of an electric field, magnetic field, gravitational field, and so on. A vector field is represented at each point by a continuous vector function, such as A (x, y, z) with vector symbol on the head of A. The function A (x, y, z) with vector symbol on the head of A gives a vector with known magnitude and direction at any point in the field, both of which vary constantly from point to point throughout the field region.Vector fields are graphically represented by lines known as field or flux lines. These lines are created in the field in such a way that the direction of a vector field at any point on the line is given by the tangent. Draw an infinitesimal area perpendicular to the field line to express the magnitude of the vector field at any position. The magnitude of the vector field is determined by the number of field lines that pass through this area element. Another essential aspect to note here is that the lines representing vector fields cannot cross because doing so would result in non-unique field direction at the site of interaction.