CBSE Physics Set I Delhi Board 2010

Q. 1. Name the physical quantity whose S.I. unit is JC^{-1}. Is it a scalar or a vector quantity?

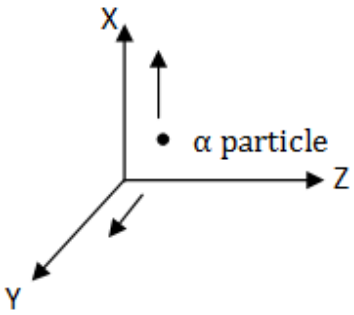
Answer:

We know that work done (W) = Charge (Q) X Potential Difference (V), therefore V=W/Q=J/C

Physical Quantity is electrostatic potential (V).

Potential is actually work done, work is scalar so potential is also Scalar quantity

Q. 2. A beam of $\alpha -$ particles projected along +x - axis, experiences a force due to a magnetic field along the +y - axis. What is the direction of the magnetic field?



Answer: We know that force is cross product of magnetic field and velocity

$$\vec{F} = \vec{B} \times \vec{V}$$

Particles projected along X axis i.e velocity, Force is along Y axis therefore Magnetic field must be along Z axis. Since $\vec{F}$ is perpendicular to the plane of $\vec{B}$ and $\vec{V}$, also evident from cross product rule

Q. 3. Define self – inductance of a coil. Write its S.I. units.

Ans. Self inductance:

$E = -L\,\Delta I/\Delta t$

If $\Delta I/\Delta t$ = rate of change of current = 1, then E=L (neglecting negative sign)

Thus Self- inductance of a coil is equal to the e.m.f induced in the coil when rate of charge of current through the coil is unity.

Its SI unit is Henry (H).