

## VECTORS-

**Physical quantity having both magnitude and direction called vector quantity** . And *the physical quantity having magnitude only called scalar quantity* . E.X.- suppose a man move 10 km , now in that case I am discussing about its distance only i.e. it has magnitude only but there is no any information about its direction hence it is a scalar quantity, if we say man is moving 10km towards East(or any other direction ) so we can say we are discussing about its displacement i.e. it has both magnitude and direction. A vector quantity is represented as an arrow on its top ex;-  $\vec{A}$

Vectors can be divided into two ways –

- (i) **Polar vector**- a vector which has a starting point or a point of application. E. X.- displacement , force etc.
- (ii) **(ii) Axial vector** – Vectors which represent rotational effects and acts along the axis of rotation in accordance with right hand screw rule . E.X.- angular velocity , torque etc.

(A) **UNIT VECTOR**- A unit vector of the given vector is the vector having unit magnitude in the same direction of the given vector . So we can say a unit vector is used to give the or represents the direction of the given vectors .

$$\text{A vector } \vec{A} = |\vec{A}| \hat{A} .$$

$$\text{SO, } \hat{A} = \vec{A} / |\vec{A}|$$

A unit vector of a vector is represent a cap on that vector , like  $\hat{A}$ .

In cartesian coordinates ,  $\hat{i}$  ,  $\hat{j}$  , and  $\hat{k}$  are the unit vectors along X-AXIS, Y-AXIS and Z-AXIS respectively .

- (B) **EQUAL VECTORS**– two vectors are said to be equal if they have same magnitude and direction as well .
- (C) **NEGATIVE VECTOR** – the negative vector of a given vector is a vector of same magnitude but in opposite direction . suppose we have a vector  $\vec{A}$  the its negative vector can be written as  $-\vec{A}$  .
- (D) **CO-INITIAL VECTORS**– The vectors are said to be co-initial if their initial point is common
- (D) **CO-PLANER VECTORS**- Those vectors acting in the same plane .
- (E) **LOCALISED VECTOR** – Those vectors whose initial point is fixed , it is also known is the fixed vector

**Position vector and displacement vector** – suppose motion of an object is in X-Y plane with origin at O , let at any time the object is at point A . If we meet the point A from origin O as tail and point A as head then the  $\vec{OA}$  is called position vector . Similarly B is another point then  $\vec{OB}$  is another position vector . If we meet the points A and B then  $\vec{AB}$  is called displacement vector .

Hence , *position vector is the straight line distance of the object from the origin , it tells the direction of the position of the object with respect to the origin.*

And, *displacement vector is that vector which tells how much and in which direction an object has changed his position in a given time.*