



INTERMEDIATE

Kinematics

Hand Notes For JEE Mains, Advance, NEET UG, Class 11 & 12 etc...

Hand Notes

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Note : We also providing IIT JEE, Advance, NEET, JEE UG, GATE, IES, PSUs & Competitive Exam Materials [Handnotes, Shortnotes & Books], All Reports [Seminar Reports & PPT]

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KINEMATICS

I/Distance & Displacement

DISTANCE

- * Actual length of path.
- * Scalar
- * Depend on path
- * always ↑ w.r.t time.
- * Always ⊕ve.
- * In close path not equal to zero.

Displacement

* Shortest dist. b/w Initial & Final point.

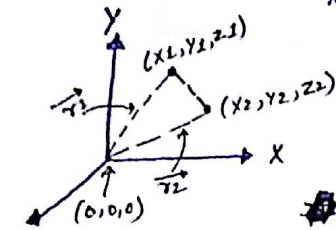
* Disp vector

$$\vec{r} + \vec{r} = \vec{r}$$

$$\vec{r} = \vec{r}_2 = \vec{r}_1$$

$$\vec{r} = (x_2 - x_1)\hat{i} + (y_2 - y_1)\hat{j} + (z_2 - z_1)\hat{k}$$

$$|\vec{r}| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

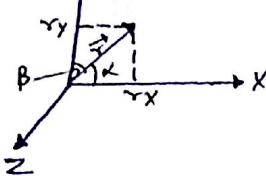


* Angle from 'x'-axis

$$\cos \alpha = \frac{r_x}{|\vec{r}|} \Rightarrow \alpha = \cos^{-1} \left(\frac{r_x}{\sqrt{r_x^2 + r_y^2 + r_z^2}} \right)$$

* Angle from 'y'-axis

$$\cos \beta = \frac{r_y}{|\vec{r}|} = \beta = \cos^{-1} \left(\frac{r_y}{\sqrt{r_x^2 + r_y^2 + r_z^2}} \right)$$

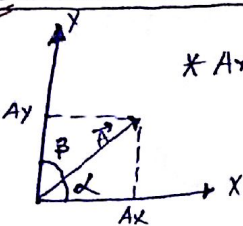


* Angle from 'x'-axis

$$\tan \alpha = \frac{A_y}{A_x} = \alpha = \tan^{-1} \left(\frac{A_y}{A_x} \right)$$

* Angle from 'y'-axis

$$\tan \beta = \frac{A_x}{A_y} = \beta = \tan^{-1} \left(\frac{A_x}{A_y} \right)$$



NOTE -> It is vector quantity & depend on Final & Initial position. (Independent from path)
 * When particle goes away from Initial point its value ↑ & move towards Initial its value ↓. [Int May (t) or (t) w.r.t Time].

- * Distance ≥ Displacement.
- * If particle move in a rectilinear path in same direction distance is equal to displacement & When direction change distance is always greater than displacement.
- * In close path disp. of moving particle is zero.

A particle move in circular path radius 'r'. then for calculation of distance & Displacement of particle.

	Distance	Displacement
1) → 1/4 th	→ $\frac{\pi}{2} R$	→ $\sqrt{2} R$
2) → 1/2	→ πR	→ $2R$
3) → 3/4	→ $\frac{3\pi}{2} R$	→ $\sqrt{2} R$
4) → 1	→ $2\pi R$	→ 0
5) → In a 'θ' angular disp.	→ θR	→ $2R \sin(\theta/2)$

