## Chapter 10

## STRAIGHT LINES

SLOPE OF A LINE : $m=\tan \theta$ if $\theta$ is the angle of inclination.
$\mathrm{m}=\frac{y_{2}-y_{1}}{x_{2}-x_{1}} \quad$ if $\quad\left(x_{1}, y_{1}\right)$ and $\left(x_{2}, y_{2}\right)$ are two points on the line.
SLOPE of a horizontal line is 0 and vertical line is not defined.
If $m_{1}$ and $m_{2}$ are slopes of $L_{1}$ and $L_{2}$ respectively.

$$
\begin{aligned}
& \mathrm{L}_{1} \| \mathrm{L}_{2} \rightarrow \mathrm{~m}_{1}=\mathrm{m}_{2} \\
& \mathrm{~L}_{1} \perp \mathrm{~L}_{2} \rightarrow \mathrm{~m}_{1} \times \mathrm{m}_{2}=-1
\end{aligned}
$$

Acute angle between $L_{1}$ and $L_{2}$
$\tan \theta=\left|\frac{\mathrm{m} 2-\mathrm{m} 1}{1+\mathrm{m} 1 \times \mathrm{m} 2}\right|$ as $1+m_{1} m_{2} \neq 0$ and the obtuse angle $\emptyset=180-\theta$.

## EQUATION OF STRAIGHT LINE

$$
\begin{array}{lll}
\mathrm{x} \text {-axis } & \rightarrow & \mathrm{y}=0 \\
\mathrm{y} \text {-axis } & \rightarrow & \mathrm{x}=0 \\
\| \text { to } \mathrm{x} \text {-axis } & \rightarrow & \mathrm{y}=\mathrm{b} \\
\| \text { to y-axis } & \rightarrow & \mathrm{x}=\mathrm{a}
\end{array}
$$

Having slope $m$ and making an intercept $c$ on $y$-axis $\rightarrow y=m x+c$
Making intercepts a and b on the x -axis and y -axis $\rightarrow \frac{x}{a}+\frac{y}{b}=1$
passing through $\left(x_{1}, y_{1}\right)$ and $\left(x_{2}, y_{2}\right) \quad \rightarrow \mathrm{y}-\mathrm{y}_{1}=\frac{y_{2}-y_{1}}{x_{2}-x_{1}}\left(\mathrm{x}-\mathrm{x}_{1}\right)$
Having normal distance from orgin P and angle between the normal and positive x -axis $\omega \rightarrow \mathrm{x} \cos \omega+\mathrm{y} \sin \omega=\mathrm{P}$.

General form $\rightarrow \mathrm{Ax}+\mathrm{By}+\mathrm{C}=0$
Distance of a point $\left(x_{1}, y_{1}\right)$ from a line $\mathrm{ax}+\mathrm{by}+\mathrm{c}=0$ is $\left|\frac{a x_{1}+b y_{1}+c}{\sqrt{a^{2}+b^{2}}}\right|$

## TEXT BOOK QUESTIONS

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* }->\mathrm{ Exercise 10.1 }->\mathrm{ Qns 5,8,9
    * }->\mathrm{ Exercise 10.2 }->\mathrm{ Qns 7,8,9,10,11,16
    * }->\mathrm{ Exercise 10.3 }->\mathrm{ Qns 3,4,5,7,8,9,10,12,16
* }->\mathrm{ MiscExercis }->\mathrm{ Qns 1,6,7,8,9,12,14,15,23
** }->\mathrm{ Exercise 10.1 }->\mathrm{ Qns 11,13
** }->\mathrm{ Exercise 10.2 }->\mathrm{ Qns 12,13,15,18,20
** }->\mathrm{ Exercise 10.3 }->\mathrm{ Qns 13,14,17,18
** }->\mathrm{ Misc Exercise }->\mathrm{ Qns 3,4,11,18,19
** }->\mathrm{ Example }->2,3,13,14,15,17,19,20,2
Misc Example }->2
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## EXTRA/ HOT QUESTIONS

1. Find the equation of the line through $(4,-5)$ and parallel to the line joining the points $(3,7) \&(-2,4)$.
(Ans.3x-5y-37=0)
2. If $\mathrm{A}(1,4), \mathrm{B}(2,-3)$ and $\mathrm{C}(-1,-2)$ are the vertices of a triangle ABC . find a) The equation of the median through A
b) The equation of the altitude through A
c) The right bisector of side BC
3. Find the equation of the straight line which passes through $(3,-2)$ and cuts off positive intercepts on the x axis and y axis which are in the ratio 4:3
4. Reduce the equation $3 x-2 y+4=0$ to intercept form. Hence find the length of the segment intercepted between the axes.
5. Find the image of the point $(1,2)$ in the line $x-3 y+4=0$
6. If the image of the point $(2,1)$ in a line is $(4,3)$.Find the equation of the line.
7. Find the equation of a line passing through the point $(-3,7)$ and the point of intersection of the lines $2 x-3 y+5=0$ and $4 x+9 y=7$.

$$
(\text { Ans. } 8 x+3 y+3=0)
$$

8. Find the equation of straight lines which are perpendicular to the line
$12 x+5 y=17$ and at a distance of 2 units from the point $(-4,1)$

$$
\text { (ans. } 5 \mathrm{x}-12 \mathrm{y}+6=0 \& 5 \mathrm{x}-12 \mathrm{y}+58=0)
$$

9.The points $A(2,3) \quad B(4,-1) \& C(-1,2)$ are the vertices of a triangle. Find the length of perpendicular from A to BC and hence the area of ABC (Ans. $\frac{14}{\sqrt{34}}$ units \& 7 sq.units)
10. Find the equation of straight line whose intercepts on the axes are thrice as long as those made by $2 x+11 y=6$

