# STRAIGHT LINES

## GENERAL EQUATION OF A LINE

### REDUCTION OF GENERAL FORM OF EQUATIONS INTO STANDARD FORMS

General Form of equation $ax + by + c = 0$ then its –

(i) Slope Intercept Form is

$$y = -\frac{a}{b}x - \frac{c}{b}$$

here slope $m = -\frac{a}{b}$, Intercept $C = \frac{c}{b}$

(ii) Intercept Form is

$$\frac{x}{-\frac{c}{a}} + \frac{y}{-\frac{c}{b}} = 1$$

here x intercept is $= -\frac{c}{a}$ , y intercept is $= -\frac{c}{b}$

(iii) Normal Form is

To change the general form of a line into normal form, first take c to right hand side and make it positive, then divide the whole equation by $\sqrt{a^2 + b^2}$ like

$$-\frac{ax}{\sqrt{a^2+b^2}} - \frac{by}{\sqrt{a^2+b^2}} = \frac{c}{\sqrt{a^2+b^2}},$$

here $\cos\alpha = \frac{a}{\sqrt{a^2+b^2}}, \sin\alpha = \frac{b}{\sqrt{a^2+b^2}}$

and $p = \frac{c}{\sqrt{a^2+b^2}}$

**Ex.** Standard forms of a line $3x + 4y = 5$ are

(i) Slope intercept form is $y = -\frac{3}{4}x + \frac{5}{4}$

Here $m = -\frac{3}{4}, c = \frac{5}{4}$

(ii) Intercept form $\frac{x}{\frac{5}{3}}+\frac{y}{\frac{5}{4}}=1$

Here $a=\frac{5}{3}, b=\frac{5}{4}$

(iii) Normal form

$$\frac{3x}{\sqrt{3^2+4^2}}+\frac{4y}{\sqrt{3^2+4^2}}=\frac{5}{\sqrt{3^2+4^2}}$$

$\Rightarrow$ $$\frac{3x}{5}+\frac{4y}{5}=1$$

Here $p=1, \alpha=\cos^{-1}\left(\frac{3}{5}\right)$