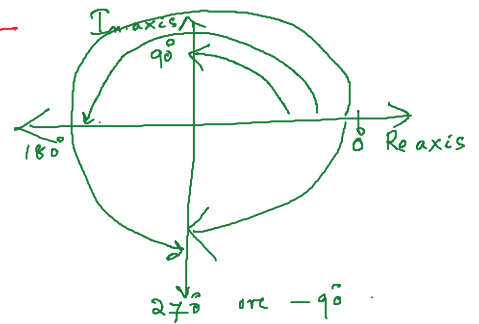


Phasor Algebra

$$Z = a + j b$$



$$+j = 0 + j \times 1$$

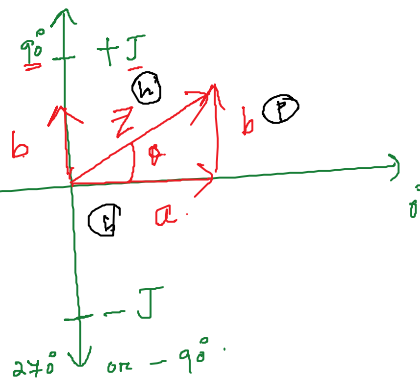
$$= \sqrt{0^2 + 1^2} \angle \tan^{-1}\left(\frac{1}{0}\right)$$

$$= 1 \angle 90^\circ$$

$$-j = 0 - j \times 1$$

$$= \sqrt{0^2 + (-1)^2} \angle \tan^{-1}\left(\frac{-1}{0}\right)$$

$$= 1 \angle -90^\circ$$



$$Z = a + j b$$

$$= |Z| \angle \theta$$

$$= \sqrt{a^2 + b^2} \angle \tan^{-1}\left(\frac{b}{a}\right)$$

$$Z = \frac{a + j b}{\text{Rectangular / Cartesian}}$$

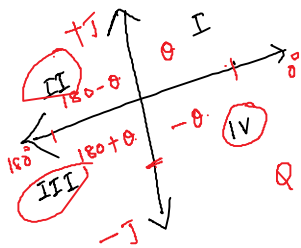
$$= \frac{|Z| \angle \theta}{\text{Polar}}$$

$$= \sqrt{a^2 + b^2} \angle \tan^{-1}\left(\frac{b}{a}\right)$$

$$= |Z| (\cos \theta + j \sin \theta) \quad \text{Trigonometric form.}$$

$$= |Z| e^{j\theta} \quad \text{exponential form.}$$

Q. 1 Convert Rectangular to polar form



(i) $3 + j7$

$$\downarrow$$

$$7.62 \angle 66.8^\circ$$

(ii) $-2 + j5$

$$\sqrt{(-2)^2 + (5)^2} \angle \tan^{-1}\left(\frac{5}{-2}\right)$$

$$5.38 \angle 111.8^\circ$$

(iii) $-50 - j75$

$$\sqrt{(-50)^2 + (-75)^2} \angle \tan^{-1}\left(\frac{-75}{-50}\right)$$

$$90.1 \angle 236.3^\circ$$

(iv) $6 - j8$

$$\downarrow$$

$$\sqrt{6^2 + (-8)^2} \angle -\tan^{-1}\left(\frac{8}{6}\right)$$

$$10 \angle -53.13^\circ$$

Q. 2.

Express
trigonometric

$$V = 50 \angle 36.87^\circ$$

and
rectangular
forms.

4.2.

Express
trigonometric

form

and

rectangular
forms.

Trigonometric form

$$\begin{aligned} V &= 50 \angle 36.87^\circ \\ &= 50 (\cos 36.87^\circ + j \sin 36.87^\circ) \\ &= 50 (0.8 + j 0.6) \\ &= \underline{\underline{40 + j 30}} \end{aligned}$$