Complex Numbers Formulae for Competitive Exams

$i = \sqrt{-1}$ Note: - ;$'j'$ often used rather than $'i'$.

Exponential Notation

$$e^{i\theta} = \cos \quad \theta + i \sin \quad \theta$$

De Moivre's theorem

$$\left[r\left(\cos \quad \theta + i \sin \quad \theta\right)\right]^n = r^n\left(\cos \quad n\theta + i \sin \quad n\theta\right)$$

n^{th} roots of complex number

$$If\ z = re^{i\theta} = r\left(\cos \quad n\theta + i \sin \quad n\theta\right)\ than$$

$$z^{\frac{1}{n}} = \sqrt[n]{re^{\frac{i(\theta+2k\pi)}{n}}},\ k = 0, \pm 1, \pm 2, \ldots\ldots$$

HYPERBOLIC IDENTITIES

$$\cosh \quad x = \frac{e^x + e^{-x}}{2}$$

$$\sinh \quad x = \frac{e^x - e^{-x}}{2}$$

$$\tanh \quad x = \frac{\sinh x}{\cosh \quad x}$$

$$\text{sech} \quad x = \frac{1}{\cosh \quad x}$$

$$cosech\, x = \frac{1}{\sinh \quad x}$$

$$\coth \quad x = \frac{\cosh \quad x}{\sinh \quad x} = \frac{1}{\tanh \quad x}$$

$$\cosh \quad ix = \cos \quad x$$

$$\cos \quad ix = \cosh \quad x$$

$$\sinh \quad ix = i \sin \quad x$$

$$\sin \quad ix = i \sinh \quad x$$

$$\cosh^2 A - \sinh^2 A = 1$$

$$\text{sech}^2 A = 1 - \tanh^2 A$$

$$cosech^2 A = \coth^2 A - 1$$