छ. SHIVAJI TECHNICAL ACADEMY
General Formulae

1. Law of Indices

1) $a^m \times a^n = a^{m+n}$

2) $\dfrac{a^m}{a^n} = a^{m-n}$

3) $(a^m)^n = a^{m \times n}$

4) $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

5) $(ab)^n = a^n b^n$

6) $\dfrac{1}{a^n} = a^{-n}$

7) $a^0 = 1$

2. Logic of Power and Roots

1) $\sqrt{x} = x^{\frac{1}{2}}$

2) $\sqrt[3]{x} = x^{\frac{1}{3}}$

3) $\sqrt[n]{x} = x^{\frac{1}{n}}$

4) $\dfrac{\sqrt{x}}{\sqrt{y}} = \sqrt{\dfrac{x}{y}}$

5) $\sqrt[n]{x^m} = (x^m)^{\frac{1}{n}} = x^{\frac{m}{n}}$

omgfreestudy.com

3. Law of Logarithms

1) $\log_a a = 1, \log_a b = 0$

2) $\log(m \times n) = \log m + \log n$

3) $\log\left(\dfrac{m}{n}\right) = \log m - \log n$

4) $\log m^n = n \log m$

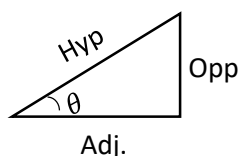5) $\log_b a = \dfrac{\log a}{\log b}$

6) $-\log a = \dfrac{1}{\log a}$

4. Factorization

1) $a^2 - b^2 = (a-b)(a+b)$

2) $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

3) $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

4) $a^4 - b^4 = (a^2 - b^2)(a^2 + b^2)$

5. Expansion

1) $(a+b)^2 = a^2 + b^2 + 2ab$

2) $(a-b)^2 = a^2 + b^2 - 2ab$

3) $(a+b)^3 = a^3 + 3a^2 b + 3ab^2 + b^3$

4) $(a-b)^3 = a^3 - 3a^2 b + 3ab^2 - b^3$

6. Trigonometry

1) $\sin\theta = \dfrac{Opp.side}{Hypo.}, cosec\,\theta = \dfrac{1}{\sin\theta}$

2) $\cos\theta = \dfrac{Adj.side}{Hypo.}, \sec\theta = \dfrac{1}{\cos\theta}$

3) $\tan\theta = \dfrac{Opp.side}{Adj.side}, \cot\theta = \dfrac{1}{\tan\theta}$

4) $\tan\theta = \dfrac{\sin\theta}{\cos\theta}, \cot\theta = \dfrac{\cos\theta}{\sin\theta}$

7. Factorization Formulae

1) $\sin A + \sin B = 2\sin\left(\dfrac{A+B}{2}\right) \times \cos\left(\dfrac{A-B}{2}\right)$

2) $\sin A - \sin B = 2\cos\left(\dfrac{A+B}{2}\right) \times \sin\left(\dfrac{A-B}{2}\right)$

3) $\cos A + \cos B = 2\cos\left(\dfrac{A+B}{2}\right) \times \cos\left(\dfrac{A-B}{2}\right)$

4) $\cos A - \cos B = -2\sin\left(\dfrac{A+B}{2}\right) \times \sin\left(\dfrac{A-B}{2}\right)$

8. Identities

1) $sin^2\theta + cos^2\theta = 1$

2) $sec^2\theta - tan^2\theta = 1$

3) $cosec^2\theta - cot^2\theta = 1$

9. De-Factorization

1) $2cosA\,sinB = \sin(A+B) - \sin(A-B)$

2) $2sinA\,cosB = \sin(A+B) + \sin(A-B)$

3) $2sinA\,sinB = \cos(A-B) - \cos(A+B)$

4) $2cosA\,cosB = \cos(A+B) + \cos(A-B)$

10. Addition Formulae

1) $\sin(A+B) = sinA\,cosB + cosA\,sinB$

2) $\sin(A-B) = sinA\,cosB - cosA\,sinB$

3) $\cos(A+B) = \cos A \cos B - sinA\,sinB$

4) $\cos(A-B) = \cos A \cos B + sinA\,sinB$

5) $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$

6) $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}$

11. Trigonometric Ratios of Negative Angle

1) $\sin(-\theta) = -sin\theta$

2) $\cos(-\theta) = \cos\theta$

3) $\tan(-\theta) = -\tan\theta$

12. Triple Angle Formulae

1) $\sin 3\theta = 3\sin\theta - 4sin^3\theta$

2) $\cos 3\theta = 4cos^3\theta - 3\cos\theta$

omgfreestudy.com

13. Double Angle Formulae

1) $\sin 2\theta = 2\sin\theta\cos\theta$

$= \dfrac{2\tan\theta}{1 + tan^2\theta}$

2) $\cos 2\theta = cos^2\theta - sin^2\theta$

$= 1 - 2sin^2\theta$

$= 2cos^2\theta - 1$

$= \dfrac{1 - tan^2\theta}{1 + tan^2\theta}$

3) $\tan 2\theta = \dfrac{2\tan\theta}{1 - tan^2\theta}$

$\mathfrak{F}$. SHIVAJI TECHNICAL ACADEMY
General Formulae

Trigonometry Table

Angles (in Degrees)	0°	30°	45°	60°	90°	180°	270°	360°
Angles (in Radians)	0	$\dfrac{\pi}{6}$	$\dfrac{\pi}{4}$	$\dfrac{\pi}{3}$	$\dfrac{\pi}{2}$	π	$\dfrac{3\pi}{2}$	2π
sin	0	$\dfrac{1}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{\sqrt{3}}{2}$	1	0	-1	0
cos	1	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{1}{2}$	0	-1	0	1
tan	0	$\dfrac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞	0	∞	0
cot	∞	$\sqrt{3}$	1	$\dfrac{1}{\sqrt{3}}$	0	∞	0	∞
sec	1	$\dfrac{2}{\sqrt{3}}$	$\sqrt{2}$	2	∞	-1	∞	1
cosec	∞	2	$\sqrt{2}$	$\dfrac{2}{\sqrt{3}}$	1	∞	-1	∞