Class :- 10
Subject :- Opt Maths
Unit :- 2e (Trigonometry)
➔ 17 Marks

Important formulae

Compound Angles

1. $\sin(A+B) = \sin A \cdot \cos B + \cos A \cdot \sin B$

2. $\sin(A-B) = \sin A \cdot \cos B - \cos A \cdot \sin B$

3. $\cos(A+B) = \cos A \cdot \cos B - \sin A \sin B$

4. $\cos(A-B) = \cos A \cos B + \sin A \sin B$

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

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

7. $\cot(A+B) = \dfrac{\cot A \cot B - 1}{\cot B + \cot A}$

8. $\cot(A-B) = \dfrac{\cot A \cot B + 1}{\cot B - \cot A}$

9. $\tan(A+B+C)$

$$= \frac{\tan A + \tan B + \tan C - \tan A \tan B \tan C}{1 - \tan A \tan B - \tan B \tan C - \tan C \tan A}$$

Multiple Angles →

1. $\sin 2A = 2 \sin A \cos A$

$$\Rightarrow \frac{2 \tan A}{1 + \tan^2 A}$$

2. $\cos 2A = \cos^2 A - \sin^2 A$

$$\Rightarrow 2\cos^2 A - 1$$

$$\Rightarrow 1 - 2\sin^2 A$$

$$\Rightarrow \frac{1 - \tan^2 A}{1 + \tan^2 A}$$

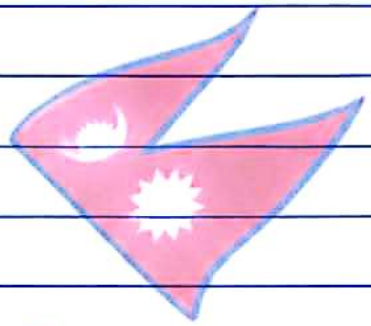
3. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$

4. $\sin 3A = 3 \sin A - 4 \sin^3 A$

5. $\cos 3A = 4 \cos^3 A - 3 \cos A$

6. $\tan 3A = \dfrac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$

Sub-Multiple Angles



1. $\sin A = 2\sin\dfrac{A}{2}\cos\dfrac{A}{2}$

$$\Rightarrow \frac{2\tan\frac{A}{2}}{1+\tan^2\frac{A}{2}}$$

2. $\cos A = \cos^2\dfrac{A}{2} - \sin^2\dfrac{A}{2}$

$$\Rightarrow 2\cos^2\frac{A}{2} - 1$$

$$\Rightarrow 1 - 2\sin^2\frac{A}{2}$$

3. $\tan A = \dfrac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}}$

4. $\sin A = 3\sin\dfrac{A}{3} - 4\sin^3\dfrac{A}{3}$

5. $\cos A = 4\cos^3\frac{A}{3} - 3\cos\frac{A}{3}$

6. $\tan A = \frac{3\tan\frac{A}{3} - \tan^3\frac{A}{3}}{1 - 3\tan^2\frac{A}{3}}$

Transformation of Trigonometric Identities

1. (a) $2\sin A\cos B = \sin(A+B) + \sin(A-B)$

(b) $2\cos A\sin B = \sin(A+B) - \sin(A-B)$

(c) $2\cos A\cos B = \cos(A+B) + \cos(A-B)$

(d) $2\sin A\sin B = \cos(A-B) - \cos(A+B)$

2. (a) $\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$

(b) $\sin C - \sin D = 2\cos\frac{C+D}{2}\sin\frac{C-D}{2}$

(c) $\cos C + \cos D = 2\cos\frac{C+D}{2}\cos\frac{C-D}{2}$

(d) $\cos C - \cos D = -2\sin\frac{C+D}{2}\sin\frac{C-D}{2}$

Values of Trigonometric Ratios

Angles	0°	30°	45°	60°	90°	120°	135°	150°	180°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0
cosec	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined	-2	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1
cot	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	$-\frac{1}{\sqrt{3}}$	-1	$-\sqrt{3}$	Not defined

Height & Distance

1. Angle of Elevation :- The angle made by upward line of sight with horizontal line is called angle of elevation.
2. Angle of Depression :- The angle made by downward line of sight with horizontal line is called angle of depression.