Question 18:
A = 60° and B = 30°, (A +B) = (60° + 30°) = 90°
(A - B) = (60° - 30°) = 30°

(i) LHS = sin(A + B) = sin90° = 1

RHS = sin A cos B + cos A sin B

$= \sin 60° \cos 30° + \cos 60° \sin 30°$

$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$

Hence, sin(A + B) = sin A cos B + cos A sin B

(ii) LHS = sin(A – B) = sin 30° = 1/2

RHS = sin A cos B – cos A sin B

= sin 60° cos30° – cos60° sin 30°

$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2}$

$= \frac{3}{4} - \frac{1}{4} = \frac{3-1}{4} = \frac{2}{4} = \frac{1}{2}$

Hence, sin(A – B) = sin A cos B – cos A sin B

(iii) LHS = cos(A + B) = cos90° = 0

RHS = cos A cos B – sin A sin B

$= \cos 60° \cos 30° - \sin 60° \sin 30°$

$= \frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2} = \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$

Hence, cos (A + B) = cos A cos B – sin A sin B

(iv) $\text{LHS} = \cos(A - B) = \cos 30° = \frac{\sqrt{3}}{2}$

$\text{RHS} = \cos A \cos B + \sin A \sin B$

$= \cos 60° \cos 30° + \sin 60° \sin 30°$

$= \frac{1}{2} \times \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} \times \frac{1}{2} = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$

(v) $\text{LHS} = \tan(A - B) = \tan 30° = \frac{1}{\sqrt{3}}$

$\text{RHS} = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\tan 60° - \tan 30°}{1 + \tan 60° \tan 30°}$

$= \frac{\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + \sqrt{3} \times \frac{1}{r3}} = \frac{2}{\sqrt{3}} \times \frac{1}{2} = \frac{1}{\sqrt{3}}$

Hence, $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

********** END **********