



Trigonometric Ratios of Compound Angles Ex 7.1 Q2

We have,

$$\sin A = \frac{12}{13} \text{ and } \sin B = \frac{4}{5}$$

$$\therefore \cos A = -\sqrt{1 - \sin^2 A} \text{ and } \cos B = \sqrt{1 - \sin^2 B}$$

[\because In the second quadrant $\cos \theta$ is negative]

$$\Rightarrow \cos A = -\sqrt{1 - \left(\frac{12}{13}\right)^2} \text{ and } \cos B = \sqrt{1 - \left(\frac{4}{5}\right)^2}$$

$$\Rightarrow \cos A = -\sqrt{1 - \frac{144}{169}} \text{ and } \cos B = \sqrt{1 - \frac{16}{25}}$$

$$\Rightarrow \cos A = -\sqrt{\frac{25}{169}} \text{ and } \cos B = \sqrt{\frac{9}{25}}$$

$$\Rightarrow \cos A = -\frac{5}{13} \text{ and } \cos B = \frac{3}{5}$$

Now,

(i)

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$= \frac{12}{13} \times \frac{3}{5} - \frac{5}{13} \times \frac{4}{5}$$

$$= \frac{36}{65} - \frac{20}{65}$$

$$= \frac{16}{65}$$

(ii)

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

$$= \frac{-5}{13} \times \frac{3}{5} - \frac{12}{13} \times \frac{4}{5}$$

$$= \frac{-15}{65} - \frac{48}{65}$$

$$= \frac{-63}{65}$$

We have,

$$\sin A = \frac{3}{5} \text{ and } \cos B = \frac{-12}{13}$$

$$\therefore \cos A = -\sqrt{1 - \sin^2 A} \text{ and } \sin B = \sqrt{1 - \cos^2 B}$$

[\because In the second quadrant $\cos \theta$ is negative]

$$\Rightarrow \cos A = -\sqrt{1 - \left(\frac{3}{5}\right)^2} \text{ and } \sin B = \sqrt{1 - \left(\frac{-12}{13}\right)^2}$$

$$\Rightarrow \cos A = -\sqrt{1 - \frac{9}{25}} \text{ and } \sin B = \sqrt{1 - \frac{144}{169}}$$

$$\Rightarrow \cos A = -\sqrt{\frac{16}{25}} \text{ and } \sin B = \sqrt{\frac{25}{169}}$$

$$\Rightarrow \cos A = -\frac{4}{5} \text{ and } \sin B = \frac{5}{13}$$

Now,

$$\begin{aligned} \sin(A+B) &= \sin A \cos B + \cos A \sin B \\ &= \frac{3}{5} \times \left(\frac{-12}{13}\right) - \frac{4}{5} \times \frac{5}{13} \\ &= -\frac{36}{65} - \frac{20}{65} \\ &= -\frac{56}{65} \end{aligned}$$

$$\therefore \sin(A+B) = -\frac{56}{65}$$

Trigonometric Ratios of Compound Angles Ex 7.1 Q3

We have,

$$\cos A = -\frac{24}{25} \text{ and } \cos B = \frac{3}{5}$$

$$\therefore \sin A = -\sqrt{1 - \cos^2 A} \text{ and } \sin B = -\sqrt{1 - \cos^2 B}$$

[\because In the 3rd and 4th quadrant $\sin \theta$ is negative]

$$\Rightarrow \sin A = -\sqrt{1 - \left(\frac{-24}{25}\right)^2} \text{ and } \sin B = -\sqrt{1 - \left(\frac{3}{5}\right)^2}$$

$$\Rightarrow \sin A = -\sqrt{1 - \frac{576}{625}} \text{ and } \sin B = -\sqrt{1 - \frac{9}{25}}$$

$$\Rightarrow \sin A = -\sqrt{\frac{49}{625}} \text{ and } \sin B = -\sqrt{\frac{16}{25}}$$

$$\Rightarrow \sin A = -\frac{7}{25} \text{ and } \sin B = -\frac{4}{5}$$

Now,

$$\begin{aligned} \text{(i)} \quad \sin(A+B) &= \sin A \cos B + \cos A \sin B \\ &= -\frac{7}{25} \times \frac{3}{5} - \frac{24}{25} \times \left(-\frac{4}{5}\right) \\ &= -\frac{21}{125} + \frac{96}{125} \\ &= \frac{75}{125} \\ &= \frac{3}{5} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad \cos(A+B) &= \cos A \cos B - \sin A \sin B \\ &= -\frac{24}{25} \times \frac{3}{5} - \left(-\frac{7}{25}\right) \times \left(-\frac{4}{5}\right) \\ &= -\frac{72}{125} - \frac{28}{125} \\ &= \frac{-72-28}{125} \\ &= \frac{-100}{125} = -\frac{4}{5} \end{aligned}$$

Trigonometric Ratios of Compound Angles Ex 7.1 Q4

We have,

$$\tan A = \frac{3}{4}, \text{ and } \cos B = \frac{9}{41}$$

$$\begin{aligned}\therefore \sin B &= \sqrt{1 - \cos^2 B} \\&= \sqrt{1 - \left(\frac{9}{41}\right)^2} \\&= \sqrt{1 - \frac{81}{1681}} \\&= \sqrt{\frac{1600}{1681}} \\&= \frac{40}{41}\end{aligned}$$

$$\therefore \tan B = \frac{\sin B}{\cos B} = \frac{\frac{40}{41}}{\frac{9}{41}} = \frac{40}{9}$$

Now,

$$\begin{aligned}\tan(A + B) &= \frac{\tan A + \tan B}{1 - \tan A \tan B} \\&= \frac{\frac{3}{4} + \frac{40}{9}}{1 - \frac{3}{4} \times \frac{40}{9}} \\&= \frac{\frac{27 + 160}{36}}{\frac{36 - 120}{36}} \\&= \frac{187}{-84} \\&= -\frac{187}{84}\end{aligned}$$

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