Trigonometric Ratios of Compound Angles Ex 7.1 Q2

We have,

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

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

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

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

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

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

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

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,

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

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

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

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

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

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

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

Now,

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

$$= \frac{3}{5}\times\left(\frac{-12}{13}\right) - \frac{4}{5}\times\frac{5}{13}$$

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

$$= -\frac{56}{65}$$

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

Trigonometric Ratios of Compound Angles Ex 7.1 Q3

We have,

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

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

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

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

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

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

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

Now,

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

$$= -\frac{7}{25}\times\frac{3}{5} - \frac{24}{25}\times\left(-\frac{4}{5}\right)$$

$$= -\frac{21}{25} + \frac{96}{125}$$

$$= \frac{75}{125}$$

$$= \frac{3}{5}$$

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

$$= -\frac{24}{25}\times\frac{3}{5} - \left(-\frac{7}{25}\right)\times\left(-\frac{4}{5}\right)$$

$$= -\frac{72}{125} - \frac{28}{125}$$

$$= \frac{-72-28}{125}$$

$$= \frac{-100}{125} = \frac{-4}{5}$$

Trigonometric Ratios of Compound Angles Ex 7.1 Q4

We have,

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

$$\therefore \quad \sin B = \sqrt{1 - \cos^2 B}$$

$$= \sqrt{1 - \left(\frac{9}{41}\right)^2}$$

$$= \sqrt{1 - \frac{81}{1681}}$$

$$= \sqrt{\frac{1600}{1681}}$$

$$= \frac{40}{41}$$

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

Now,

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

$$= \frac{\frac{3}{4} + \frac{40}{9}}{1 - \frac{3}{4} \times \frac{40}{9}}$$

$$= \frac{\frac{27 + 160}{36}}{\frac{36 - 120}{36}}$$

$$= \frac{\frac{187}{36}}{\frac{-84}{36}}$$

$$= -\frac{187}{84}$$

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