Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If cos(α + β) = 3/5 ,sin (α - β) = 5/13 and 0 < $\alpha, \beta < \frac{\pi}{4}$, then tan(2$\alpha$) is equal to :

A. 21/16

B. 63/52

C. 33/52

D. 63/16

Solutions

Solution: 01

Explanation

Given $0 < \alpha < \frac{\pi}{4}$

and $0 < \beta < \frac{\pi}{4}$

$\therefore 0 > -\beta > -\frac{\pi}{4}$

$\therefore 0 < \alpha + \beta < \frac{\pi}{2}$

and $-\frac{\pi}{4} < \alpha - \beta < \frac{\pi}{4}$

As cos(α + β) = 3/5

so $\tan(\alpha + \beta) = \frac{4}{3}$

As sin(α - β) = 5/13

so $\tan(\alpha - \beta) = \frac{5}{12}$

Now tan(2α) = tan(α + β + α - β)

$= \frac{\tan(\alpha+\beta)+\tan(\alpha-\beta)}{1-\tan(\alpha+\beta)\tan(\alpha-\beta)}$

$= \frac{\frac{4}{3}+\frac{5}{12}}{1-\frac{4}{3}\times\frac{5}{12}} = \frac{63}{16}$