Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If $15\sin^4\alpha + 10\cos^4\alpha = 6$, for some $\alpha \in R$, then the value of

$27\sec^6\alpha + 8\operatorname{cosec}^6\alpha$ is equal to :

A. 500

B. 400

C. 250

D. 350

Solutions

Solution: 01

Explanation

$15\sin^2\alpha + 10(1 - \sin^2\alpha)^2 = 6$

$\Rightarrow 25\sin^2\alpha - 20\sin^2\alpha + 4 = 0$

$\Rightarrow 25\sin^2\alpha - 10\sin^2\alpha - 10\sin^2\alpha + 4 = 0$

$\Rightarrow (5\sin^2\alpha - 2)^2 = 0 \Rightarrow \sin^2\alpha = \frac{2}{5}$

$\therefore \cos^2\alpha = \frac{3}{5}$

$\therefore 27\sec^2\alpha + 8\operatorname{cosec}^6\alpha = 27\left(\frac{5}{3}\right)^3 + 8\left(\frac{5}{2}\right)^3$

$= 125 + 125 = 250$