Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If $A = \sin^2 x + \cos^4 x$, then for all real x:

A. $\frac{13}{16} \leq A \leq 1$

B. $1 \leq A \leq 2$

C. $\frac{3}{4} \leq A \leq \frac{13}{16}$

D. $\frac{3}{4} \leq A \leq 1$

Solutions

Solution: 01

Explanation

$A = \sin^2 x + \cos^4 x$

$= \sin^2 x + \cos^2 x \left(1 - \sin^2 x\right)$

$= \sin^2 x + \cos^2 x - \frac{1}{4}(2 \sin x . \cos x)^2$

$= 1 - \frac{1}{4}\sin^2 (2x)$

Now $0 \leq \sin^2 (2x) \leq 1$

$\Rightarrow 0 \geq -\frac{1}{4}\sin^2 (2x) \geq -\frac{1}{4}$

$\Rightarrow 1 \geq 1 - \frac{1}{4}\sin^2 (2x) \geq 1 - \frac{1}{4}$

$\Rightarrow 1 \geq A \geq \frac{3}{4}$