Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If $\sin\theta + \cos\theta = \frac{1}{2}$, then 16(sin(2$\theta$) + cos(4$\theta$) + sin(6$\theta$)) is equal to :

A. 23

B. −27

C. −23

D. 27

Solutions

Solution: 01

Explanation

$\sin\theta + \cos\theta = \frac{1}{2}$

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{1}{4}$

$\sin 2\theta = -\frac{3}{4}$

Now :

$\cos 4\theta = 1 - 2\sin^2 2\theta$

$= 1 - 2\left(-\frac{3}{4}\right)^2$

$= 1 - 2 \times \frac{9}{16} = -\frac{1}{8}$

$\sin 6\theta = 3\sin 2\theta - 4\sin^3 2\theta$

$= (3 - 4\sin^2 2\theta).\sin 2\theta$

$= \left[3 - 4\left(\frac{9}{16}\right)\right] . \left(-\frac{3}{4}\right)$

$\Rightarrow \left[\frac{3}{4}\right] \times \left(-\frac{3}{4}\right) = -\frac{9}{16}$

$16[\sin 2\theta + \cos 4\theta + \sin 6\theta]$

$= 16\left(-\frac{3}{4} - \frac{1}{8} - \frac{9}{16}\right) = -23$