Past Year JEE Questions

Questions

Quetion: 01

The term independent of x in the expansion of

$\left(\frac{1}{60} - \frac{x^8}{81}\right) \cdot \left(2x^2 - \frac{3}{x^2}\right)^6$ is equal to :

A. 36

B. - 108

C. - 36

D. - 72

Solutions

Solution: 01

Explanation

Given expression = $\left(\frac{1}{60} - \frac{x^8}{81}\right) \cdot \left(2x^2 - \frac{3}{x^2}\right)^6$

$= \frac{1}{60}\left(2x^3 - \frac{3}{x^2}\right)^6 - \frac{x^8}{81}\left(2x^2 - \frac{3}{x^2}\right)^6$

So its general term is

$T_{r+1} = \frac{1}{60} {}^6C_r\left(2x^2\right)^{6-r}\left(-\frac{3}{x^2}\right)^r - \frac{x^8}{81} {}^6C_r\left(2x^2\right)^{6-r}\left(-\frac{3}{x^2}\right)^r$

$= \frac{1}{60} {}^6C_r(2)^{6-r}(-3)^r x^{12-4r} - \frac{1}{81} {}^6C_r(2)^{6-r}(-3)^r x^{20-4r}$ ....(i)

For this term to be independent of x, put r = 3 in 1st part and r = 5 in 2nd part.

So from (i) the term independent of
x = $\frac{1}{60} \times 2^3 \times (-3)^3 \times {}^6C_3 + \left(-\frac{1}{81}\right)(2)(-3)^5 \times {}^6C_5$
= -72 + 36 = **-36**