

Infinite Series - Class XI

Past Year JEE Questions

Questions

Question: 01

If the coefficients of x^{-2} and x^{-4} in the expansion of $\left(x^{\frac{1}{3}} + \frac{1}{2x^3}\right)^{18}$, $(x > 0)$, are m and n respectively, then $\frac{m}{n}$ is equal to :

- A. 182
- B. $\frac{4}{5}$
- C. $\frac{5}{4}$
- D. 27

Solutions

Solution: 01

Explanation

$$T_{r+1} = {}^{18}C_r \left(x^{\frac{1}{3}}\right)^{18-r} \cdot \left(\frac{1}{2x^3}\right)^r$$

$$= {}^{18}C_r \left(\frac{1}{2}\right)^r \cdot x^{\frac{18-r}{3}-2r}$$

For coefficient of x^{-2} ,

$$\frac{18-r}{3} = -2$$

$$\Rightarrow r = 12$$

$$\therefore \text{Coefficient of } x^{-2} \text{ is } (m) = {}^{18}C_{12} \left(\frac{1}{2}\right)^{12}$$

For coefficient of x^{-4} ,

$$\frac{18-r}{3} = -4$$

$$\Rightarrow r = 15$$

$$\therefore \text{Coefficient of } x^{-4} \text{ is } (n) = {}^{18}C_{15} \left(\frac{1}{2}\right)^{15}$$

$$\therefore \frac{m}{n} = \frac{{}^{18}C_{12} \left(\frac{1}{2}\right)^{12}}{{}^{18}C_{15} \left(\frac{1}{2}\right)^{15}}$$

$$= \frac{{}^{18}C_6 (2)^3}{{}^{18}C_3}$$

$$= 182$$