Question -

The ratio of the 5th term from the beginning to the 5th term from the end in the binomial expansion of $\left(2^{\frac{1}{3}} + \frac{1}{2(3)^{\frac{1}{3}}}\right)^{10}$ is **(2019 Main, 12 Jan I)**

(a) $1 : 2(6)^{\frac{1}{3}}$ (b) $1 : 4(16)^{\frac{1}{3}}$ (c) $4(36)^{\frac{1}{3}} : 1$ (d) $2(36)^{\frac{1}{3}} : 1$

Ans - C

Solution -

Since, rth term from the end in the expansion of a binomial $(x+a)^n$ is same as the $(n-r+2)$th term from the beginning in the expansion of same binomial.

$$\therefore \text{Required ratio} = \frac{T_5}{T_{10-5+2}} = \frac{T_5}{T_7} = \frac{T_{4+1}}{T_{6+1}}$$

$$\Rightarrow \quad \frac{T_5}{T_{10-5+2}} = \frac{{}^{10}C_4 (2^{1/3})^{10-4}\left(\frac{1}{2(3)^{1/3}}\right)^4}{{}^{10}C_6 (2^{1/3})^{10-6}\left(\frac{1}{2(3)^{1/3}}\right)^6}$$

$$[\because T_{r+1} = {}^nC_r x^{n-r} a^r]$$

$$= \frac{2^{6/3}\,(2(3)^{1/3})^6}{2^{4/3}\,(2(3)^{1/3})^4} \qquad [\because {}^{10}C_4 = {}^{10}C_6]$$

$$= 2^{6/3-4/3}\,(2(3)^{1/3})^{6-4}$$

$$= 2^{2/3}\cdot 2^2 \cdot 3^{2/3} = 4(6)^{2/3} = 4(36)^{1/3}$$

So, the required ratio is $4(36)^{1/3} : 1$.