Past Year JEE Questions

Questions

Quetion: 01

If some three consecutive in the binomial expansion of $(x + 1)^n$ is powers of x are in the ratio 2 : 15 : 70, then the average of these three coefficient is :-

A. 625
B. 227
C. 964
D. 232

Solutions

Solution: 01

Explanation

Given $^nC_{r-1} : {}^nC_r : {}^nC_{r+1} = 2 : 15 : 70$

$$\frac{^nC_{r-1}}{^nC_r} = \frac{2}{15}$$

$$\Rightarrow \frac{r}{n-r+1} = \frac{2}{15}$$

$$\Rightarrow 15r = 2n - 2r + 2$$

$$\Rightarrow 17r = 2n + 2 \text{ .... (i)}$$

Now $\frac{^nC_r}{^nC_{r+1}} = \frac{15}{70}$

$$\Rightarrow \frac{r+1}{n-r} = \frac{3}{14}$$

$$\Rightarrow 14r + 14 = 3n - 3r$$

$$\Rightarrow 17r = 3n - 14 \text{ ... (ii)}$$

Now From (i) and (ii) equation

$2n + 2 = 3n - 14 \Rightarrow n = 16$

By putting n = 16 in equation (i)

$\Rightarrow r = 2$

$\therefore$ Average of coefficient $= \frac{^nC_1 + {}^nC_2 + {}^nC_3}{3}$

$$= \frac{16 + 120 + 560}{3}$$

$$= \frac{696}{3} = 232$$