Question -

Given positive integers $r > 1$, $n > 2$ and the coefficient of $(3r)$th and $(r + 2)$th terms in the binomial expansion of $(1 + x)^{2n}$ are equal. Then, **(1980, 2M)**

(a) $n = 2r$ (b) $n = 2r + 1$

(c) $n = 3r$ (d) None of these

Ans - A

Solution -

In the expansion $(1 + x)^{2n}$, $t_{3r} = {}^{2n}C_{3r-1}(x)^{3r-1}$

and $t_{r+2} = {}^{2n}C_{r+1}(x)^{r+1}$

Since, binomial coefficients of t_{3r} and t_{r+2} are equal.

$\therefore \quad {}^{2n}C_{3r-1} = {}^{2n}C_{r+1}$

$\Rightarrow \quad 3r - 1 = r + 1 \quad \text{or} \quad 2n = (3r - 1) + (r + 1)$

$\Rightarrow \quad 2r = 2 \quad \text{or} \quad 2n = 4r$

$\Rightarrow \quad r = 1 \quad \text{or} \quad n = 2r$

But $r > 1$

$\therefore$ We take, $n = 2r$