**Question 75759.** From 7 men and 4 women a committee of 6 is to be formed. In how many ways can this be done
(i) when the committee contains exactly 2 women,
(ii) at least 2 women?

**Solution.**

**(i)** It is possible to choose exactly 2 women from 4 by

$\binom{4}{2} = \frac{4!}{2!2!} = 6,$

and the remaining 4 out of 6 members of the men's committee of 7 men by
$\binom{7}{4} = \frac{7!}{4!3!} = 35$

And than ways of choosing men and women do not depend on each other, so for every choice of women, any choice of men is suitable and, therefore, they can be multiplied. Then

$$N = \binom{4}{2} \cdot \binom{7}{4} = 6 \cdot 35 = 210$$

**Answer (i)** 210.

**(ii)** In this case the committee can consist of 2, 3, or 4 women, while men in the committee will remain 4, 3 and 2, respectively.. We write out the number of committees for each number of women similarly to the case (i):

$$N = \binom{4}{2} \cdot \binom{7}{4} + \binom{4}{3} \cdot \binom{7}{3} + \binom{4}{4} \cdot \binom{7}{2}$$

$$N = \frac{4!}{2!\,2!} \cdot \frac{7!}{4!\,3!} + \frac{4!}{3!\,1!} \cdot \frac{7!}{4!\,3!} + \frac{4!}{4!\,0!} \cdot \frac{7!}{5!\,2!} = 6 \cdot 35 + 4 \cdot 35 + 1 \cdot 21 = 371$$

**Answer (ii)** 371.