



Combinations Ex 17.2 Q5

Total number of professor = 10

Total number of student = 20

Committee of 2 professor and 3 student can be selected in $^{10}C_2 \times ^{20}C_3$ ways.

$$= \frac{10!}{2!8!} \times \frac{20!}{3!17!}$$

$$= \frac{10 \times 9}{2} \times \frac{20 \times 19 \times 18}{3 \times 2}$$

$$= 51300 \text{ ways}$$

(i) a particular professor is included

\therefore committee is $^9C_1 \times ^{20}C_3$

$$= \frac{9!}{8!} \times \frac{20!}{3!17!} = \frac{9 \times 20 \times 19 \times 18}{3 \times 2}$$

$$= 10260$$

(ii) a particular student is included

\therefore committee is $^{10}C_2 \times ^{19}C_2$

$$= \frac{10!}{2 \times 8!} \times \frac{19!}{2! \times 17!} = \frac{10 \times 9 \times 19 \times 18}{2 \times 2 \times 1} = 7695$$

(iii) a particular student is excluded \rightarrow now total student are 19

\therefore committee is $^{10}C_2 \times ^{19}C_3$

$$= \frac{10!}{2 \times 8!} \times \frac{19!}{3! \times 16!} = \frac{10 \times 9 \times 19 \times 18 \times 17}{2 \times 3 \times 2} = 43605$$

Combinations Ex 17.2 Q6

The we can multiplying 2 or 3 or 4 digits.

Then number of ways of multiplying 4 digits at a time

$$= {}^4C_4 \dots \dots \dots (i)$$

The number of ways of multiplying 3 digits at a time

$$= {}^4C_3 \dots \dots \dots (ii)$$

The number of ways of multiplying 2 digits at a time

$$= {}^4C_2 \dots \dots \dots (iii)$$

\therefore Total number of ways

$$= {}^4C_4 + {}^4C_2 + {}^4C_3$$

$$\Rightarrow = 1 + \frac{4 \times 3}{2} + 4$$

$$\Rightarrow = 11$$

= There are 11 ways

Combinations Ex 17.2 Q7

Total number of boys = 12

Total number of girls = 10

Total number of girls for the competition

$$= 10 + 2 = 12$$

Total students chosen for competition

$$= 10 - 2 \text{ (at least 4 boys and 4 girls)}$$

\therefore Selection can be made in

$${}^{12}C_4 \times {}^8C_4 + {}^{12}C_5 \times {}^8C_3 + {}^{12}C_6 \times {}^8C_2$$

$$= \frac{12!}{4!8!} \times \frac{8!}{4!4!} + \frac{12!}{5!7!} \times \frac{8!}{3!5!} + \frac{12!}{6!6!} \times \frac{8!}{2!6!}$$

$$= \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 4 \times 3 \times 2} \right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6}{5 \times 4 \times 3 \times 2 \times 3 \times 2} \right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 8 \times 7}{6 \times 5 \times 4 \times 3 \times 2 \times 2} \right)$$

$$= 55440 + 44352 + 181104$$

$$= 280896$$

\therefore Total number of ways = $385770 - 280896 = 104874$

(385770 = from 10 girls 4 are chosen)

Combinations Ex 17.2 Q8

Total number of books = 10
total books to be selected = 4

(i) there is no restriction

$$= {}^{10}C_4 = \frac{10!}{4! 6!} = \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2}$$
$$= 210$$

(ii) two particular books are always selected
these the total books = $10 - 2 = 8$

So out of remaining 8 books selection of 2 books can be done in 8C_2 way

$$= \frac{8!}{2! 6!} = \frac{8 \times 7}{2 \times 1} = 28 \text{ ways}$$

(iii) two particular books are never selected
these the total number of books = $10 - 2 = 8$

so out of remaining 8 books, 4 books can be selected in 8C_4 way

$$= \frac{8!}{4! 4!} = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2}$$
$$= 14 \times 5$$
$$= 70 \text{ ways}$$

***** END *****