امتحانات رقم (8)

2- Combination

It's a selection of different objects (r), taken from a set of different objects (n) without required to the arrangement of them it's given by:-

$$C_r^n = \frac{n!}{r!\,(n-r)!} = \frac{P_r^n}{r!} \;;\quad r \le n.$$

EX①: How many ways can be selected (chosen). Comittee of four persons from six?

Sol $n = 6,\ r = 4;$

$$\therefore C_r^n = C_4^6 = \frac{6!}{4!\,(6-4)!} = \frac{6\cdot 5\cdot \cancel{4!}}{\cancel{4!}\;2!} = 15$$

$= 15$ no. of selected

سؤال

EX(2) we want to select comitte of six members from five teachers and ten students; find.

① How many ways can be selected?

② 〃 〃 〃 〃 〃 s.t. no. of teachers are always more than the students?

③ There are at most 2 students?

احتمالات رقم (٩)

Sol ① $n = 5+10 = 15$, $r = 6$,

$\therefore C_6^{15} = \dfrac{15!}{6!\,(15-6)!} = 5005$ no. of selec.

② no. of selec $= C_5^5 C_1^{10} + C_4^5 C_2^{10}$

$= 10 + 225$

$= 235$

③ no. of selec. $= C_1^{10} C_5^5 + C_2^{10} C_4^5 = 235$

if he want ④ There are at least 2 students:-

no. of selec. $= C_2^{10} C_4^5 + C_3^{10} C_3^5 + C_4^{10} C_2^5 + C_5^{10} C_1^5$

$= \boxed{}$ H.W.

4785

⑤ no. of students are always more than the teachers?

no. of selec. $= C_5^{10} \cdot C_1^5 + C_4^{10} C_2^5 = \boxed{}$ H.W

3360

Ex: Find the Value of n if :-

① $C_2^{n+1} = 3 \Rightarrow \dfrac{(n+1)!}{2!\,(n+1-2)!} = 3$

$$\Rightarrow \frac{(n+1)(n)\cancel{(n-1)!}}{2!\,\cancel{(n-1)!}} = 3$$

$\therefore n^2 + n - 6 = 0$

$\Rightarrow (n+3)(n-2) = 0$

$\therefore n+3 = 0 \Rightarrow n = -3$ neglect

or $n-2 = 0 \Rightarrow \boxed{n = 2}$

notes: (1) $C_n^n = 1$

$\therefore C_n^n = \dfrac{\cancel{n!}}{\cancel{n!}\,(n-n)!} = \dfrac{1}{0!} = 1$

(2) $C_1^n = n \Rightarrow \therefore C_1^n = \dfrac{n!}{1!\,(n-1)!} = \dfrac{n\cancel{(n-1)!}}{\cancel{(n-1)!}} = n$

3) $C_0^n = 1 \Rightarrow \therefore C_0^n = \dfrac{n!}{0!\,(n-0)!} = 1$