



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VQAR -VERBAL QUANTITATIVE APTITUDE REASONING-II IIYEAR/ IV SEMESTER

PERMUTATION & COMBINATION–UNIT 2
/VERBAL QUANTATIVE APTITUDE AND
REASONING II /RAMYA E/ECE/SNSCT

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UNIT 2–QUANTITATIVE ABILITY IV

TOPIC 1: PERMUTATION & COMBINATION



PERMUTATION & COMBINATION



<p>Definition</p> <p>A <i>combination</i> is a grouping of outcomes in which the order does not matter.</p>	<p>Formula</p> <p>The number of <i>combinations</i> of n things chosen r at a time is found using ${}_nC_r = \frac{n!}{r!(n-r)!}$.</p>	<p>Example</p> <p>How many pairs can be made from a group of 6 people? (Jin and Tom are the same pair as Tom and Jin)</p> ${}_6C_2 = \frac{6!}{2!(6-2)!} = \frac{720}{2(24)} = 15$
<p>Definition</p> <p>A <i>permutation</i> is an arrangement of outcomes in which the order does matter.</p>	<p>Formula</p> <p>The number of <i>permutations</i> of n things chosen r at a time is found using ${}_nP_r = \frac{n!}{(n-r)!}$.</p>	<p>Example</p> <p>6 people are in a contest. How many ways can 1st and 2nd place be awarded? (Jin first and Tom second is different than Tom first and Jin second)</p> ${}_6P_2 = \frac{6!}{(6-2)!} = \frac{720}{24} = 30$



PERMUTATION & COMBINATION



Permutations	Combinations
The number of ways to arrange things	The number of ways to choose things
Order matters	Order doesn't matter
These are for lists	These are for groups



PERMUTATION & COMBINATION



VISUALIZING THE DIFFERENCE

Permutation

1. ●
2. ●
3. ●

Ordered list

Combination



Unordered group or set



PERMUTATION & COMBINATION



1. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

Explanation:

We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).

$$\begin{aligned} \therefore \text{Required number of ways} &= {}^7C_3 \times {}^6C_2 + {}^7C_4 \times {}^6C_1 + {}^7C_5 \\ &= \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6 \times 5}{2 \times 1} \right) + ({}^7C_3 \times {}^6C_1) + ({}^7C_2) \\ &= 525 + \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times 6 \right) + \left(\frac{7 \times 6}{2 \times 1} \right) \\ &= (525 + 210 + 21) \\ &= 756. \end{aligned}$$



PERMUTATION & COMBINATION



2. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

Explanation:

The word 'LEADING' has 7 different letters.

When the vowels EAI are always together, they can be supposed to form one letter.

Then, we have to arrange the letters LNDG (EAI).

Now, 5 ($4 + 1 = 5$) letters can be arranged in $5! = 120$ ways.

The vowels (EAI) can be arranged among themselves in $3! = 6$ ways.

\therefore Required number of ways = $(120 \times 6) = 720$.



PERMUTATION & COMBINATION



3. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

Explanation:

In the word 'CORPORATION', we treat the vowels OOAIO as one letter.

Thus, we have CRPRTN (OOAIO).

This has 7 (6 + 1) letters of which R occurs 2 times and the rest are different.

Number of ways arranging these letters = $\frac{7!}{2!} = 2520$.

Now, 5 vowels in which O occurs 3 times and the rest are different, can be arranged

in $\frac{5!}{3!} = 20$ ways.

∴ Required number of ways = (2520 x 20) = 50400.



PERMUTATION & COMBINATION



4. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

Answer: Option C

Explanation:

Number of ways of selecting (3 consonants out of 7) and (2 vowels out of 4)

$$= {}^7C_3 \times {}^4C_2$$

$$= \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{4 \times 3}{2 \times 1} \right)$$

$$= 210.$$

Number of groups, each having 3 consonants and 2 vowels = 210.

Each group contains 5 letters.

Number of ways of arranging
5 letters among themselves = $5!$

$$= 5 \times 4 \times 3 \times 2 \times 1$$

$$= 120.$$

\therefore Required number of ways = $(210 \times 120) = 25200$.



PERMUTATION & COMBINATION



5. In how many ways can the letters of the word 'LEADER' be arranged?

Explanation:

The word 'LEADER' contains 6 letters, namely 1L, 2E, 1A, 1D and 1R.

$$\therefore \text{Required number of ways} = \frac{6!}{(1!)(2!)(1!)(1!)(1!)} = 360.$$



PERMUTATION & COMBINATION



6. How many 4-letter words with or without meaning, can be formed out of the letters of the word 'LOGARITHMS', if repetition of letters is not allowed?

Explanation:

'LOGARITHMS' contains 10 different letters.

Required number of words = Number of arrangements of 10 letters, taking 4 at a time.

$$= {}^{10}P_4$$

$$= (10 \times 9 \times 8 \times 7)$$

$$= 5040.$$



PERMUTATION & COMBINATION



Case I

PERMUTATION

Arranging 4 persons in 5 chairs is a permutation.

E. G. Suppose there is a party in your house of your son's birthday and you have invited 10 close friends in the party as you know that there is only 10 chairs in your house but the real problem occurs when you came to know that your wife has given 1 chair to your neighbor because some guests have visited on their home and they are short of 1 chair and your wife's nature is very kind and helpful. So after knowing this you become tense as to what you will do right now, so after thinking a lot you have decided that you will arrange 10 persons in 9 chairs by using the concept of permutation and you can arrange 10 persons in 9 chairs in $10P9 = 10$ FACTORIAL OR 362880 WAYS.

So you can arrange 10 persons in 9 chairs in 362880 ways.

So this is just a basic real life application of permutation and likewise there are numerous applications like arrange 4 employees of organization in 6 different chairs, arrange six different fruits in 5 trays.



PERMUTATION & COMBINATION



Case II

Combination

Select 11 players from 15 players team for the World Cup Final 2019.

Suppose Our Cricket team has performed tremendously in the world Cup 2019 and due to the performance they are able to qualify for the final of the world Cup. But a very gigantic problem occurs in front of selectors and captain Virat Kohli, the best spin bowler of the team injured and due to which he will not able to play for 2 weeks and the final of the World Cup is round the corner.

So Indian cricket team selectors and captain has a choice between Akshar Patel, Yujvendra chahal and Amit Mishra and they have 1 vacant position. So they can select 1 candidate out of 3 candidate in ${}^3C_1 = 3$ Ways, either Akshar or Yujvendra or Amit.

Second example, suppose you want to select 5 employees out of 50 employees of your company for the upcoming project, so you say select 5 employees out of 50 employees in ${}^{50}C_5 = 2118760$ ways.

So this is just a basic real life application of permutation likewise there can be infinite applications like selecting 5 fruits out of 10 fruits, selecting 3 best books out of 50 books for the same subject.

So these examples can be well explained the concept of permutation and combination.



PERMUTATION & COMBINATION



THANK YOU