



## PERSONALITY DEVELOPMENT ASSOCIATION

### MADRAS INSTITUTE OF TECHNOLOGY

### ANNA UNIVERSITY – CHENNAI

Aptitude class no.:03

**Permutation & Combination**

Date: 08.08.2016

#### FORMULAE:

1. The number of permutations for different objects taken  $r$  for a time without repetition is

i)  $nP_r = n(n-1) \dots (n-r+1) = n! \div (n-r)!$

ii)  $nP_r = (n-1)P_r + r(n-1)P_{(r-1)}$

iii) Particularly,  $nP_0=1$ ;  $nP_1 = n$ ;  $nP_n = n!$

2. For  $n$  objects,  $p$  are alike,  $q$  are alike,  $r$  are alike and so on. The number of permutations is  $nP_o = n! \div (p! q! r! \dots)$

3. The number of permutations for different objects taken  $r$  for a time with repetition is  $n^r$ .

4. If both clockwise & anti-clockwise arrangements are same, then the number of arrangements is  $(n-1)! \div 2$ , for the  $n$  different objects arranged in a circle.

5. The number of permutations for different objects taken  $r$  for a time

i) with particular thing,  $r \cdot (n-1)P_{(r-1)}$

ii) without particular thing,  $(n-1)P_r$

6. The number of combinations for  $n$  objects taken  $r$  for a time is  $nC_r$

i)  $nC_r = nP_r \div r! = n! \div [(n-1)! r!]$       ii)  $nC_r = nC_{(n-r)}$

iii)  $nC_r = (n-1)C_{r-1} + (n-1)C_r$       iv) Particularly,  $nC_0 = nC_n = 1$ ;  $nC_1 = nC_{n-1} = n$

7. The number of combinations for  $n$  objects taken  $r$  for a time in which particular thing  $p$ ,

i) will occur,  $(n-p)C_{r-p}$       ii) will not occur,  $(n-p)C_r$

8. The number of combinations for  $n$  different objects taken any number at a time is  $2^n - 1$ .

9. For  $n$  objects,  $p$  are alike,  $q$  are alike,  $r$  are alike and so on. The number of combinations is  $(p+1)(q+1)(r+1)\dots - 1$ .

10. The number of combinations for  $n$  objects taken  $r$  for a time with repetition is

$(n-r+1)C_r$

11.i) The number of ways in dividing  $(m+n+p+\dots)$  unlike objects into  $q$  unequal parts with  $m, n, p, \dots$  objects is  $[(m+n+p+\dots)!] \div [m! n! p! \dots]$

ii) If  $m=n=p=\dots=q$  terms, the number of divisions is  $(mq)! \div [q! (m!)^q]$

12.  $nC_r$  is greatest,  $r=n/2$  when  $n$  is even;  $r=(n-1)/2$  or  $(n+1)/2$  when  $n$  is odd.

13. Product of  $r$  consecutive integers is exactly divisible by  $r!$

### PROBLEMS:

- 1) In a rail route between two station A and B, there are exactly ten stations. How many different tickets of a particular class are to be printed so that passengers can travel from any station to any other station?
- 2) a) Twelve candidates have applied for four identical posts in a company. If a particular candidate is definitely selected, in how many ways can the candidates be selected?  
b) In the above problem, if a particular is definitely rejected, in how many ways can the candidates be selected?
- 3) a) In how many of the words that can be formed using all the letters of the words TUESDAY are all the vowels together?  
b) The number of words that can be using all the letters of the word TUESDAY such that two vowels are together .....
- 4) In how many ways can a committee of four persons be formed from four boys and three girls, such that the committee has at least two boys ?  
b) In the above problem, in how many ways can the committee be formed so that it has at most two boys ?
- 5) In how many ways can a girl invite at least two of her eight friends to a party ?  
In the above problem, in how many ways can the girl invite at most seven of her to the party ?
- 6) In how many ways can six persons be seated around a circular table?
- 7) There are three places A, B, C in a city. A is connected to B in 5 ways and B is connected to C in 3 ways. In how many ways can one travel from A to C, if there is no direct way to travel from A to C?
- 8) a) Find the numbers of words that can be formed using all the letters of the word BHUPATI  
b) How many of the words that can be formed using all the letters of the words BHUPATI begin with B but don't end with B  
c) How many of the words that can be using all the letters of the word BHUPATI begin with B but don't end with I?
- 9) In a party there are 15 guests. Each of them shakes hands with every other guest only once. Find the total number of handshakes that are exchanged at the party?