

Chapter 07

PERMUTATIONS AND COMBINATIONS

EXAMPLE:

If the letters of the word **MASTER** are permuted in all possible ways and the words thus formed arranged in the dictionary order, then find the ranks of the words:

(i) **REMAST**

(ii) **MASTER**

SOLUTION:

(i) The alphabetical order of the letters of the given word is A, E, M, R, S, T.

The number of words begin with A is $5! = 120$.

The number of words begin with E is $5! = 120$.

The number of words begin with M is $5! = 120$.

The number of words begin with RA is $4! = 24$.

The number of words begin with REA is $3! = 6$.

The next word is REMAST.

$$\therefore \text{Rank of the word REMAST} = 3(120) + 24 + 6 + 1 \\ = 360 + 31 = 391.$$

(ii) The alphabetical order of the letters of the given word is A, E, M, R, S, T.

The number of words begin with A is $5! = 120$.

The number of words begin with E is $5! = 120$.

The number of words begin with MAE is $3! = 6$.

The number of words begin with MAR is $3! = 6$.

The number of words begin with MASE is $2! = 2$.

The number of words begin with MASR is $2! = 2$.

The next word is MASTER.

$$\therefore \text{Rank of the word MASTER} \\ = 2(120) + 2(6) + 2(2) + 1 \\ = 240 + 12 + 4 + 1 = 257.$$