

Chapter 07

PERMUTATIONS AND COMBINATIONS

SUMMARY:

- ◆ Fundamental principle of counting If an event can occur in ‘ m ’ different ways, following which another event can occur in ‘ n ’ different ways, then the total number of occurrence of the events in the given order is $m \times n$.
- ◆ The number of permutations of ‘ n ’ different things taken ‘ r ’ at a time, where repetition is not allowed, is denoted by ${}^n P_r$ and is given by ${}^n P_r = \frac{n!}{(n-r)!}$, where $0 \leq r \leq n$.
- ◆ $n! = 1 \times 2 \times 3 \times \dots \times n$.
- ◆ $n! = n \times (n-1)!$
- ◆ The number of permutations of ‘ n ’ different things, taken ‘ r ’ at a time, where repetition is allowed, is n^r .
- ◆ The number of permutations of ‘ n ’ objects taken all at a time, where p_1 objects are of first kind, p_2 objects are of the second kind, ..., p_k objects are of the k^{th} kind and rest, if any, are all different is $\frac{n!}{p_1! p_2! \dots p_k!}$.
- ◆ The number of combinations of ‘ n ’ different things taken ‘ r ’ at a time, denoted by ${}^n C_r$, is given by

$${}^n C_r = \frac{n!}{r!(n-r)!}, \quad 0 \leq r \leq n.$$