B. Sc Part - II

Equality of Two permutations

Two permutations f and g of degree n are said to be equal if we have $f(a) = g(a) \ \forall \ a \in S$.

For example, if $f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{pmatrix}$

and $g = \begin{pmatrix} 2 & 3 & 4 & 1 \\ 3 & 4 & 1 & 2 \end{pmatrix}$ are

two permutations of degree 4, then we have f = g. Here we see that both f and g replace 1 by 2, 2 by 3, 3 by 4, and 4 by 1.

Total number of distinct permutations of degree n.

If S is a finite set having n distinct elements, then we shall have n! distinct arrangements of the elements of S.

Therefore there will be n! distinct permutations of degree n.

If P_n be the set containing of all permutations of degree n, then the set P_n will have $n!$ distinct elements. This set P_n is called the Symmetric set of permutation of degree n.

Thus $P_n = \{f : f$ is a permutation of degree $n\}$

The set P_3 of all permutations of degree 3 will have $3!$ i.e. 6 elements.

$$P_3 = \left\{ \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix} \right\}$$