B.Sc Part - II

Date
Page

Definition Transformation

Let $X = \varphi$. Any map $f : X \to X$ is called a transformation, i.e, any map from a set onto itself is a transformation of the set.

Def: Permutation

Let X be a non-empty finite set A one-one onto map $f : X \to X$ is called a permutation.

The number of elements in the finite set X is known as degree of the permutation.

Symbol for a Permutation

Let $X = \{a_1, a_2, a_3, ----, a_n\}$ s.t. $a_i \neq a_j$ for $i \neq j$

Then X contains n distinct elements

Let f be a permutation on X s.t

$$f(a_i) = b_i \text{ for } 1 \leq i \leq n$$

The elements $b_1, b_2, b_3 ---- b_n$ are nothing but a rearrangement of X

Date
Page

$$f = \begin{pmatrix} a_1 & a_2 & a_3 & \cdots & a_n \\ f(a_1) & f(a_2) & f(a_3) & \cdots & f(a_n) \end{pmatrix}$$

By our assumption this is also expressible as

$$f = \begin{pmatrix} a_1 & a_2 & a_3 & \cdots & a_n \\ b_1 & b_2 & b_3 & \cdots & b_n \end{pmatrix}$$

Example : Let the permutations f and g on $S = \{1, 2, 3, 4\}$ be given by

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$$

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

Then $f(1) = 3$ $f(2) = 4$ $f(3) = 1$

$f(4) = 2$; $g(1) = 4$, $g(2) = 1$

$g(3) = 2$, $g(4) = 3$.