# Scribed Notes-20

**Student I'D**

**202212096**

**202212097**

**202212098 (Absent)**

**202212099**

**202212100**

**Finite Group**

- A group (G, *) is called a Finite [redacted] group if G is an Finite [redacted] set
- Eg:-G={1,2,3,4,5,6,7} under multiplication modulo 8 is a finite group as the set G is a finite set

**Infinite Group**

- A group (G, *) is called a infinite group if G is an infinite set

  Eg: group (I, +) , where I is set of integers

## Cyclic Group

- A cyclic group is a group that can be generated by a single element. Every element of a cyclic group is a power of some specific element which is called a generator. A cyclic group can be generated by a generator 'g', such that every other element of the group can be written as a power of the generator 'g'.

**Order of Group:**

- The order of the group G is the number of elements in the group G. It is denoted by |G|. A group of order 1 has only the identity element, i.e., ({e} *).
- A group of order 2 has two elements, i.e., one identity element and one some other element.

**Order of an Element**

- The order of an element in a group is the smallest positive power of the element which gives you the identity element.

$g \in G$;smallest $k>0$ | $g^k$

**Proof by contradiction**

- If two identity is e1 and e2

  e1,e2 $e1 \neq e2$

  $e1*e2=e2$

  $e1*e2=e1$ ,so $e1=e2$

- There is a unique Identity in a group

  Suppose for x there exists two inverse y & z

  $x*y=e$

  $x*z=e$

  $x*y=x*z$

  $(y*x)*y=(y*x)*z$ (applying associativity rule)

  Every element has unique inverse

  Every group equation has unique solution

  $g1*x=g2$ but $x*g1 \neq g2$

  $g1*x=g2$

  $(g1^{-1} *g1)*x= g1^{-1} *g1$

**Recurrence Relation :**

- A Recurrence relation of the sequence {an} is a question that expresses an an in term of one or more of the previous term of the sequence, namely, a0, a1, a2, a3, ...an-1 for all integer n with $n \geq n0$, where n0 is non negative integer.

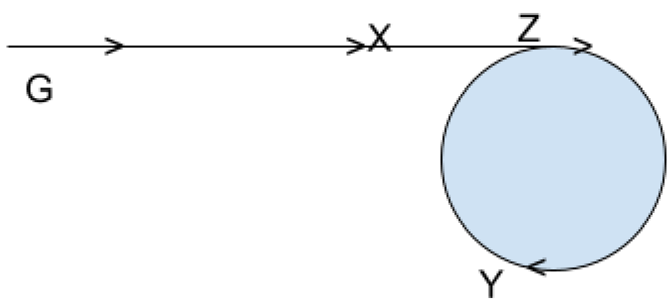
**Restriction of Function:**

- Let $f:X \rightarrow Y$ be a function from a set X to a set Y. If A is a subset of X, then the restriction of f to A is the function f|A:A→Y

x↦f(x).

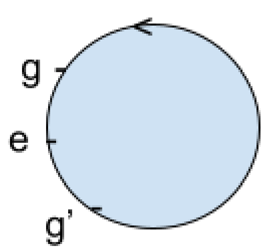
**Injective Function**

- f:G*G→G
  ∀g∈G
  F’:{g}*G→G
- Is an Injective Function F*n
  g*x=g*y
  $g*(x*g^{-1})= g*(y *g^{-1})$ (multiply inverse on both sides)
  x=y
  F’:G*{g}→G
- Every row and every column is permutation




x*g=z
y*g=z
x*g=y*g
y=z

- So we will always go back to staring point




Because of this the last element=Identity
Second element=Inverse

Cyclic means that Every element will generate the Whole Group
If an element is Generate then its inverse is also a Generator
If no is prime except 0 all number are generate
Every cyclic group is abelian but not all abelian group is cyclic
a*b=g^k1+k2

$g=g^{k2}*g^{k1}$
$=b*a$
So ∀ cyclic are abelian