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Date :
Page : 3

SYLOW THEOREM

Sylow's Theorem and its Application.

Def: Let G be a group & let P be a Prime. A group of order p^{α} for some $\alpha \geq 1$ is Called a P. Group

A Subgroup of G is Called P. Subgroup

* If G is a group of order $p^{\alpha}m$ where $p \nmid m$ then a subgroup of order p^{α} is Called a sylow P-subgroup of G.

* $Syl_p(G)$ = Set of Sylow P- subgroups of G
$n_p(G)$ = No. of. Sylow P- subgroup of G

Sylow's theorems

(i) Sylow theorem I

Let G be a group of order $p^{\alpha}m$, where p is Prime not dividing m i.e $p \nmid m$, then $\exists$ a sylow P- Subgroup of G of order p^{α} ie

$$Syl_p(G) \neq \emptyset$$

OR

If $p^{\alpha} / o(G)$ then $\exists$ $H \leq G$ s.t: $o(H) = p^{k}$.

(ii) Sylow theorem - 2

Let P is a sylow p subgroup of G and Q is any P- Subgroup of G. then $\exists$ $g \in G$ St $Q \leq gPg^{-1}$ i.e is contained in some Conjugate in G.

NB: In Particular, any two Sylow P- Subgroups are Conjugate in G