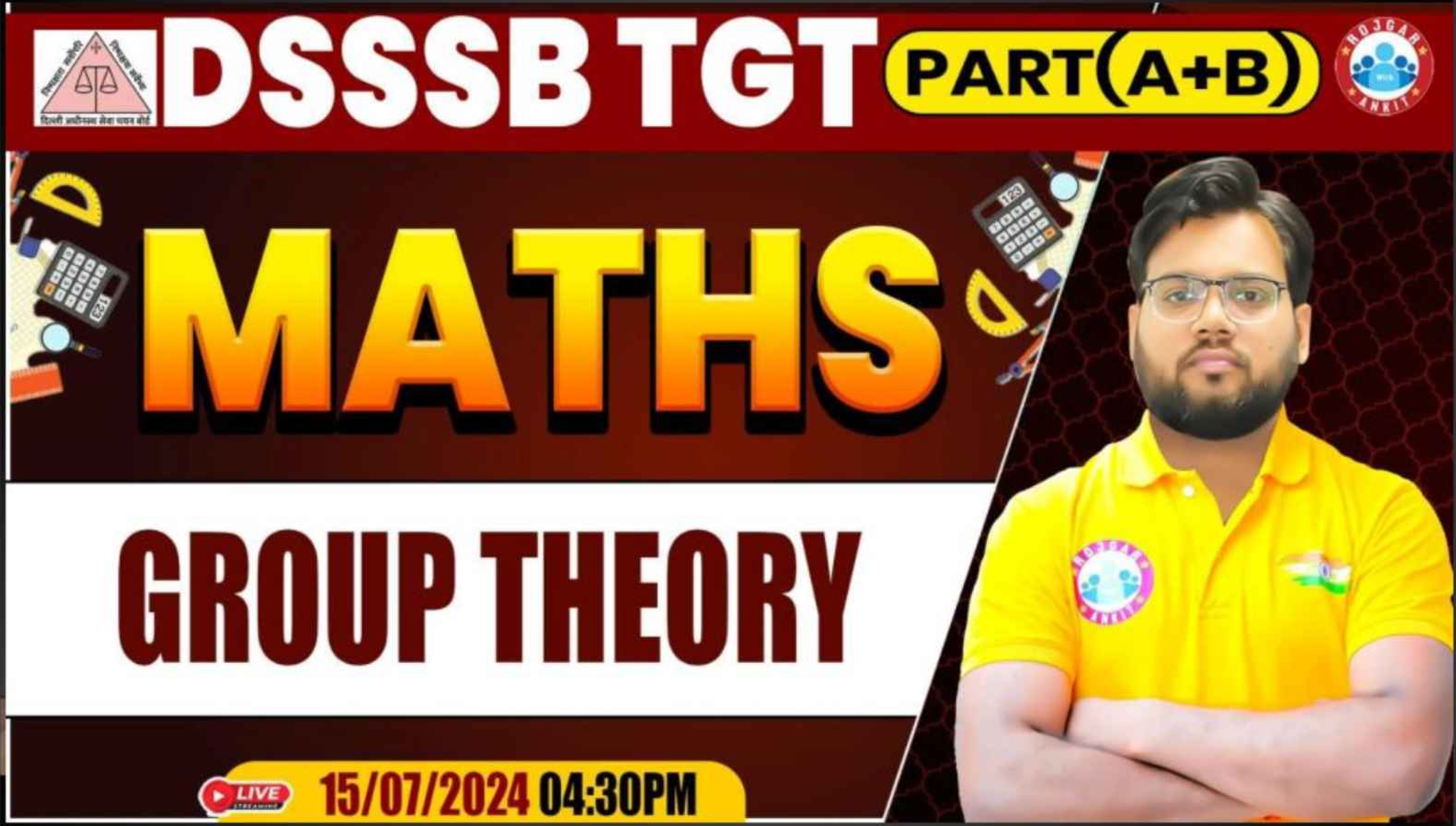
DSSSB TGT
PART(A+B)
MATHS
GROUP THEORY
LIVE
15/07/2024 04:30PM

Eular Thm →

$\Downarrow$

$$\frac{(903)^{404}}{100}$$

$$\frac{3^{404}}{100}$$

$$\Rightarrow \frac{3^4}{100} \Rightarrow \frac{81}{100} = R = 81$$

$60 \rightarrow 2 \times 3 \times 2 \times 5$

$\Rightarrow 2^2 \times 3 \times 5 \Rightarrow E.N \Rightarrow \cancel{60}^{2} \times \frac{1}{\cancel{2}} \times \frac{2}{\cancel{3}} \times \frac{4}{\cancel{5}}$

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$100 \rightarrow E.N \rightarrow 100 = 2^2 \times 5^2$

$\Rightarrow \cancel{100} \times \frac{1}{2} \times \frac{4}{5}$

$\Rightarrow 40$

Fermat Thm →

$$\frac{a^{p-1}}{p}, \quad R = 1$$

$p \rightarrow$ prime No.

$\downarrow$

only for prime No.

Remainder Thm -

- → Basic
- → Binomial
- → Fermat
- → Eular
- → Wilson
- → Chinese
- → Special Rule → $\frac{4^n}{6} \Rightarrow R = 4$; → $\frac{10^n}{6} \Rightarrow R = 4$

Abstract Algebra | Modern Algebra

TOPIC-Group Theory

1. Set Theory $-Z_n, U(n), Z_n^*$, Gaussian integers, $Gl_n(IF)$ or General Linear, $Sl_n(IF)$ or Special Linear, Klein's 4 Group, Q_4 or Quaternion, D_n (Dihedral), S_n (symmetric)

Group Theory

1. Order of Group
2. Subgroups
3. Abelian Group
4. Lagrange's theorem
5. Normal subgroups and quotient groups

6. Cyclic groups
7. Centre of Group
8. Centralizer of a Group
9. Cosets
10. Permutation groups
11. Sylow theorem
12. Symmetry groups
13. Alternating Group
14. Simple Group
15. Cayley's Theorem
16. Isomorphism theorems
17. Zassenhaus Lemma

18. Jordan Theorem
19. Solvable group
20. Nilpotent Group
21. Homomorphism
22. Automorphism
23. Epimorphism
24. Monomorphism, endomorphism

Set Theory

1) Z_n - Set of Residue Class modulo n

↳ set of Remainders when divided by n

$Z_n = \{0, 1, 2, 3, \ldots \ldots (n-1)\}$

$Z_n = \{\bar{0}, \bar{1}, \bar{2}, \bar{3}, \ldots \overline{(n-1)}\}$

$Z_n = \{(0), (1), (2), \ldots \ldots (n-1)\}$

Order $Z_n = O(Z_n) = n$

$n = 7$

$\frac{0}{7}, \frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7},$

$\frac{7}{7}, \frac{8}{7}, \frac{9}{7}, \frac{10}{7} \ldots$

$Z_7 = \{\underline{0}, \underline{1}, \underline{2}, \underline{3}, \underline{4}, \underline{5}, \underline{6}\}$

$11 \rightarrow 11'$

$\Rightarrow \# \times \frac{10}{\#}$

2) $U(n) = \{x \in \mathbb{N} / 1 \leq x \leq n;$ **and** $\gcd(x, n) = 1\}; n >$

$1 < x < n$

$(x, n) \Rightarrow 1\} : n > 1$

HCF

$U(11) \rightarrow \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, \}$

$U(6) = 1, 2, 3, 4, 5, 6$

$(1, 6) \rightarrow HCF = 1$ ✓

$(2, 6) \rightarrow \times$

$(3, 6) \rightarrow \times$

$(4, 6) \rightarrow \times$

$(5, 6) \rightarrow HCF \Rightarrow 1$

$(6, 6) \rightarrow \times$

$U(6) = \{1, 5\}$

$U(100) = \{40\}$

Totient fun ϕ

= Eular No.

Set Theory

3) $Z_n^* = \{x \in Z_n / x^{-1}$ **exist w.r.t. multiplicative modulo n**$\}$

$U(n) \Rightarrow x \in N \mid 1 \leq x \leq n$ $\quad (x, n) = 1 \mid n > 1$

$O(Z_n^*) = O(U(n))$

$Z_6^* = \{0, 1, 2, 3, 4, 5\}$

$x \cdot x^{-1} = 1$

$0x \equiv 1 \pmod 6$ ×

$1x \equiv 1 \pmod 6$

$\frac{1-1}{6}$

× $2x \equiv 1 \pmod 6$

× $3x \equiv 1 \pmod 6$

× $4x \equiv 1 \pmod 6$

✓ $5x \equiv 1 \pmod 6$

$Z_6^* = \{1, 5\}$

$$\boxed{Z_n^* = U(n) \; ; \; n > 1}$$