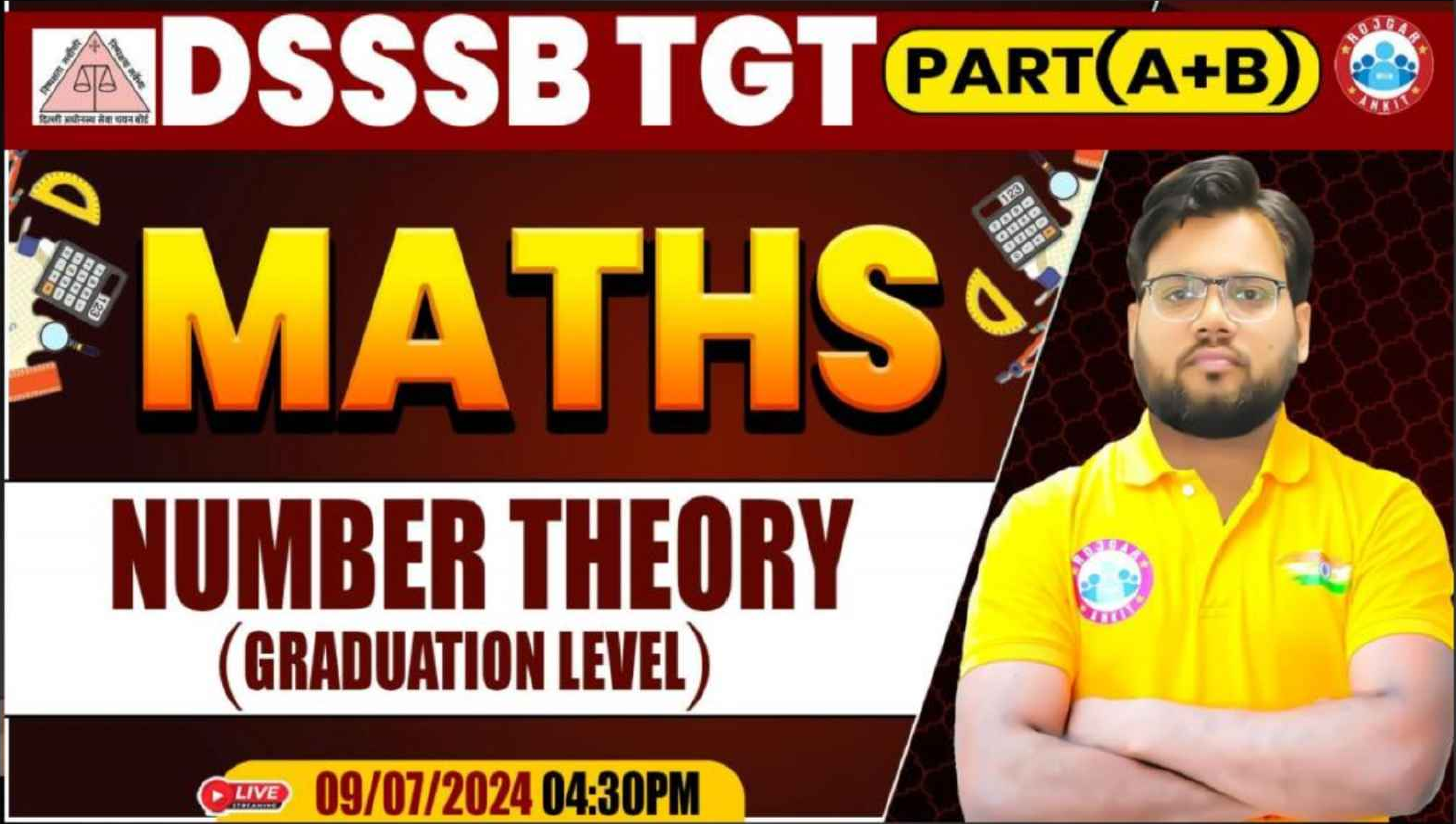
DSSSB TGT
PART(A+B)
MATHS
NUMBER THEORY
(GRADUATION LEVEL)
LIVE
09/07/2024 04:30PM

FERMAT'S THEOREM

Fermat's Theorem

If p is a prime number and a denotes an integer such that $(a, p) = 1$, then

$$a^{p-1} \equiv 1(\text{mod} p)$$

$8, 3 \to 1$

$(8^2, 3) = 1 (\text{mod } 3)$

$8^{3-1}, p = 1 (\text{mod } 3)$

$\frac{64}{3}, R = 1$

Co.prime $\left[\frac{a^{(p-1)}}{p} = 1 (\text{शेषफल}) \right.$

$\underbrace{a, p}$ $= 1$

GCD(HCF)

$\Rightarrow 1$

Theorem: If p is a prime number and a_i denotes an integer, then

$$(a_1 + a_2 + a_3 + a_4 + \cdots a_n)^p = a_1^p + a_2^p + a_3^p + a_4^p + \cdots + a_n^p + \underline{\mathrm{M}(p)}$$

where $\mathrm{M}(p)$ denotes multiple of p.

$$(2+3)^2 = 25$$

$$2^2 + 3^2$$

$$\Rightarrow 4+9 \Rightarrow 13 + 2(6)$$

$1 \times 1 \times 1$

1. If $(n, 17) = 1$ where k is any positive integer then $n^{16k} - 1$ is divisible by

a. 18

b. 17

c. 15

d. 20

$n^{16k} - 1 = ?$

$(a, p) = 1$

$a^{p-1} \equiv 1 \pmod{p}$

$n^{16} \equiv 1 \pmod{17}$

$(n^{16})^k \equiv 1^k \pmod{17}$

$n^{16k} \equiv 1 \pmod{17}$

$n^{16k} = 17a + 1$

$n^{16k} - 1 = 17a$

$(n^{16k} - 1) = \pmod{17}$

$18 - 1 = 17$

$(4, 17) \rightarrow HCF = 1$

$17 \rightarrow$ Prime

$$\frac{a^{p-1}}{p} = R = 1 \Rightarrow \frac{4^{18}}{17}, \quad R = ?$$

$$\frac{4^{16}}{17} = R = 1$$

$$\Rightarrow \frac{\overset{1}{4^{16}} \times 4^2}{17} \Rightarrow \frac{1 \times \overset{-1}{16}}{17} \Rightarrow R \Rightarrow 16$$

$17 - 1 = 16$

$$\frac{17^{18} \times 17^{18} \times 17^{18} \times 17^{18}}{19}$$

सह-अभाज्य $\left[\frac{a^{P-1}}{P}\right.$, $R=1$

$P \to$ अभाज्य

$$\Rightarrow \frac{17^{182}}{19}, R=? \Rightarrow \frac{(17^{18})^{10} \times 17^{2}}{19}$$

$$\Rightarrow \frac{289}{19} \quad R=4$$

$$\frac{2^2}{3} \qquad \frac{(2^2)^4}{3} \Rightarrow \frac{2^2 \times 2^2 \times 2^2 \times 2^2}{3}$$

$$\Rightarrow \frac{256}{3} \Rightarrow 1$$

$R \Rightarrow 1 \qquad R = 1$

TOPIC - NUMBER THEORY

1. Divisibility (Theorems On Divisibility,
HCF
$\boxed{\text{G.C.D.}}$ & $\boxed{\text{L.C.M.}}$)
2. Possible Solutions or Integer Solutions
3. Relatively prime Number
4. Congruences
5. Residue System (mod m)
6. Chinese Remainder Theorem
7. Euler's ϕ Function
8. Fermat's Theorems
9. Euler's Theorems

Divisibility →

Osculator (एकाधिक)

Positive

-2 ×7 ×3

21 · $\boxed{20}$ 3 9 → 10 (+1) -2

91 - 90 13 39 → 40 +4, -9

161 - 160 23 69 → 70

231 - 230 33 99 → 100 +10, -23

43

53

Negative

×3 ×7

7 21 → $\boxed{20}$ 49 ± 50

17 51 → 50 119 ± 120

27 81 — 80 189 ± 190

37 111 — 110

10. Wilson's Theorems
11. Some Functions of Number Theory
12. Positive Divisors →
13. Number of Divisors → No of factors
14. Sum of divisors → sum of factors