



DSSSB TGT

PART(A+B)



MATHS

EULAR, WILSON & CHINESE REMAINDER THEOREM

Part -2



12/07/2024 04:30PM



$$\frac{19}{17}, R=? \quad \frac{2}{17} \Rightarrow \frac{4}{17} \Rightarrow R=4$$

Base होना करने के

$$\begin{array}{r} 17 \overline{) 361} \\ \underline{34} \\ 21 \\ \underline{17} \\ 4 \end{array}$$

$$\frac{361}{17}, R=?$$

$$\Rightarrow \frac{2^2}{17} \Rightarrow R=4$$

$$\frac{41^2}{16}$$

$$\frac{9^2}{16}$$

$$\begin{array}{r} 16 \overline{) 1681} \\ \underline{16} \\ 81 \\ \underline{80} \\ 1 \end{array}$$

Fermat Thm:→

$$2^2 \mid 2^2 \rightarrow 1 \checkmark$$

$$5^2 \mid 5^2 \rightarrow 1 \checkmark$$

$$\frac{1296}{5} = R=1$$

$$6^4 \mid 5^2 \rightarrow 1$$

$$5^6 \mid 7^2 \rightarrow 1$$

HCF=1

$$\left[\frac{a^{p-1}}{p}, R=1 \right]$$

$\frac{729}{7}, R=1$ p → prime No.

$a, p \rightarrow \text{co-prime}$

$$\frac{107'}{31} \Rightarrow R=14$$

$$\Rightarrow \frac{107^{301}}{31}, R=?$$

$$\Rightarrow \frac{14^{301}}{31} \xrightarrow{\text{F.N.}} 30$$

$$\Rightarrow \frac{14'}{31} \Rightarrow R=14$$

$$\frac{3^8}{20} \quad \begin{matrix} 81 & \times & 81 \\ \uparrow & & \uparrow \\ 9 & & 9 \\ \uparrow & & \uparrow \\ 3 \times 3 & & 3 \times 3 \end{matrix}$$

$$\frac{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3}{20}$$

$$\frac{6561}{20} \Rightarrow \textcircled{R=1}$$

Euler Thm:

$$\frac{1 \times 1 \times 3}{20} \quad \begin{matrix} \checkmark & \checkmark \\ 1 & \times & 1 & \times & 3 \\ \uparrow & & \uparrow & & \uparrow \\ 3^8 & & 3^8 & & 3^1 \end{matrix}$$

$$\frac{9 \times 3}{20} \Rightarrow \textcircled{8}$$

Co-prime $\Rightarrow \textcircled{3} \leftarrow \text{Rem}$

$$20 \rightarrow 2^2 \times 5$$

$$20 \times \frac{1}{2} \times \frac{1}{5}$$

$$\left[\frac{23^{17}}{20}, R=? \Rightarrow \frac{23^{17}}{20} \right]$$

Composite

$$20 \rightarrow 2^2 \times 5$$

E.N. $\rightarrow 20 \times \frac{1}{2} \times \frac{1}{5} = \textcircled{8}$

$$100 \text{ का E.N.} \Rightarrow 100 \xrightarrow{\text{E.N.}} \begin{matrix} 2 \times 5 \\ 100 \times \frac{1}{2} \times \frac{4}{5} \\ \Rightarrow 40 \end{matrix}$$

$$\Rightarrow \frac{149}{100} \text{ , } R=?$$

$$\Rightarrow \frac{(149^{40})^{20} \times 149}{100} \Rightarrow \underline{\underline{49}}$$

$$\frac{1007^{1203}}{100} \text{ , } R=?$$

$$\Rightarrow \frac{7^{1203}}{100}$$

$$\Rightarrow \frac{7^3}{100} = \frac{343}{100} \text{ , } \boxed{R=43}$$

16 का Euler No $\rightarrow 16 \rightarrow 2^4$
 $\xrightarrow{\text{E.N.}} 16 \times \frac{1}{2} = 8$
 $\Rightarrow 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15$

25 का E.N. $\rightarrow 5^2$
 $\xrightarrow{\text{E.N.}} 25 \times \frac{4}{5} = 20$
 $\Rightarrow 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19,$
 $20, 21, 22, 23, 24$

40 का E.N. $\rightarrow 2^3 \times 5^1$
 $\xrightarrow{\text{E.N.}} 40 \times \frac{1}{2} \times \frac{4}{5} = 16$

$$\frac{30}{16}, R=? \textcircled{14}$$

$$\frac{15}{8}, R=7 \times 2 \Rightarrow \underline{\underline{14}}$$

$$\# 30 \text{ का E.N.} \rightarrow 30 \rightarrow 2 \times 3 \times 5$$

$$\xrightarrow{\text{E.N.}} \cancel{30} \times \frac{1}{\cancel{2}} \times \frac{2}{\cancel{3}} \times \frac{5}{\cancel{5}} \Rightarrow 8$$

$$\underline{11} \text{ का E.N.} \Rightarrow 11'$$

$$\xrightarrow{\text{E.N.}} \cancel{11} \times \frac{10}{\cancel{11}} \Rightarrow 10$$

Fermat No

$$\Rightarrow \frac{2^{161}}{30}, R=?$$

$$\Rightarrow \frac{2^{161}}{30} \Rightarrow \frac{\cancel{2} \times 2^{160}}{\cancel{30}_{15}} \Rightarrow$$

$$\frac{2^{160}}{15} \Rightarrow \frac{1 \times 2}{3} \Rightarrow 2 \text{ f}$$

$$1 \text{ Set E.N} \Rightarrow 3 \times 5$$

$$+ 5 \times \frac{2}{3} \times \frac{4}{5}$$

$$\Rightarrow 8$$

Factorial कमगुणित $\rightarrow$

$$6 = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$\Rightarrow 6 \times 5 = 720$$

$$\Rightarrow 6 \times 5 \times 4 = 720$$

$$\Rightarrow 6 \times 5 \times 4 \times 3 = 720$$

$$1 = 1$$

$$0 = 1$$

$$1 = 1! = 1$$

$$2 = 2! = 2 \times 1$$

$$3 = 3! = 3 \times 2 \times 1$$

$$4 = 4! = 4 \times 3 \times 2 \times 1$$

$$10 = 10! = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$4 = 24$$

$$4 \times 3 = 24$$

$$\frac{p-2}{p} \Rightarrow R=1$$

$p \rightarrow$ Prime No

$$\frac{22}{23} = R=-1 \text{ या } 23-1=22$$

$$\frac{12}{3}, R=-1$$

या $3-1=2$

$$(R=1) \leftarrow \frac{13}{5}, R=?$$

$$\frac{14}{5} = R=-1 \text{ या } 5-1 \Rightarrow 4$$

$\Rightarrow \overset{4}{4} \times \overset{1}{13} \Rightarrow 4$

$$\frac{p-1}{p}, R=-1$$

$p \rightarrow$ अभाज्य संख्या

$$\frac{10}{11}, R=-1$$

$$\frac{142}{41}, \boxed{R=0}$$

$$\frac{42 \times \cancel{41} \times 140}{\cancel{41}}$$

$$\frac{138}{41}, R=? \text{ 20}$$

$$\Rightarrow \frac{140}{41} - R = 40 \text{ या } -1$$

$$\Rightarrow \frac{\overset{-1}{40} \times \overset{-2}{39} \times \overset{20}{138}}{41} = R = -1, \text{ या } 40$$

$$\boxed{R=20}$$

$$\frac{139}{41}, R=? \text{ ①}$$

We know $\frac{140}{41}, R = -1 \text{ या } 40$

$$\Rightarrow \frac{\overset{40 \times I}{40} \times 139}{41} = 40$$

Wilson Thm →

$$\Rightarrow \frac{(p-1)}{p}, R = -1, \text{ या } p-1$$

$p \rightarrow$ अभाज्य

$$\frac{(p-1)}{p}, \boxed{R=0}$$

$p \rightarrow$ अभाज्य

$$\frac{15}{6} = \frac{120}{6}$$

$$\boxed{p > 4}$$

$$\frac{15}{6}, R=0$$

$$\frac{18}{11}, R = ?$$

We know = $\frac{10}{11}, R=10$

$$\frac{10 \times 9 \times \frac{5}{18}}{11} = 10$$

$$\begin{array}{r}
 \underline{136} \\
 37
 \end{array}
 \Rightarrow
 \begin{array}{r}
 \overset{-1}{\overset{2}{\times}} \overset{-2}{\times} \overset{18}{\times} \\
 \underline{36 \times 35 \times 134} \\
 37
 \end{array}
 \Rightarrow R = 36$$

$$\begin{array}{r}
 \underline{134} \\
 37
 \end{array}
 , R = ?$$

$$\begin{array}{r}
 35, 17, 18 \\
 36
 \end{array}$$

Chinese Remainder Thm $\rightarrow$

$$\frac{81}{10} = R=1$$

$$\begin{array}{l} 2 \mid 81 \rightarrow R=1 \\ 5 \mid 81 \rightarrow R=1 \end{array} \quad \text{Same}$$

$$\frac{81}{2 \times 5} \quad \text{HCF}=1$$