Foundation Batch

MATHS

Remainder Theorem

(शेषफल प्रमेय) 04

LIVE 14-03-2024 07:00PM

CRT (CHINESE REMAINDER THEOREM)

TYPE – VII

67. $\frac{(227)^{25}}{15}$ Find Remainder

$\frac{(227)^{25}}{15}$ शेषफल ज्ञात करें

a. 1

b. 2

c. 3

d. 5

$\frac{(2)^{25}}{15}$, $15 = 3 \times 5$

$\frac{2^{25}}{3}$, $\frac{25}{2}$ R=1, R=? T=3-1=2

$\frac{2^1}{3}$ R=2

$\frac{2^{25}}{5}$, $\frac{25}{4}$ R=1, T=5-1=4

$\frac{2^1}{5}$ R=2

R=2

$\frac{(719)^{240}}{143}$

$143 = 11 \times 13$

67. $\frac{(719)^{240}}{143}$ **Find Remainder**

$\frac{(719)^{240}}{143}$ शेषफल ज्ञात करें

a. 13

b. 12

c. 1

d. 5

$\frac{(719)^{240}}{11} \Rightarrow \frac{(4)^{240}}{11}$ R=0

$240 \div 10$

$T = 11 - 1 = 10$

$\frac{4^0}{11} = \frac{1}{11}$ R=1

$\frac{(719)^{240}}{13} \Rightarrow \frac{(4)^{240}}{13}$ R=0

$240 \div 12$

$T = 13 - 1 = 12$

$\frac{4^0}{13} = \frac{1}{13}$ R=1

68. $\frac{2^{1201}}{105}$ Find Remainder

$\frac{2^{1201}}{105}$ शेषफल ज्ञात करें

a. 1

b. 2 ✓

c. 15

d. 7

$105 = (2)(3)(5)(7)$

15×7

3×5

$3 \overline{)2^{1201}}$ R=1

$T = 3-1 = 2$

$= 2^1 = 2$ R=2 ✓

$5 \overline{)2^{1201}}$ R=1

$T = 5-1 = 4$

$= 2^1 = 2$ R=2 ✓

$7 \overline{)2^{1201}}$ R=1

$T = 7-1 = 6$

$7 \overline{)2^1}$ R=2 ✓

69. $\frac{2^{200}}{35}$ Find Remainder

$\frac{2^{200}}{35}$ शेषफल ज्ञात करें

a. 11

b. 12

c. 7

d. 0

35 = 5 × 7

$\frac{2^{200}}{5}$ R=0

T = 5 − 1 = 4

$\frac{2^{200}}{4}$

$\frac{2^{200}}{5} = \frac{1}{5}$ R=1

$\frac{11}{5}$ R=1

$\frac{2^{200}}{7}$ R=2

T = 7 − 1 = 6

$\frac{2^2}{7} = \frac{4}{7}$ R=4

$\frac{11}{7}$ R=4

2^{40} / 77

7 x 11

70. $\frac{2^{40}}{77}$ **Find Remainder**

$\frac{2^{40}}{77}$ शेषफल ज्ञात करें

a. 2

b. 23

c. 7

d. 1

2^{40} R=4

$\frac{2}{7}$ T=7-1=6

$\frac{2^4}{7} = \frac{16}{7}$ R=2

$\frac{23}{7}$ R=2

2^{40} R=0

$\frac{2}{11}$ T=11-1=10

$\frac{2^{20}}{11} = \frac{1}{11}$ R=1

$\frac{23}{11}$ R=1

3^{101}
77
7×11

71. $\frac{3^{101}}{77}$ **Find Remainder**

$\frac{3^{101}}{77}$ शेषफल ज्ञात करें

a. 11

b. 7

c. 1

d. 47 ✓

$\frac{3^{101}}{7}$ $R=5$ $T=7-1=6$

$\frac{3^{101}}{11}$ $R=1$ $T=11-1=10$

$3^5 = 243$ (7) $R=5$

$\frac{47}{7}$ $R=5$

3^1 (11) $R=3$

$\frac{47}{11}$ $R=3$

$\frac{2^{133}}{133}$

$133 = 19 \times 7$

72. $\frac{2^{133}}{133}$ **Find Remainder**

$\frac{2^{133}}{133}$ शेषफल ज्ञात करें

a. 19

b. 7

c. 28

d. 128

$2^{\frac{133}{18}}$ R=7

$\frac{2}{19}$ T=19−1=18

$2^{\frac{133}{6}}$ R=1

$\frac{2}{7}$ T=7−1=6

$\frac{2^7}{19} = \frac{128}{19}$ R=14

$\frac{128}{19}$ R=14

$\frac{2^1}{7} =$ R=2

$\frac{128}{7}$ R=2

∴

WILSON THEOREM

TYPE – VIII

$6! = 6 \times 5!$

$7! = 7 \times 6 \times 5!$

$12! = 12 \times 11!$

$= 12 \times 11 \times 10!$

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

$7! = 7 \times \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{6!}$

$7! = 7 \times 6!$

WILSON THEOREM.

Case-1 (N = Prime No. / अभाज्य संख्या)

$$\frac{(N-1)!}{N} \Rightarrow \boxed{R = -1}$$

Case-2 N = Composite Number (भाज्य संख्या)

$\boxed{N > 4}$

$$\frac{(N-1)!}{N} \quad \boxed{R = 0}$$

28!

29

R = -1

R = 29 - 1 = 28

58! → (N-1)!

59 - N

R = -1

R = 59 - 1 = 58

examples

4! → (N-1)! = R = -1

5 - N

R = 5 - 1 = 4

= 4 x 3 x 2 x 1

24

5

R = -1

$\frac{5!}{7}$ $R = ?$

$\frac{6!}{7}$ $R = -1$

$R = 7 - 1 = 6$

$6 \times \frac{5!}{7}$

$R = 6$

$\frac{5!}{7}$ $R = 1$ ✓

Q $\frac{9!}{11}$ $R = ?$

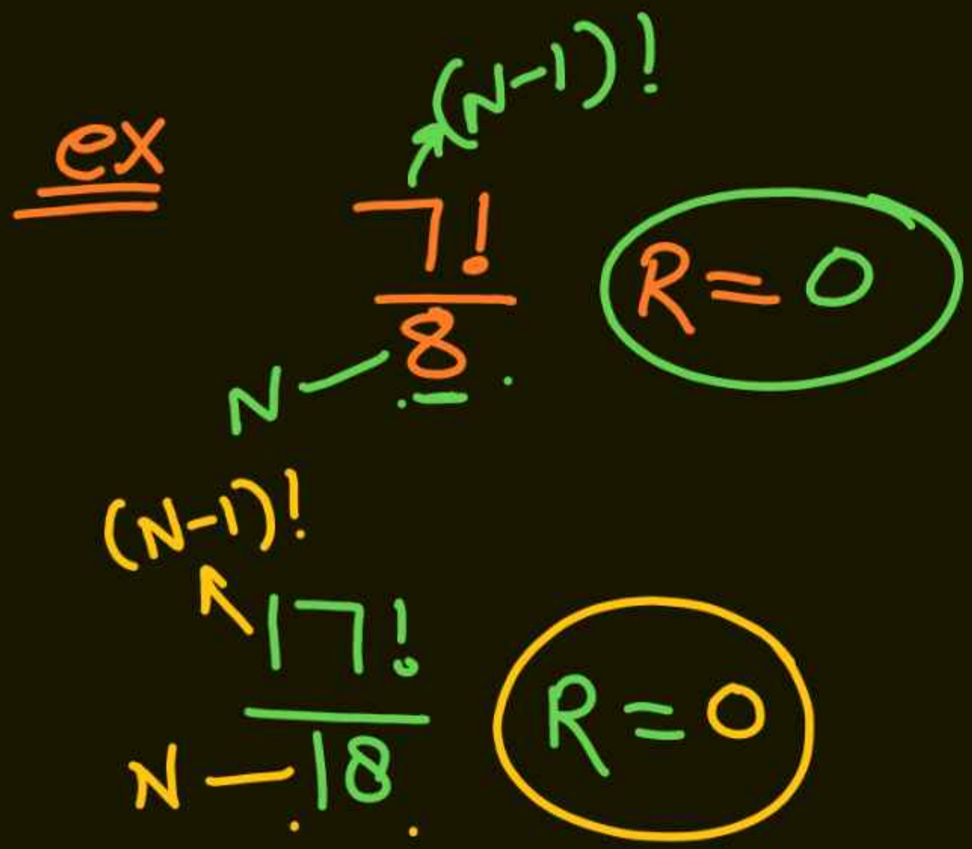
अगर $\frac{10!}{11}$ $R = -1$

$R = 11 - 1 = 10$

$10 \times \frac{9!}{11}$

$R = 10$ ✓

$\frac{9!}{11}$ $R = 1$


ex
(N-1)!
7!
8!
N
R=0
(N-1)!
17!
18!
N
R=0

73. $\frac{18!}{19}$ Find Remainder

$\frac{18!}{19}$ शेषफल ज्ञात करें

$(N-1)!$

$N \leftarrow 19 \rightarrow$ Prime

$R = -1$

$R = 19 - 1$

$= 18$

a. 0

b. 5

c. 18 ✓

d. 6

$\frac{28!}{29}$ → (N-1)!

29 → N

Prime

R = −1

R = 29 − 1 = 28

74. $\frac{28!}{29}$ **Find Remainder**

$\frac{28!}{29}$ शेषफल ज्ञात करें

a. 28

b. 1

c. 27

d. 2

$$\frac{-1 \quad +6}{\frac{100! + 6}{101}}$$

$= -1 + 6$

$= +5$

75. $\frac{100! + 6}{101}$ Find Remainder

$\frac{100! + 6}{101}$ शेषफल ज्ञात करें

a. 100

b. 5

c. 6

d. 0

$\frac{9!}{10}$ → (N-1)!

10 → N

Composite

R = 0

76. $\frac{9!}{10}$ **Find Remainder**

$\frac{9!}{10}$ शेषफल ज्ञात करें

a. 0

b. 9

c. 1

d. 8

$\frac{21!}{22}$ → (N−1)!

22 → N

Composite

R = 0

77. $\frac{21!}{22}$ **Find Remainder**

$\frac{21!}{22}$ शेषफल ज्ञात करें

a. 0

b. 1

c. 2

d. 3

$\frac{5!}{7} \rightarrow (N-2)!$

$\frac{7}{\text{Prime}} \rightarrow N$

78. $\frac{5!}{7}$ **Find Remainder**

$\frac{5!}{7}$ शेषफल ज्ञात करें

a. 1

b. 6

c. 2

d. 3

acc^ to wilson
विल्सन के अनुसार

$\frac{6!}{7}$ $R=-1$

$+6+1$ $R=7-1=6$

$= \frac{6 \times 5!}{7}$ $R=6$

$\frac{5!}{7}$ $R=1$

$\frac{11!}{13-N}$ $(N-2)$

Prime

79. $\frac{11!}{13}$ **Find Remainder**

$\frac{11!}{13}$ शेषफल ज्ञात करें

a. 0

b. 1

c. 2

d. 3

विल्सन के अनुसार

$\frac{12!}{13}$ $R = -1$

$R = 13 - 1 = 12$

12×1

$\frac{12 \times 11!}{13}$ $R = 12$

$\frac{11!}{13}$ $R = 1$

$\frac{14!}{17} \rightarrow (N-3)$

$17 \rightarrow N$

80. $\frac{14!}{17}$ **Find Remainder**

$\frac{14!}{17}$ शेषफल ज्ञात करें

a. 16

b. 8

c. 2

d. 1

विलसन के अनुसार

$\frac{16!}{17}$ $R = -1$

$R = 17 - 1 = 16$

$-1 \times -2 \times x$

$16 \times 15 \times 14!$

17

$R = 16$

$(+1) \times (+2) \times x = 16 \cdot 8 \Rightarrow x = 8$ ✓

$\frac{14!}{17}$ $R = 8$

Telgram

81. $\frac{26!}{29}$ Find Remainder

$\frac{26!}{29}$ शेषफल ज्ञात करें

a. 14

b. 27

c. 28

d. 1