

$$\begin{array}{r} 2 \overline{) 15} \text{ L7} \\ \underline{14} \\ 1 \end{array} \quad \text{L2}$$

$$\begin{array}{r} 7 \overline{) 50} \text{ L7} \\ \underline{49} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 15} \text{ L7} \\ \underline{14} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 16} \text{ L8} \\ \underline{16} \\ 0 \end{array}$$

$$\begin{array}{r} 7 \overline{) 50} \text{ L8} \\ \underline{55} \\ -6 \end{array}$$

$$\begin{array}{r} 15 \overline{) 47} \text{ L3} \\ \underline{45} \\ 2 \end{array}$$

$$\begin{array}{r} 15 \overline{) 47} \text{ L4} \\ \underline{60} \\ -13 \end{array}$$

$$\begin{array}{r} +2 \quad -13 \\ \underline{47} \\ 15 \end{array}$$

$$\begin{array}{r} 13 \overline{) 60} \text{ L4} \\ \underline{52} \\ 8 \end{array}$$

$$\begin{array}{r} 13 \overline{) 60} \text{ L5} \\ \underline{65} \\ -5 \end{array}$$

$$\begin{array}{r} +8 \quad -5 \\ \underline{60} \\ 13 \end{array}$$

$$\begin{array}{r} -13 \\ 47 \\ \underline{15} \end{array}$$

$$\begin{array}{r} -1 \\ 2 \\ \underline{5} \end{array}$$

$$\begin{array}{r} +13 \\ 47 \\ \underline{15} \end{array} \quad (+2)$$

$$5 - 1 = 4$$

$$15 - 13 = 2$$

$$\begin{array}{r} -7 \\ 11 \\ \underline{11} \end{array} \quad (+4)$$

$$\begin{array}{r} -15 \quad 6 \\ 11 \\ \underline{23} \end{array}$$

$$\begin{array}{r} 10 \overline{) 7} \text{ L1} \\ \underline{10} \\ -3 \end{array}$$

$$\begin{array}{r} -3 \quad 7 \\ 11 \\ \underline{10} \end{array}$$

(*)

$$\begin{array}{r} -1 \quad +1 \\ 35 + 37 \\ \underline{\quad} \\ 5 \end{array}$$

$$\begin{array}{r} 712 \\ \underline{6} \end{array} \quad 11 = 0$$

$$-1 + 1 = 0$$

$$\begin{array}{r} +3 \quad +1 \\ 38 + 43 \\ \hline 7 \end{array}$$

$$\therefore (14)$$

$$\begin{array}{r} 2 \quad + 5 \\ 57 + 49 \\ \hline 11 \end{array} = (7)$$

(c)

$$\frac{16}{12}$$

$$\underline{R=4}$$

✓ (4)

$$\frac{16^4}{123}$$

$$\frac{4}{3} (R=1) \times 4 = (4)$$

REMINDER THEOROM

1. Find remainder

$$\begin{array}{r} +2 \quad +3 \\ 173 + 139 \\ \hline 19 \end{array}$$

$$\frac{(173 + 139)}{19}$$

$$2+3 = 5 \text{ R}$$

$$19 \times 9 = 171$$

$$19 \times 7 = 133$$

2. Find remainder

$$\begin{array}{r} +3 -2 \quad 8 \\ (1548 + 3028 + 1598) \\ \hline 15 \end{array}$$

$$11-2 = 9$$

$$1548$$

$$1500 + 48$$

3. Find remainder

$$\begin{array}{r} 21 \overline{) 804} \\ 84 \\ \hline -4 \end{array}$$

$$\frac{(105 - 80)}{21}$$

$$84$$

$$-4 = 4$$

$$21 \overline{) 804}$$

$$83$$

$$17$$

$$-17$$

$$21 - 17 = 4$$

4. Find remainder?

$$\frac{(175 - 110)}{21}$$

5. Find remainder

$$+8 -2 -2$$

$$\frac{(348 - 121 - 104)}{17}$$

$$8-4 = 4$$

6. Find remainder

$$\frac{(32 * 33 * 34 * 35 * 36 * 37)}{17}$$

$$R = 0$$

$$\frac{6 \times 5 \times 30}{6}$$

$$+9$$

7. Find remainder

$$\frac{(243 * 245 * 247 * 249 * 251)}{12}$$

$$\frac{12 \overline{) 251} \quad 12$$

$$\frac{24}{1}$$

$$-1$$

$$12 - 1 = 11$$

8. Find remainder

$$\frac{(553 + 378859 + 4768 + 59379)}{25}$$

$$16 - 7 = 9$$

$$\begin{array}{r} 00 \\ 25 \\ 50 \\ 75 \end{array}$$

9. Find remainder

$$\frac{(7361 + 11829 + 1769)}{8}$$

$$61 + 4 = \frac{65}{8}$$

$$\frac{29}{8} \quad \frac{63 + 4}{8}$$

10. Find remainder

$$\frac{(158 * 68 * 197 * 819)}{11}$$

$$\frac{17}{11}$$

$$\begin{array}{r} 158 \\ \times 68 \\ \hline 1264 \\ 10160 \\ \hline 10736 \end{array}$$

$$4 + 2 - 1 + 5 = 10$$

11. Find remainder

$$\begin{array}{r} +2 \quad +1 \quad +2 \quad +1 \\ 137 \times 71 \times 77 \times 93 \\ \hline 155 \end{array}$$

$$\frac{(137 \times 71 \times 77 \times 93)}{15}$$

$$2 \times 1 \times 2 \times 1 = 4 \times 3 = 12 \text{ R}$$

12. Find remainder

$$\begin{array}{r} +1 \quad +3 \quad +3 \quad +2 \\ 89 \times 113 \times 28 \times 101 \\ \hline 66 \end{array}$$

$$\frac{(89 \times 113 \times 78 \times 101)}{66}$$

$$3 \times 3 \times 2 = \frac{18}{11} = 7 \times 6 = 42$$

13. Find remainder

$$\begin{array}{r} -1 \quad 1433 \\ (19847 \times 6743 \times 4299 \times 725) \\ \hline 12 \\ 4 \\ -1 \quad -1 \quad +1 \quad +1 \\ 47 \times 43 \times 33 \times 25 \\ \hline 4 \end{array}$$

$$\frac{(19847 \times 6743 \times 4299 \times 725)}{12}$$

$$= 1 \times 3 = 3$$

14. Find remainder

$$\begin{array}{r} -3 \quad -2 \quad +7 \times 11 \\ (6397 \times 9398 \times 7007 \times 3111) \\ \hline 100 \end{array}$$

$$\begin{array}{r} -3 \times -2 \times 7 \times 11 \\ 42 \times 11 \\ 442 \end{array}$$

$$\frac{442}{100}$$

$$42 \text{ R}$$

$$\begin{array}{r} 1 \times 1 \times 1 \times 1 \times 1 \times 1 \\ \hline 4 \end{array}$$

$$\frac{56}{4}$$

TYPE - 02

1. Find the remainder

$$\frac{36^{99}}{7}$$

$$\frac{36^{99}}{7} = \frac{1^{99}}{7} \quad (R=1)$$

2. Find the remainder

$$\frac{45^{190}}{23}$$

$$\frac{45^{190}}{23} = \frac{45}{23} = \frac{190}{23} = (-1)^{190} = 1 \quad (R)$$

3. Find the remainder

$$\frac{79^{80}}{80}$$

$$\frac{79^{80}}{80} = \frac{(34)^{20}}{80} = \frac{81^{20}}{80} = 1 \quad (R)$$

$$\begin{aligned} 3^1 &= 3 \\ 3^2 &= 9 \\ 3^3 &= 27 \\ 3^4 &= 81 \end{aligned}$$

4. Find the remainder

$$\frac{2^{64}}{17} = \frac{(2^4)^{16}}{17} = \frac{16^{16}}{17}$$

$$(-1)^{16} = 1 \quad (R)$$

$$\frac{2^{64}}{17}$$

$$\frac{17}{16} = 10 \quad (R)$$

5. Find the remainder

$$\frac{237}{6} = 39 \quad (6^3)$$

$$\frac{216}{217} = (-1)^{79} = -1$$

$$217 - 1 = 216$$

$$6^3 = 216$$

$$3-1 = 2 \times 32 = 64 \text{ R}$$

2

(25)

29) 72 12

58

14 12

4. Find the remainder

2007

$$\frac{4^{2007}}{17}$$

$$4^{2000} \times 4^7$$

$$4^{16} \times 4^7$$

$$4^7 \times 4^7 \times 4^7 \times 4$$

$$16 \times 16 \times 16 \times 4$$

$$17$$

$$13$$

Wilson's Theorem $P = \text{any prime no.}$

$$\frac{(P-1)!}{P} \rightarrow \text{Rem} = -1 \text{ or } (P-1)$$

$$\frac{(P-1)!}{P}$$

$$R = (P-1)$$

$$\frac{12!}{13}$$

$$R = 12$$

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

$$R = 10$$

1. Find the remainder

$$\frac{(126)!}{127}$$

$$R = 126$$

2. Find the remainder

$$\frac{(190)!}{191}$$

$$190$$

Hem Mantra