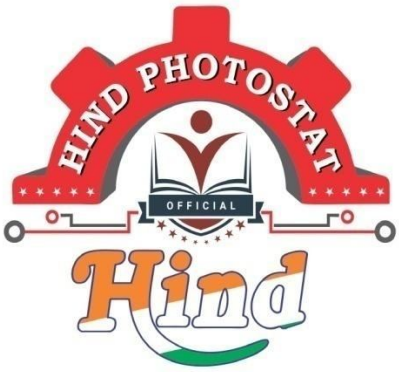

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- **GATE**

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Reasoning + Aptitude

Gate = 10 - 13 Marks
ESE = 22 means 10 %

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chapt 1. Number System.

Factors :-

Factors are the set of ~~set~~ numbers which will divide a given number completly.

$$N = a^p \times b^q \times c^r$$

$$Tf = (p+1)(q+1)(r+1)$$

Where, a, b, c are distinct Prime Numbers
p, q, r are natural Numbers.

① $N = 72 = 2^3 \times 3^2 = 4 \times 3 = 12f$

1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

② $N = 120 = 2 \times 3 \times 5 = 4 \times 2 \times 2 = 16f$

1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120

$N = 9000 = 2^3 \times 5^2 \times 5^3$

TF = ~~4x~~ $(p+1)(q+1)(r+1) = 4 \times 3 \times 4 = 48$

Odd factor = 2 को छोड़ो और बाकी वालो का T.F निकालो.

$(q+1)(r+1) = 3 \times 4 = 12$ — odd factor.

Even factor = $48 - 12 = 36$ factors.

≠ Prime and Composite factors.

Prime has only two factors.

e.g. = 7 = 7, 1

5 = 5, 1

* Composite has more than two factors.

e.g. = 4 = 1, 2, 4

6 = 1, 2, 3, 6

* Prime & compo. factors.

e.g. $9000 = 2^{(3)} \times 3^{(2)} \times 5^{(3)}$

= Total factors = 48

= Don't go for higher power of No. सभी को छोड़ दो.

= Prime factors are = 2, 3, 5 (3)

= Neither Prime Nor composite = 1 (1)

= Composite factors = T.f − (P.F + N.P.N.C)

= 48 − (3 + 1)

composite factors = (44)

e.g. $72 = 2^{(3)} \times 3^{(2)}$

Total factors $= 4 \times 3 = \underline{12} = Tf + cf + 1$

Prime factors $= 2, 3 = \underline{(2)}$

For prime remove higher power of factors

NOR composite NOR prime $= 1 = (1)$

composite factors = Total factors $-$ (P.F + N.P.N.C)

$= 12 - (2+1)$

$= \underline{(9)}$

* Formula :-

Total factor = Prime factor + Compo. factor + 1

NOT IMPORTANT

$N = a^p \times b^q \times \ldots\ldots$

$$\text{Sum of all factors} = \frac{(a^{p+1}-1)}{(a-1)} \times \frac{(b^{q+1}-1)}{(b-1)}$$

E.g. $N = 72 = 2^3 \times 3^2$

$$\text{Sum of all factors} = \frac{(2^{3+1}-1)}{(2-1)} \times \frac{(3^{2+1}-1)}{(3-1)}$$

$$= \frac{15}{1} \times \frac{26}{2}$$

$$= 15 \times 13$$

Sum of all factors = 195

$N = a^p \times b^q \ldots\ldots\ldots$

NOT IMPORTANT for Gate.

Product of all factors $\longrightarrow (N)^{\frac{Tf}{2}}$

$= (N)^{\frac{Tf}{2}}$

e.g. = 72

$N = 72 = 2^3 \times 3^2$

$Tf = 4 \times 3 = 12.$

Product of all factors $= (72)^{\frac{12}{2}}$

$= (72)^6$

e.g = 36

$= 2^3 \times 3^2$

$= 3 \times 3$

$Tf = 9.$

Product of all factors $= (N)^{\frac{Tf}{2}}$

$= (36)^{9/2}$

$= (36)^{4.5}.$

Base System

$(25)_{10} \equiv (\overset{2^4}{1}, \overset{2^3}{1}\ \overset{2^2}{0}\ \overset{2^1}{0}\ \overset{2^0}{1})$

2	25	Reminder
2	12	1
2	6	0
2	3	0
	2	1
	1	

$= 16 + 8 + 1$

$= 25.$

Q. If $137 + 276 = 435$ how much $731 + 672$?

(a) 534 (b) 1403 (c) 1623 (d) 3162.

$\Rightarrow$
$$\begin{array}{r} 1\ 3\ 7 \\ +\ 2\ 7\ 6 \\ \hline 4\ 3\ 5 \end{array}$$
Here base = 8

$$\begin{array}{r} 7\ 3\ 1 \\ +\ 6\ 7\ 2 \\ \hline 1\ 6\ 2\ 3 \end{array}$$ $b = 8$

Q. = IF $137 + 276 = 435$ how much $731 + 672$?

$$\begin{array}{r} 1\ 3\ 7 \\ +\ 2\ 7\ 6 \\ \hline 4\ 3\ 5 \end{array}$$ base = 8

8 8

$$\begin{array}{r} \not{7}\ 6\ \ \not{3}_2\ 1 \\ (-)\ 6\ \ 7\ \ 2 \\ \hline 0\ \ 3\ \ 7 \end{array}$$

Q.

7 7 7

$$\begin{array}{r} 2_1\ \ \not{3}_2\ \ 4_3\ 2 \\ (-)\ \ 1\ \ 6\ \ 5\ \ 6 \\ \hline 0\ \ 3\ \ 5\ \ 3 \end{array}$$

$$\begin{array}{r} 2\ \ 2\ \ 4\ 6 \\ (+)\ \ 4\ \ 4\ \ 2\ 2 \\ \hline 1\ 0\ 0\ 0\ 1 \end{array}$$

$6 + 2 = b + 1$ = base = 7

Q. Consider the equation $(7526)_8 - (Y)_8 = (4364)_8$, where $(X)_N$ stands for X to the base N. Find Y.

(a) 1634 (b) 1737 (c) 3142 (d) 3162.

~~75226~~

$a - Y = b$

$Y = (a - b)$.

$$\begin{array}{r} 7\,5\,4\,2\,6 \\ -\quad 4\,3\,6\,4 \\ \hline 3\,1\,4\,2 \end{array}$$

base = 8

ANS ✓

Cyclicity :-

4 Cycle →

N	Reminder	formula	NO.	NO.	NO.
2	1	4n+1	3	7	8
4	2 Rem	4n+2	9	9	4
8	3 R	4n+3	7	3	2
6	4	4n+4	1	1	6

e.g. $(732)^{2\left(\frac{27}{4}\right)}$ reminder = 3 = u = ?

u = 8

e.g = $(453)^{2\left(\frac{22}{4}\right)}$ reminder = 2 = u = ?

u = 9

2. Cyclic →

★ N N

odd 4 odd 9 → $(79)^{9\,1 = \text{odd}}$ = Ans = 9

even 6 even 1 → $(79)^{9\,2 = \text{even}}$ = Ans = 1

No. that NOT follows Cyclicity

[0, 1, 5, 6]

Q. The numeral in the units position of $211^{870} + 146^{127} * 3424$ is

↳ $211^{870} + 146^{127} * 3^{\frac{424}{4}}$ remainder = 1.

$= 1 + 6 \times 1$

Ans = 7

Q. The last digit of $(2171)^7 + (2172)^{\frac{9}{4}} + (2173)^{\frac{11}{4}} + (2174)^{\frac{13}{4}}$ is

$1 + 2 + 7 + 4$

↳ **Ans = 4**

Factorial

It is product of natural Numbers.

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

$5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$

$6! = 6 \times 5! = 720$

$7! = 7 \times 5! = 5040$

$P = 1! + 2! + 3! + 4! + 5! \cdots\cdots 99!$ = ?

$1 + 2 + 6 + 24 + 0 + 0 + 0 \cdots + 0$

$= 33 + 0 + 0 + 0$

So unit place is 3.

$100! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \cdots\cdots \times 100$

$\frac{100}{5} = 20$ $[5, 10, 15, 25 \ldots 100] \Rightarrow 5^1$

$\frac{20}{5} = 4$ $[25, 50, 75, 100] \Rightarrow 5^2$

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