Toppersnotes
Unleash the topper in you

I.N.E.T.

OFFICERS ENTRY

Indian Navy Entrance Test

Part - 3

Mathematical Aptitude

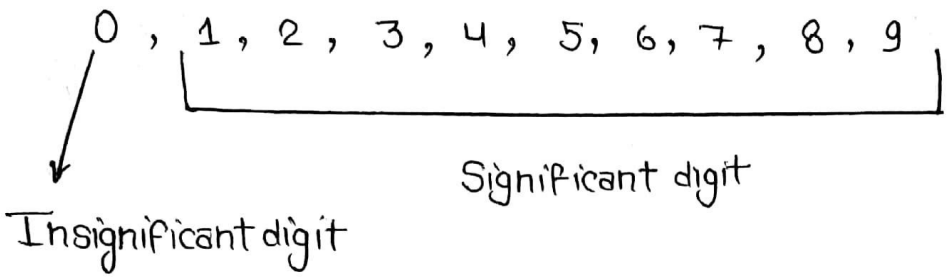
SIERRA INNOVATIONS

INDIAN NAVY ENTRANCE TEST

CONTENTS

Mathematical Aptitude

NUMBER SYSTEM



Natural No-

$$N = [1, 2, 3, 4, 5, \ldots\ldots \infty]$$

Whole No-

$$W = [0, 1, 2, 3, 4 \ldots\ldots\ldots\ldots \infty]$$

Integar No-

$$I = -\infty \text{ to } +\infty$$

$$= [-\infty, \ldots\ldots\ldots\ldots 3, -2, -1, 0, 1, 2, 3 \ldots\ldots\ldots \infty]$$

Even Number-

The number which is divisible by 2 is Called even no.

or

Even number Contains unit digit 0,2,4,6,8

eg:- 2,4,6 ..... 1972, 2008

Odd Number-

The number which are not divisible by 2.

or

Odd no's Contain Unit digit 1,3,5,7,9.

eg:- 1,3,5,7 ..... 1983, 2005, 2115.

Note:- 0 is neither Odd or even.

Prime Number:-

The number which is not divisible by any other number except 1 and onself.

- 2 is the Only even prime number.
- First Prime number - 2
- Prime number from 1 to 100 = 25

  Prime number from 1 to 75 = 21

  Prime number from 1 to 50 = 15

  Prime number from 1 to 25 = 09

Que:- How many Prime numbers are these from 1 to 105?

Soln:- From 1 to 100, Prime number = 25

From 101 to 105, Prime numbers = 101, 103

Total Prime numbers = 25+2 = 27

Composite Number

The number which Can be divided by any other number is Called Composite number.

- 0 and 1 are neither Prime number nor Composite number.

Co-Prime Number

The number which are not divisible by each other.

eg:-
- (3,4)
- (3,4,6)

- HCF of Co-Prime numbers be always 1.

Rational Number –

- 0 is a rational Number.
- a/b , $b \neq 0$ a and b both are integers.
- All the numbers which can be written in the form of a/b is rational number but only condition is $b \neq 0$

eg: $\frac{3}{1}$, $\frac{0}{1}$, -1

- All the natural no, whole no. Integer no's are rational no's but vice-versa is not true.
- If no. of decimal digit are finite in any number then the no will be rational.

$3.5 \hookrightarrow \frac{35}{10}$, $8.73 \hookrightarrow \frac{873}{100}$

- $.44444\ldots\ldots\infty = .\overline{4} = \frac{4}{9}$
- $.838383\ldots\ldots\infty = .\overline{83} = \frac{83}{99}$

If repetition occurs in finite way after the decimal then they can be called rational numbers.

- $2\sqrt{25}$, $3\sqrt{27}$, $6\sqrt{64}$

All the no's of which are can find out complete square root is called rational no.

Irrational no's –

All the no's which Can't be Written in the form of rational no is Called irrational no's.

- $\cdot 123486784\ldots\ldots\infty$
- $\sqrt{2}$, $\sqrt{3}$
- π – Irrational no.
- $\frac{22}{7}$ – rational no.

Rules of dinsibility –

→ • If Unit digit is 0 then divisible by 5 → eg: 2870
• If last two digit are 00 then divisible by 25. eg – 16900
• If last three digits are 000 then divisible by 125.

→ Rule of 3 and 9:–

The Sum of digit should be divisible by 3 and 9.

eg: 7832211
7+8+3+2+2+1+1 = 24
divisible by Only 3.

eg: 7833213
7+8+3+3+2+1+3 = 27
divisible by both 3 and 9.

Rule of 6:-

Rule of 2 and 3 both are applied

eg: 23412

$2+3+4+1+2 = 12 \rightarrow$ divisible by 3.

$2341\underline{2} \rightarrow$ divisible by 2.

eg: 72 * 72, if given number is divisible by 9 then find the possible value of *?

Soln:- min Possible Values are Only 0 and 9.

eg: What is the minimum number found by Only 0 and 1 Which is Completely divisible by 225?

Soln:- $225 - 25 \times 9$

Rule of 25 and 9 should be applied.

$= 11111111100$

→ ## Rule of 2,4,8:-

- If unit digit is divisible by 2 then number be divisible by 2. eg:- 2874
- If last two digit are divisible by 4 then number be divisible by 4. eg:- 16924
- If last three digits are divisible by 8 then number be divisible by 8. eg - 176864

Rule of 11.

Difference of even place and Odd Place Should be divisible by 11.

eg: If 7 38 A 6 A is Completely divisible by 11 then find the Value of A ?

Soln:- even Place of number - Odd Place of Number

$$(A+A+3)-(6+8+7)=0$$

$$2A-18=0$$

$$A=9$$

eg: Is 361658 divisible by 11 ?

Soln:- $(8+6+6)-(5+1+3)$

$$20-9=11$$

11 is divisible by 11 so yes, it is divisible.

Test of Unit digit:-

Multiplication:

eg: $783 \times 694 \times 897 \times 386$

$3 \times 4 \times 7 \times 6$

$1\,②$ $\quad 2\times7=1④$ $\quad 4\times6=2④$

So, Unit digit is 4.

eg: $879 \times 637 \times 583 \times 985$

- (If atleast One '5' x all odds = Unit digit = 5)

$879 \times 637 \times 583 \times 985$

9 (Odd) 7 (Odd) 3 (Odd) 5

answer is 5 -

eg: $878 \times 679 \times 383 \times 582 \times 685$

- (If atleast One '5' x at least One even = Unit digit = 0)

Powers

- Whatever Power is Placed On 0, 1, 5, 6, Unit digit Will be Same 0, 1, 5, 6.

eg: $6156^{273} \longrightarrow$ Unit digit = 6 eg: $275^{2551} \longrightarrow$ Unit digit = 5

- $9^1 = 9$, $9^2 = 81$

$9^3 = 729$, $9^4 = 6561$

9^{odd} then Unit digit $\rightarrow 9$

9^{even} then Unit digit $\rightarrow 1$

- ∵ If x^h and $h > 4$

  then do $\frac{h}{4}$, means divide to last two digit of h by 4.

If Remainder	Power
1	1
2	2
3	3
0	4

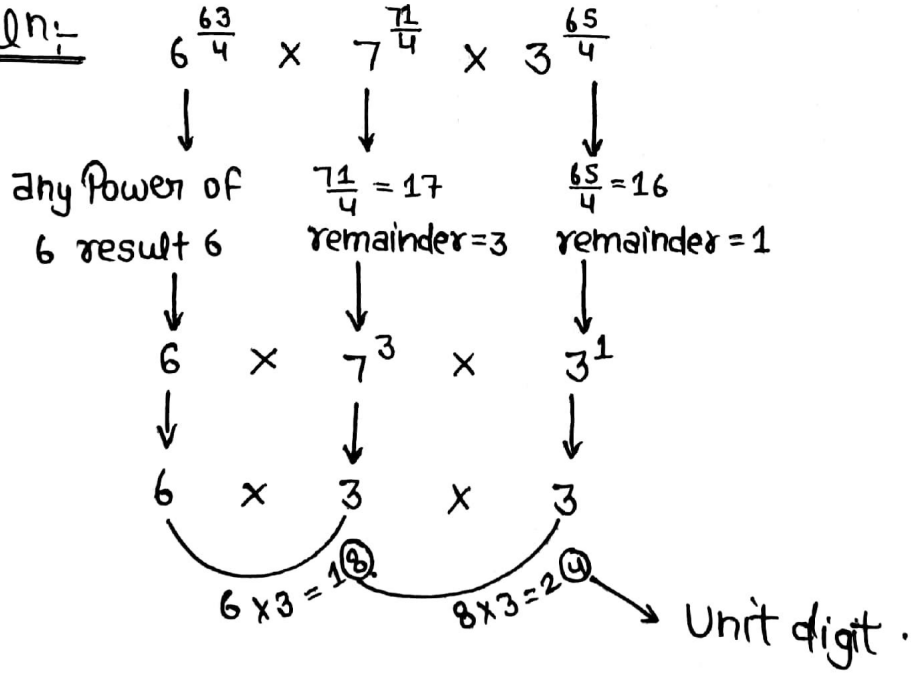
eg: $(122)^{173}$

Soln:- $(122)^{\frac{173}{4}}$ ⇒ here remainder = 1 then Power 1

$(122)^1 = 2^1 = 2$ = Unit digit

eg: $6^{63} \times 7^{71} \times 3^{65}$

Soln:- $6^{\frac{63}{4}} \times 7^{\frac{71}{4}} \times 3^{\frac{65}{4}}$



eg:- $124^{372} + 124^{373}$, What would be Unit digit of given data?

Soln = $124^{372} + 124^{373}$

$= 124^{\frac{72}{4}} + 124^{73/4}$

$4^4 + 4^1$

$6 + 4 = 10$ ⟶ Unit digit = 0

eg:- $3^{108} - 8^{34}$, Unit digit = ?

Soln:- $3^{108} - 8^{34}$

$3^4 = 81$ $8^2 = 64$

$1 - 4$

$= 11 - 4 = 7$ ⟶ Unit digit

(take Carry)

eg:- Number at Zero's:

$5 \times 2 = 10$

$5 \times 2 \times 5 \times 2 = 150$

$5 \times 2 \times 5 \times 2 \times 5 \times 2 = 1000$ ..... etc.

eg: Find the number of zero's in the end of given multiple $1 \times 2 \times 3 \times 4 \times \dots \times 1000$

Soln:- First find the number of factors of 5 because no. of '2' are a lot

Factors of 5 = $\frac{1000}{5}$ (last number) = 200

$\frac{200}{5} = 40$

$\frac{40}{5} = 8$

$\frac{8}{5} = 1$

249

Factors of 5 = 249

Factors of 2 = more (than 249 (can understand by given data)

then these are 249 zero's.

eg: Find the numbers of zero's in the end given multiplication?

$1 \times 2 \times 3 \times 4 \times \dots \times 100$

Soln:- Factors of 5 = $\frac{100}{5}$ (last no) = 20

$\frac{20}{5} = 4$

Factors of 5 → 24

Factors of 2 → more than 24

24 Pairs

So zero's are 24.

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Eg: Find the number of zero's in the End of given multiplication?

$1 \times 3 \times 5 \times 7 \times 9 \times \ldots\ldots \times 99$

Soln:- Factor of 5 = 12

Factor of 2 = 0 (these is no even no so there is no Pair)

So no. of zeros are '0'

⇒ No of Completely divisible -

Que:- How many natural numbers between 3 to 200 Completely divisible by 7.

Soln:- $\frac{3}{7}$ $\frac{200}{7}$

Quotient 0 28

28 - 0 = 28 ✓

∵ Note — If the first number, divisor the given number Completely then add '1' in difference.

Que:- How many three digit numbers are there Completely divisible by 6?

Soln:- $\frac{100}{6}$ $\frac{999}{6}$

16 166

166 - 16 = 150

Que:- Numbers of numbers below 1000 which are divisible by 10 and 13 both?

Soln:- LCM of (10, 13) = 130

$\frac{0}{130}$ $\frac{999}{130}$

7 - 0 = 7

⇒

Dividen	Divisor	Remainder
998		
99	97	1
998		
98	99	1
1073		
89	88	1
987		
79	80	79

If difference of base of dividend and divsor is 1 then.

ⓐ When Power is even then remainder = 1

ⓑ When Power is Odd then remove the Power and divide.

Que:- What is the remainder after dividing 5^{111} by 126?

Soln:- $5^{111} \div 126$

$\downarrow$

$(5^3)^{37} = 125^{111} \div 126$

Remainder = 125

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Q⇒ What is the remainder after dividing $(9^{19}+6)$ by 8?

Soln:-

$= (9^{19} + 6) \div 8$

$= \left(\frac{9^{19}}{8} + \frac{6}{8}\right)$

$= 1+6 = 7$

Que:- What is the remainder after dividing 2^{33} by 10?

Soln:-

$= 2^{33} \div 10$

$\downarrow \frac{33}{4}$

2

$\downarrow 1$

$2 \div 10$ then remainder $= 2$

⇒ Divisor) Dividend (Quotient Divident = divisor = divisor × quotient + remainder

eg: Divide 27 by 6?

Soln:-

6) 27 (4 — Quotient
24
3 — remainder

(Divisor → 6; dividend → 27)

Que:- When a number is divided by 3 - remainder is 1. When the quotient of it divided by 2 then remainder is 1. If the Initial number is divided by 6 then what is the remainder.

Soln:-

Divisor $3 \times 3 = 9$

$+ 3 \times 2$

Remainder $\frac{1}{9+1=10} \quad \frac{\downarrow +}{3}$

Initial number = 10

then $10 \div 6 = 4$

Que:- In a divide, divisor is 10 times of it's quotient 5 times of its remainder. If remainder is 46 then what is the dividend?

Soln:- Remainder = 46

Divisor = $46 \times 5 = 230$

Quotient = $\frac{230}{10} = 23$

Dividend = divisor x Quotient x Remainder

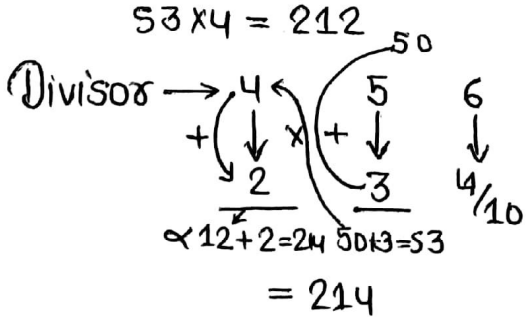
$= 230 \times 23 \times 46$

$= 5336$

Que:- If any number is Succeinely dividend by 4, 5, 6 then remainders are 2, 3, 4 resspectively. What is this Smallest numbers?

Soln:- Method-1

$53 \times 4 = 212$



$= 214$

∵ Add Vertically then multiply the result in cross, again add Vertically and multiply in Cross, So on.

Method-2

Do any options

Arithmetic Progression (AP):

2, 5, 8, 11, 14.....

1, 2, 3, 4, 5.....

$a, a+d, a+2d, a+3d$..... at $(n-1)d$

a = First term, d = Second term − First A term

l = last term, n = number of terms.

Last term = $T_n = a + (n-1)d$

Sum of n Places $(S_n) = \frac{n}{2}(a+l)$ or

$= \frac{n}{2}[2a+(n-1)d]$

$= \frac{(a+l)(l+d-a)}{2d}$ or

∵ In arithmetic Progression, difference between every two Consecutive digits would be Same.

Que:- 4, 9, 14, 19..... 109, Find the number of terms in given equation?

Soln:- $a = 4, d = 9-4 = 5$

$a + (n-1)d = T_n$

$4 + (n-1)5 = 109$

$(n-1) = \frac{105}{5} = 21$

$n = 22$