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# SSC MATHS

## Chapterwise – Topicwise SOLVED PAPERS

**7100+ TCS MCQs**

Coverage of all Questions asked in SSC Exams till December 2022

CGL (Tier I & II)
CPO (SI/ASI)
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CHAPTERWISE TREND ANALYSIS

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| | **Total** | **100** | **25** | **25** | **25** | **50** | **100** |

CHAPTER

01

# Number System

A system in which we study different types of numbers, their relationship and rules govern in them is called **number system.**

In the Hindu-Arabic system, we use the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. These symbols are called **digits.** Out of these ten digits, 0 is called an **insignificant digit**, whereas the others are called **significant digits.**

## Numerals

A mathematical symbol representing a number in a systematic manner is called a numeral represented by a set of digits.

### How to Write a Number?

To write a number, we put digits from right to left at the places designated as unit's, ten's, hundred's, thousand's, ten thousand's, lakh's, ten lakh's, crore's, ten crore's.

*Let us see how the number* 308761436 *is denoted*

| Ten crore's | Crore's | Ten lakh's | Lakh's | Ten thousand's | Thousand's | Hundred's | Ten's | Unit's |
|---|---|---|---|---|---|---|---|---|
| $10^8$ ↓ | $10^7$ ↓ | $10^6$ ↓ | $10^5$ ↓ | $10^4$ ↓ | $10^3$ ↓ | $10^2$ ↓ | $10^1$ ↓ | $10^0$ ↓ |
| 3 | 0 | 8 | 7 | 6 | 1 | 4 | 3 | 6 |

It is read as 'Thirty crore eighty seven lakh sixty one thousand four hundred thirty six'.

## Face and Place Values of the Digits in a Number

### Face Value

In a numeral, the face value of a digit is the value of the digit itself irrespective of its place in the numeral.

*e.g.,* In the numeral 486729, the face value of 8 is 8, the face value of 7 is 7, the face value of 6 is 6, the face value of 4 is 4 and so on.

### Place (Local) Value

In a numeral, the place value of a digit changes according to the change of its place.

In a number,

Place value of unit's digit $=$ (Digit at one's place) $\times 10^0$

Place value of ten's digit $=$ (Digit at ten's place) $\times 10^1$

Place value of hundred's digit

$=$ (Digit at hundred's place) $\times 10^2$ and so on.

The place value of number is also called the local value of the number.

*e.g.,* In the number 28397,

Place value of 8 $= 8 \times 10^3 = 8000$

## Types of Numbers

*There are various types of numbers as follow*

### 1. Natural Numbers

Natural numbers are counting numbers and these are denoted by $N$,

i.e. $N = \{1, 2, 3, ...\}$.

- All natural numbers are positive.
- 1 is the smallest natural number.

### 2. Whole Numbers

All natural numbers and zero form the set of whole numbers and these are denoted by $W$,

i.e. $W = \{0, 1, 2, 3, ...\}$.

- Zero is the smallest whole number.

### 3. Integers

Whole numbers and negative of natural numbers form the set of integers and these are denoted by $I$,

i.e. $I = \{\ldots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \ldots\}$.

### 4. Even Numbers

A counting number, which is divisible by 2, is called an even number.

*e.g.,* 2, 4, 6, 8, 10, 12, … etc.

- The unit's place of every even number will be 0, 2, 4, 6 or 8.

### 5. Odd Numbers

A counting number, which is not divisible by 2, is known as an odd number.

*e.g.,* 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, … etc.

- The unit's place of every odd number will be 1, 3, 5, 7 or 9.

### 6. Prime Numbers

A counting number is called a prime number, when it is exactly divisible by only 1 and itself.

*e.g.,* 2, 3, 5, 7, 11, 13, … etc.

- 2 is the only even number which is prime.
- There are 15 prime numbers between 1 and 50, and 10 prime numbers between 50 and 100.

**How to test a number is prime or not?**

If $P$ = Given number, then

(i) find the whole number $x$ such that $x > \sqrt{P}$.

(ii) take all the prime numbers less than or equal to $x$.

(iii) if none of these divides $P$ exactly, then $P$ is prime; otherwise $P$ is non-prime.

*e.g.,* Let $P = 193$, clearly $14 > \sqrt{193}$

Prime numbers upto 14 are 2, 3, 5, 7, 11, 13.

No one of these divides 193 exactly.

### 7. Composite Numbers

Composite numbers are non-prime natural numbers. They must have atleast one factor apart from 1 and itself.

*e.g.,* 4, 6, 8, 9, etc.

- Composite numbers can be both odd and even.
- 1 is neither a prime number nor a composite number.

### 8. Coprimes

Two natural numbers are said to be coprimes, if their common divisor is 1.

*e.g.,* (7, 9), (15, 16), etc.

- Coprime numbers may or may not be prime.
- Every pair of consecutive natural numbers is coprime.

### 9. Rational Numbers

A number that can be expressed in the form of $p/q$, is called a rational number, where $p, q$ are integers and $q \neq 0$.

*e.g.,* $\frac{3}{5}, \frac{7}{9}, \frac{8}{9}, \frac{13}{15}$, etc.

- A rational number between $a$ and $b = \frac{a+b}{2}$

### 10. Irrational Numbers

The numbers that cannot be expressed in the form of $p/q$, are called irrational numbers, where $p$, $q$ are integers and $q \neq 0$.

*e.g.,* $\sqrt{2}, \sqrt{3}, \sqrt{7}, \sqrt{11}$, etc.

### 11. Real Numbers

Real numbers include both rational and irrational numbers. They are denoted by $R$.

*e.g.,* $\frac{7}{9}, \sqrt{2}, \sqrt{5}, \pi, \frac{8}{9}$, etc.

### Division Formula

Division is repeated subtraction. If $D$ and $d$ are two numbers, then $D/d$ is called the operation of division, where $D$ is the **dividend** and $d$ is the **divisor**. A number which tells how many times a divisor ($d$) exists in dividend ($D$) is called the **quotient** ($Q$).

If dividend ($D$) is not a multiple of divisor ($d$), then $D$ is not exactly divisible by $d$ and in this case, **remainder** ($R$) is obtained.

*Let us see the following operation of division*

Let $D = 17$ and $d = 3$, then $\frac{D}{d} = \frac{17}{3} = 5\frac{2}{3}$

Here, 5 = Quotient ($Q$), 3 = Divisor ($d$)

and 2 = Remainder ($R$)

We see that, $17 = (3 \times 5) + 2$

Hence, we can write a formula

Dividend = (Divisor × Quotient) + Remainder

## Divisibility Tests

*There are following rules to test the divisibility by different numbers*

**Divisibility by 2** When the last digit of a number is either 0 or even, then the number is divisible by 2.

*e.g.,* 12, 86, 472, 520, 1000 etc., are divisible by 2.

**Divisibility by 3** When the sum of the digits of a number is divisible by 3, then the number is divisible by 3.

*e.g.,* 1233, Sum of digits = 1 + 2 + 3 + 3 = 9, which is divisible by 3, so 1233 must be divisible by 3.

**Divisibility by 4** When the number made by last two digits of a number is divisible by 4, then that particular number is divisible by 4. Apart from this, the number having two or more zeros at the end, is also divisible by 4.

*e.g.,* 6428 is divisible by 4 as the number made by its last two digits, i.e. 28 is divisible by 4.

**Divisibility by 5** Numbers having 0 or 5 at the end are divisible by 5.

*e.g.,* 45, 4350, 135, 14850 etc., are divisible by 5 as they have 0 or 5 at the end.

**Divisibility by 6** When a number is divisible by both 3 and 2, then that particular number is divisible by 6 also.

*e.g.,* 18, 36, 720, 1440 etc., are divisible by 6 as they are divisible by both 3 and 2.

**Divisibility by 7** A number is divisible by 7 when the difference between twice the digit at ones place and the number formed by other digits is either zero or a multiple of 7.

*e.g.,* 658 is divisible by 7, because

$$65-2\times 8=65-16=49.$$

As 49 is divisible by 7, so the number 658 is also divisible by 7. This process can be repeat.

**Divisibility by 8** When the number made by last three digits of a number is divisible by 8, then the number is also divisible by 8. Apart from this, if the last three or more digits of a number are zero, then the number is divisible by 8.

*e.g.,* 2256 As 256 (the last three digits of 2256) is divisible by 8, therefore 2256 is also divisible by 8.

**Divisibility by 9** When the sum of all the digits of a number is divisible by 9, then the number is also divisible by 9.

*e.g.,* 936819, Sum of digits $=9+3+6+8+1+9=36$, which is divisible by 9. Therefore, 936819 is also divisible by 9.

**Divisibility by 10** When a number ends with zero, then it is divisible by 10.

*e.g.,* 20, 40, 150, 123450, 478970 etc., are divisible by 10, as they all end with zero.

**Divisibility by 11** When the sum of digits at odd and even places are equal (or difference is zero) or differ by a number divisible by 11, then the number is also divisible by 11.

*e.g,* 2865423 Let us see

Sum of digits at odd places $(A)=2+6+4+3=15$

Sum of digits at even places $(B)=8+5+2=15$

$\because \quad A-B=0$

Hence, 2865423 is divisible by 11.

**Divisibility by 12** A number which is divisible by both 4 and 3, is also divisible by 12.

*e.g.,* 2244 is divisible by both 3 and 4. Therefore, it is divisible by 12 also.

**Divisibility by 14** A number which is divisible by both 7 and 2, is also divisible by 14.

*e.g.,* 1232 is divisible by both 7 and 2. Therefore, it is divisible by 14 also.

**Divisibility by 15** A number which is divisible by both 5 and 3, is also divisible by 15.

*e.g.,* 1275 is divisible by both 5 and 3. Therefore, it is divisible by 15 also.

**Divisibility by 16** A number is divisible by 16, when the number made by its last 4 digits is divisible by 16.

*e.g.,* 126304 is divisible by 16 as the number made by its last 4 digits, i.e. 6304 is divisible by 16.

**Divisibility by 18** A number is divisible by 18, when it is even and divisible by 9.

*e.g.,* 936198 is divisible by 18 as it is even and divisible by 9.

**Divisibility by 25** A number is divisible by 25, when its last 2 digits are either zero or divisible by 25.

*e.g.,* 500, 1275, 13550 are divisible by 25 as last 2 digits of these numbers are either zero or divisible by 25.

- $(x^m-a^m)$ is divisible by $(x-a)$ for all values of $m$.
- $(x^m-a^m)$ is divisible by $(x+a)$ for even values of $m$.
- $(x^m+a^m)$ is divisible by $(x+a)$ for odd values of $m$.

## Unit's Digit of an Expression

*Given expression can be of following two types*

### 1. When expression is Given in the Form of Product of Numbers

To find the unit's digit in the product of two or more numbers, we take unit's digit of every numbers and then multiply them. Then, the unit's digit of the resultant product is the unit's digit of the product of given expression.

*e.g.,* Unit digit of $207\times 781\times 39\times 94$

Taking unit's digit of every number and then multiplying them

$$=7\times 1\times 9\times 4=7\times 36$$

Again, taking unit's digits and then multiplying $=7\times 6=42$

$\therefore$ Unit's digit for $207\times 781\times 39\times 94$ is 2.

### 2. When expression is Given in the Form of Index

Suppose that the number is of the form $a^b$, where $a$ and $b$ are natural numbers.

1. If unit's digit of $a$ is 0, 1, 5, or 6, then the resultant unit's digit of $a^b$ remains same.
   i.e., Unit's digit of $a^b$ = unit's digit of $a$

*e.g.,*

(i) Unit's digit of $(576)^{1151}=6$

(ii) Unit's digit of $(155)^{120}=5$

(iii) Unit's digit of $(191)^{19} = 1$

(iv) Unit's digit of $(100)^{52} = 0$

2. If unit's digit of $a$ is 4 or 9.

   Unit's digit of $(4)^1 = 4, (4)^2 = 6, (4)^3 = 4, (4)^4 = 6$

   Here, cyclicity of units digit '4' is two.
   For, unit's digit of $a = 4$,
   Resultant unit's digit of $a^b = 4$, for $b =$ odd

   $= 6$ for $b =$ even
   *e.g.*, Unit's digit in $4^{102} = 6$

   Unit's digit of $(9)^1 = 9, (9)^2 = 1, (9)^3 = 9, (9)^4 = 1$

   Here, cyclicity of unit's digit '9' is two.
   For unit's digit of $a = 9$
   Resultant unit's digit of $a^b = 9$, for $b =$ odd

   $= 1$, for $b =$ even
   *e.g.*, unit's, digit in $9^{105} = 9$

3. If unit's digit of $a$ is 2, 3, 7 or 8.

   Unit's digit of $(2)^1 = 2, (2)^2 = 4, (2)^3 = 8,$
   $(2)^4 = 6, (2)^5 = 2$

   Unit's digit of $(3)^1 = 3, (3)^2 = 9, (3)^3 = 7,$
   $(3)^4 = 1, (3)^5 = 3$

   Unit's digit of $(7)^1 = 7, (7)^2 = 9, (7)^3 = 3,$
   $(7)^4 = 1, (7)^5 = 7$

   Unit's digit of $(8)^1 = 8, (8)^2 = 4, (8)^3 = 2,$
   $(8)^4 = 6, (8)^5 = 8$

   Here, cyclicity of each 2, 3, 7 and 8 is four

**Case I** $b$ is multiple of 4.

For unit digits of $a = 2$ or 8.
Resultant unit's digit of $a^b = 6$

*e.g.*, unit's digit of $(152)^{392} = (152)^{4 \times 98} = 6$

Unit's digit of $(408)^{756} = (408)^{4 \times 189} = 6$

For unit's digits of $a = 3$ or 7
Resultant unit's digit of $a^b = 1$

*e.g.*, unit's digit of $(4137)^{756} = (4137)^{4 \times 189} = 1$

Unit's digit of $(223)^{100} = (223)^{4 \times 25} = 1$

**Case II** $b$ is not a multiple of 4.

Let $r$ be the remainder, when $b$ is divided by 4 i.e.,
$b = 4q + r$
For unit digit of $a = 2, 3, 7$ or 8.
$\therefore$Resultant unit's digit of $a^b =$ Unit's digit of $a^r$.
*e.g.*, unit's digit of $7^{105} = 7^{4 \times 26 + 1} = 7^1 = 7$

## Important Formulae

1. Sum of first $n$ natural numbers $= \dfrac{n(n+1)}{2}$
2. Sum of first $n$ odd numbers $= n^2$
3. Sum of first $n$ even numbers $= n(n+1)$
4. Sum of squares of first $n$ natural numbers $= \dfrac{n(n+1)(2n+1)}{6}$
5. Sum of cubes of first $n$ natural numbers $= \left[\dfrac{n(n+1)}{2}\right]^2$

# Questions Asked in SSC Exams

## TYPE 1 Questions Based on Types of Numbers

**1.** The sum of the odd divisors of 216 is **[SSC CPO 2022]**

(a) 16 (b) 14
(c) 40 (d) 600

*(c)* Factors of 216 = 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 27, 36, 54, 72, 108 and 216.

Sum of odd divisors

$= 1 + 3 + 9 + 27 = 40$

**2.** How many numbers are there from 400 to 700 in which the digit 6 occurs exactly twice? **[SSC CGL (Mains) 2022]**

(a) 19 (b) 18
(c) 21 (d) 20

*(d)* The numbers from 400 to 700 in which the digit 6 occurs exactly twice are

466, 566, 606, 616, 626, 636, 646, 656, 660, 661, 662, 663, 664, 665, 667, 668, 669, 676, 686, 696

∴ Required number of the numbers = 20

**3.** How many composite numbers are there from 53 to 97? **[SSC CGL (Mains) 2022]**

(a) 36 (b) 38
(c) 37 (d) 35

*(d)* The numbers are there from 53 to 97

$= 97 - 53 + 1 = 45$

The prime numbers are there from 53 to 97,

(53, 59, 61, 67, 71, 73, 79, 83, 89, 97) = 10

∴ The composite numbers are there from 53 to 97 = 45 − 10 = 35

**4.** $x$, $y$ and $z$ are distinct prime numbers, where $x < y < z$. If $x + y + z = 70$, then what is the value of $z$? **[SSC CGL (Mains) 2022]**

(a) 29 (b) 43
(c) 31 (d) 37

*(d)* $x$, $y$ and $z$ are distinct prime numbers, where $x < y < z$ and $x + y + z = 70$

If $x = 2$, then $y + z = 70 - 2 = 68$

If $y = 31$, then $z = 68 - 31 = 37$

Here, $x + y + z = 2 + 31 + 37 = 70$

$\therefore \quad z = 37$

**5.** The sum of all possible three-digit numbers formed by digits 3, 0 and 7, using each digit only once is **[SSC CPO 2018]**

(a) 2010 (b) 1990
(c) 2220 (d) 2110

*(d)* All possible three digit numbers formed by digits 3, 0 and 7

= 307, 370, 703 and 730

[∵ excluding 037 and 073 because here digit '0' is not useful]

∴ Required sum = 307 + 370 + 703 + 730

= 2110

**6.** A rational number between 3/4 and 3/8 is **[SSC CGL 2013]**

(a) 7/3 (b) 16/9 (c) 9/16 (d) 1/7

*(c)* Rational number between

$$\frac{3}{4} \text{ and } \frac{3}{8} = \frac{\frac{3}{4} + \frac{3}{8}}{2} = \frac{9}{16}$$

**7.** The sum of all those prime numbers which are not greater than 17 is **[SSC Constable (GD) 2012]**

(a) 59 (b) 58 (c) 41 (d) 42

*(b)* Prime numbers till 17 are 2, 3, 5, 7, 11, 13, 17.

∴ Required sum

$= 2 + 3 + 5 + 7 + 11 + 13 + 17 = 58$

**8.** The sum of a natural number and its square equals the product of the first three prime numbers. The number is **[SSC Constable (GD) 2012]**

(a) 2 (b) 3 (c) 5 (d) 6

*(c)* Let the required number be $x$.

First three prime number = 2, 3 and 5.

According to the question,

$$x^2 + x = 2 \times 3 \times 5$$

$$\Rightarrow \quad x^2 + x - 30 = 0$$

$$\Rightarrow \quad x^2 + 6x - 5x - 30 = 0$$

$$\Rightarrow \quad x(x + 6) - 5(x + 6) = 0$$

$$\Rightarrow \quad (x - 5)(x + 6) = 0$$

$$\therefore \quad x = 5 \quad [\because x \neq -6]$$

**9.** If multiplied a natural number by 18 and another by 21 and added the products. Which one of the following could be the sum? **[SSC CGL 2011]**

(a) 2007 (b) 2008 (c) 2006 (d) 2002

*(a)* Let the natural numbers be $x$ and $y$.

∴ Required sum $= 18x + 21y$

$= 3(6x + 7y)$

Hence, the sum is divisible by 3.

Out of the given options, only 2007 is completely divisible by 3.

**10.** If $a$ and $b$ are odd numbers, then which of the following is even? **[SSC CGL 2011]**

(a) $a + b + ab$ (b) $a + b - 1$
(c) $a + b + 1$ (d) $a + b + 2ab$

*(d)* The sum of two odd numbers is always even and their product multiplied by 2 is also even.

∴ $a + b + 2ab$ = Even + Even = Even

**11.** The rational number between $\frac{1}{2}$ and $\frac{3}{5}$ is **[SSC CPO 2008]**

(a) $\frac{2}{5}$ (b) $\frac{4}{7}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$

*(b)* Required number between $\frac{1}{2}$ and $\frac{3}{5}$.

$$\Rightarrow \frac{\frac{1}{2} + \frac{3}{5}}{2} \Rightarrow \frac{5 + 6}{20} = \frac{11}{20} \approx \frac{4}{7}$$

**12.** How many natural numbers divisible by 7 are there between 3 and 200? **[SSC CPO 2003]**

(a) 27 (b) 28 (c) 29 (d) 36

*(b)* Number of natural numbers divisible by 7 from 0 to 3 = 0

Number of natural numbers divisible by 7 to 199

$$= \frac{199}{7} = 28\frac{3}{7} = 28$$

∴ Required number of natural numbers

$= 28 - 0 = 28$

## TYPE 2 Questions Based on Divisibility and Remainder

**1.** Which of the following pairs of non-zero values of $p$ and $q$ make 6-digit number $674pq0$ divisible by both 3 and 11? **[SSC CGL (Pre) 2022]**

(a) $p = 4$ and $q = 2$ (b) $p = 5$ and $q = 2$
(c) $p = 5$ and $q = 4$ (d) $p = 2$ and $q = 2$

**(b)** 6-digit number - 674 $pq$0

∴ This number is divisible by 3.

∴ The sum of its digits will be divisible by 3.

$\Rightarrow 6 + 7 + 4 + p + q + 0$, is divisible by 3.

$\Rightarrow 17 + p + q$, is divisible by 3.

$\Rightarrow \quad p + q = 1, 4, 7 \quad \ldots(i)$

∵ The number is also divisible by 11, then

Sum of odd places – Sum of even places = 0 or divisible by 11.

$\Rightarrow (6 + 4 + q) - (7 + p + 0) = 0$ or divisible by 11

$\Rightarrow 10 + q - 7 - p = 0$ or divisible by 11

$\Rightarrow 3 + q - p = 0$ or divisible by 11

If $\quad 3 + q - p = 0$

$\Rightarrow \quad q - p = -3$

$\Rightarrow \quad p - q = 3 \quad \ldots(ii)$

From Eq. (i), $\quad p + q = 7 \quad \ldots(iii)$

$[\because p + q \geq 4]$

To solve Eqs. (ii) and (iii), $p = 5, q = 2$

Hence, $p = 5$ and $q = 2$.

**2.** A four-digit pin, say $abcd$, of a lock has different non-zero digits. The digits satisfy $b = 2a$, $c = 2b$, $d = 2c$. The pin is divisible by _______ . **[SSC CGL (Pre) 2022]**

(a) 2, 3, 11 (b) 2, 3, 7
(c) 2, 3, 5 (d) 2, 3, 13

**(d)** Pin number of four-digits $= a\,b\,c\,d$

Here, $b = 2a,\ c = 2b,\ d = 2c$

$\therefore \quad c = 4a, d = 8a$

∴ Pin-number of four-digits

$= (a)(2a)(4a)(8a) = 64a^4$

The greatest four-digits number which is divisible by 64 = 9984 = 64 × 156

Remain factors of number = 156

$= 2 \times 2 \times 3 \times 13$

Hence, the number is divisible by 2, 3 and 13.

**3.** If the nine-digit number $3422213AB$ is divisible by 99, then what is the value of $2A + B$? **[SSC CGL (Pre) 2022]**

(a) 11 (b) 12
(c) 10 (d) 13

**(a)** Nine-digit number = 3422213 $AB$

This number is divisible by 99, then this number will be divisible by 9 and 11.

∵ The number is divisible by 9, then the sum of digits of number will be divisible by 9.

$\Rightarrow 3 + 4 + 2 + 2 + 2 + 1 + 3 + A + B$ will be divisible by 9

$\Rightarrow 17 + A + B$, will be divisible by 9

∴ The possible value of $A+B = 1, 10 \quad \ldots(i)$

∵ The number is divisible by 11, then the difference of the sum of digits of odd places and the sum of digits of even places will be 0 or divisible by 11.

$\Rightarrow (3 + 2 + 2 + 3 + B) - (4 + 2 + 1 + A)$
$= 0$ or divisible by 11.

$\Rightarrow 10 + B - 7 - A = 0$ or divisible by 11

$\Rightarrow 3 + B - A = 0$ or divisible by 11

If $3 + B - A = 0 \Rightarrow A - B = 3$

(The values of $A$ and $B$ will be not possible)

If $\quad 3 + B - A = 11$

$\Rightarrow \quad B - A = 8 \quad \ldots(ii)$

From relation Eq. (i),

$A + B = 10 \quad \ldots(iii)$

From Eqs. (ii) and (iii), $B = 9, A = 1$

$\therefore 2A + B = 2 \times 1 + 9 = 11$

**4.** What are the values of $R$ and $M$, respectively, if the given number is perfectly divisible by 16 and 11 ?
$34R05030M6$ **[SSC CPO 2022]**

(a) 4 and 6 (b) 7 and 5
(c) 5 and 5 (d) 5 and 7

**(c)** Given number is $34R05030M6$.

When the number is divisible by 16.

Then the number formed by last 4 digit is divisible by 16.

$\therefore \quad M = 1, 3, 5, 7, 9$

When the number is divisible by 11, then the defference of odd peace digits and even places digits is 0 or divisible by 11.

$\therefore (4 + 0 + 0 + 0 + 6)$
$+ (3 + R + 5 + 3 + M)$ is divisible by 11.

$\Rightarrow (11 + R + M) - (10)$ is divisible by 11.

Put $M = 5$

$\Rightarrow \quad (11 + 5 + R - 10)$ is divisible by 11.

$\Rightarrow \quad R = 5$ (only possible)

**5.** If a 4 digit number $x58y$ is exactly divisible by 9, then the least value of $(x + y)$ is **[SSC CPO 2022]**

(a) 4 (b) 5 (c) 3 (d) 2

**(b)** Given, number $x58y$.

For divisible by 9.

$\therefore \quad (x + 5 + 8 + y)$ is divisible by 9.

$\Rightarrow \quad 18 + x + y$ is divisible by 9.

For the least value of $(x + y) = 5$

$\left[\because \frac{13 + 5}{9} = 2\right]$

**6.** If the 9-digit number $97x4562y8$ is divisible by 88, what is the value of $(x^2 - y^2)$ for the smallest value of $y$, given that $x$ and $y$ are natural numbers ? **[SSC CPO 2022]**

(a) 64 (b) 68 (c) 76 (d) 80

**(d)** A number to be divisible by 88, must be divisible by 8 and 11.

The number $97x4562y8$ to be divisible by 8, the number formed by last three digit of number must be divisible by 8.

So, $2y8$ is divisible by 8, if $y = 4$ $(\because y \leq 9)$

Also, the number $97x4562y8$ will be divisible by 11 only if difference of sum of odd and even places digits is multiple of 11 or 0.

Now, $(9 + x + 5 + 2 + 8)$
$- (7 + 4 + 6 + y) = 11$

$\Rightarrow \quad 24 + x - 17 - y = 11$

$\Rightarrow \quad x = 11 - 7 + y \quad (\because y = 4)$
$= 8$

Now, $(x^2 + y^2) = (8^2 + 4^2) = 64 + 16 = 80$

**7.** Find the least value of $p$ so that $246p48$ is divisible by 8. **[SSC CPO 2022]**

(a) 2 (b) 1
(c) 4 (d) 0

**(d)** The number $246p48$ will be divisible by 8 only if the number formed by last three digits of number is divisible by 8.

i.e. $P48$ is divisible by 8.

$\therefore \quad$ Possible value of $P = 0, 2, 4, 8$

So, the required least value = 0

**8.** What is the remainder, when 8127 is divided by 8 ? **[SSC (10 + 2) 2022]**

(a) 7 (b) 5
(c) 4 (d) 6

**(a)** 8)8127(1015
 8
 12
 8
 47
 40
 7 = Remainder

$\therefore$ Required remainder = 7