SYLLABUS

Class - I Year

Subject – Business Mathematics

UNIT – I	Brief history of Vedic mathematics in Indian knowledge tradition, methods and practice of quick calculation of addition, multiplication, division, square and square root of numbers through Vedic mathematics, method of quick verification of answers from Digital Sum.
UNIT – II	Rules for sign in Algebra and practice, Rules for calculation (BODMAS) and practice, Simultaneous Equations – Meaning, Characteristic, types, calculation (with word problems)
UNIT – III	Theory of Indices (preliminary knowledge only formulae), Logarithms and Antilogarithms – principles and calculation, Percentage
UNIT – IV	Ratio, Proportion, Discount and Brokerage
UNIT – V	Commission , Average, profit and loss
Unit - VI	Simple Interest, Compound Interest

UNIT I, II, & III

Brief history of Vedic mathematics in Indian knowledge tradition

- Bharati Krishna Tirtha was born in March 1884 in Puri Village, Orissa, a state in India. Apart from mathematics, he also excelled in Science, Humanities, and Sanskrit as a student. He was passionate about meditation and spiritualism. He claims to have gained knowledge of the Vedic Sutras while meditating in a forest near Singeri for eight years. According to Krishna Tirtha, he learned the sutras from the Vedas, like the Atharva Veda and the Rig Veda. Hence the term 'Vedic Mathematics'.
- He wrote the initial 16 sutras in 1957. He planned to pen more down, but cataract developed in both eyes, and he passed away in 1960.

Meaning of Vedic Mathematics

The word Vedic Mathematics means Vedic + Mathematics. 'Vedic' means knowledge and wisdom , and 'Mathematics' is the Abstract science of numbers. Thus vedic mathematics represent knowledge of mathematics. It is used by Indian sages (Rishis).

It is an ancient technique, which simplifies multiplication , divisibility, complex number, squaring, cubic, square roots and cube roots. Even recurring decimals and partial fractions can be handled by Vedic Mathematics. Vedic Mathematics forms part of Jyotish Shastra which is one of the six parts of Vedangas.

Terms and Operations

1. **Ekadhika** means ' One more'
   Ex. Ekadhika of 0 is 0 + 1 = 1
   Ekadhika of 5 is 5 + 1 = 6
2. **Ekanyuna** means ' One Less'
   Ex. Ekanyuna of 1 is 1 – 1 = 0
   Ekanyuna of 5 is 5 – 1 = 4
3. **Purak** means ' Complement' (from 10)
   Ex. Purak of 1 is 10 – 1 = 9
   Purak of 2 is 10 – 2 = 8
4. **Rekhank** means ' a digit with a bar on its top'
   Ex. A bar on 7 is written as $\overline{7}$
5. **Beejank** means sum of digit of a number added upto get a single digit.
   Ex. Beejank of 27 = 2 + 7 = 9
   Beejank of 348 = 3 + 4 + 8 = 15 = 1 + 5 = 6
6. **Vinculum** means when we use positive and negative digit together , this is

called vinculum.

Ex. 1 $\overline{7}$ here 1 is positive number and 7 is a negative number.

- **Methods of quick calculation**
  - **Addition**

1. SUTRA "ENDING WITH ZERO"

This method is called making a number ending with zero and then add the remaining. The number at the end of which there is a zero as 10 , 100 , 1000, 2000, 3000… The addition can be made easy and interesting using his sutra.

Working :

Step 1 : First add the digits of left most column. Then put zero at the end of sum Obtained.

Step 2 : Add the digits of second column from left to the sum with zero at the end in step (1)

Step 3 : Again put zero at the end of sum obtained in step (2) . Then add the digits of third column from left.

Ex. 86 + 79 using Sutra 'ending with zero'

Sol.

$$\begin{array}{r} 8\ \ 6 \\ +\ 7\ \ 9 \\ \hline \end{array}$$

Step 1 : 8 + 7 = 15

Put 0 at the end of this sum and we get 150

Step 2 : 150 + 6 + 9 = 165

2. SUTRA 'NIKHLAM'

The addition of numbers around base or sub-base can be done quickly. Bases are 10 , 100 , 1000, …… and sub – bases are 20 , 30 , 40 , 200 , 300 ….. 20000, 3000 etc. So by using 'NIKHLAM' sutra addition is very easy.

Working : In this method we write numbers with help of bases or sub-bases

Ex. 102 = 100 + 2 99 = 100 – 1

67 = 70 – 3 42 = 40 + 2

Addition of 10 , 100 , 1000 …… 20 , 30 , 40 , 70 ……numbers is very easy. So we can add easily .

Ex. Add 73 + 96 by using the sutra 'Niklam'.

Sol. 73 + 96

= 73 + (100 – 4)

= (73 + 100) – 4

= 173 – 4 = 169

3. SHUDH METHOD FOR A LIST OF NUMBERS

Shudh means pure. The pure numbers are the single digit numbers i.e. 0,1,2,3…..9 . In Shudh method of addition we drop the 1 at the tens place and carry only the single digit forward.

Ex. Find 2 + 7 + 8 + 9 + 6 + 4

Sol.

```
   2
 • 7
 • 8
   9
 • 6
   4
-------
 3  6
```

We start adding from bottom to top. As soon as we come across a two – digit number, we put a dot (•) and carry only the single digit forward for further addition. We put down the single digit (6 in this case) that we get in the end. For the first digit, we add all the dots (3 in this case) and write it .

Ex. 234 +658 + 818 + 46

```
    2    3    4
  • 6  • 5  • 8
    8    1  • 8
         4    6
-------------------
   17    5    6
-------------------
```

- **SUBSTRACTION**

For subtraction we use sutra " **ending with zero**" as done in addition from left to right .

Ex. Subtract 38 from 87

Sol.

```
   8 7
 - 3 8
-------
   4 9
-------
```

Step 1 : 8 – 3 = 5
Write it as 50
Step 2 : 50 + 7 – 8 = 49

- Easy way for Multiplication

1. **SUTRA : VERTICALLY AND CROSS – WISE**
   <u>Same base Method</u> : When both the numbers are less than the same base .
   <u>Working :</u>
   Step 1: First we find the deficiencies of the numbers to be multiplied.
   Step 2 : Cross subtract to get first part of answer.

Step 3 : Multiply deficiencies (vertically) to get the second part of the answer.

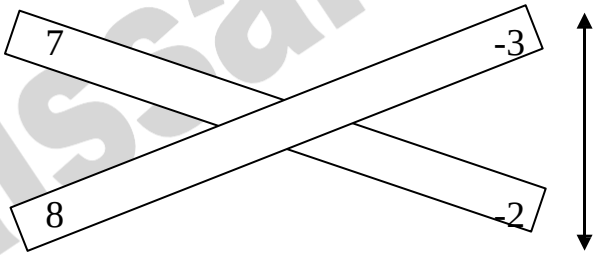
Ex. Multiply 7×8

Sol. Here base is 10

So 7 is 3 below 10

And 8 is 2 below 10

Step 1 : Number Deficiency



Step 2 : Cross subtract i.e. $7 - 2 = 5$ or $8 - 3 = 5$. The two difference are always same . So 5 is the first part of answer.

Step 3 : Multiply vertically (deficiencies)

i.e. , $-3 \times -2 = 6$ which is the second part of answer.

Hence

7	-3
8	-2
5	/ 6

i.e. $7 \times 8 = 56$

Different Base Method

When both numbers are less than base

Working

Step 1 : First write the deficiencies of the numbers.

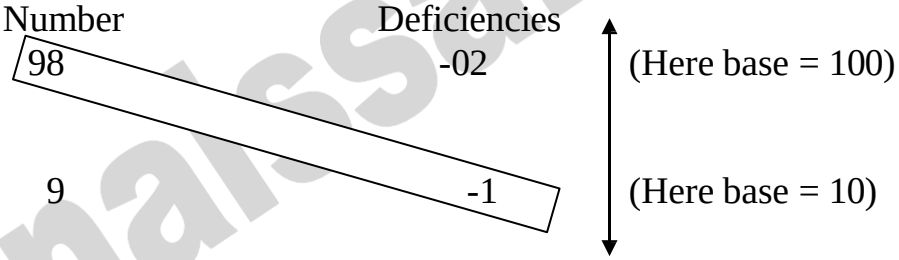
Step 2 : Cross subtract to get first part of answer .

Step 3 : Multiply deficiencies (Vertically) to get the second part of the answer

By combining these two parts , we get the required answer.

Ex. Multiply 98×9

Sol. Number Deficiencies



Cross Subtract

9	8
-1	×
8	8

(Difference of no. of digits in bases = 1 so leave one space from right.)

Which is the part of the answer.

Vertically multiply

-02 × -1 = 2 (one digit allowed as lower base 10 has one zero)

Which is the second part of answer

Hence , 98 × 9 = 882

- **Squaring**

  Squaring numbers near base

  Step 1 : For first part add the number to its surplus or subtract deficiency from the number

  Step 2 : For second part square surplus / deficiency . Number of digit in second part should be equal to number of zero in the base.

  Ex. $(107)^2$

  Sol. Base = 100

  Surplus = +07

  For the first part = 107 + 7 = 114

  For the second part = $(07)^2$ = 49

  $(107)^2$ = 114/ 49 = 11449

  Ex. $(93)^2$

  Sol. Base = 100

  Deficiency = -07

  For the first part = 93- 07 = 86

  For the second part = $(07)^2$ = 49

  $(93)^2$ = 86/ 49 = 8649

- **Square roots**

  Step 1 : From pairs from right to left. Number of pairs decide the number of digits in the square roots.

  Step 2 : For the square root of 4 digit number, take first pair from left, Check the square number less than this pair Corresponding digit of this square number gives the tens digit of required square root.

  Step 3 : See the last digit of the number and guess the corresponding digits

  Step 4 : To choose the correct last digit in step 3.

  Find (Tens digit)^2 + Tens digit

  If first pair is less than this number, then choose smaller digit in step 3.

  If first pair is more than this number then choose bigger digit in step 3 .

- **Method of quick verification of answers from digit sum**

  9' CHECK METHOD

  In this method digit sum is the sum of digits of a number added upto a single digit. Digit sum also known as " Beejank"

  Verification Steps:

  Step 1 : Write down the digit sums of the numbers being added / subtracted or multiplied.

  Step 2 : Add / Subtract or multiply these digit sums upto a single digit.

Step 3 : Find the digit sum of the result.
Step 4 : Check whether the two digit sums in Step (2) , Step (3) are Same. If both are same , then the answer is correct.

Ex. Add 278 and 119 . Check the answer

Sol.
$$\begin{array}{r} 2\ 7\ 8 \\ +\ 1\ 1\ 9 \\ \hline 3\ 9\ 7 \end{array}$$

Verification :

Step 1 : Digit sum of 278 = 8
Digit Sum of 119 = 1 + 1 = 2
Step 2 : L.H.S. = 8 + 2 = 10
1 + 0 = 1
Step 3 : Digit sum of R.H.S.
i.e. Digit sum of result 397
= 3 + 7 = 10
= 1 + 0 = 1
Step 4 : Digit sum of LHS = Digit sum of RHS = 1
Hence, answer may be correct.

UNIT-II

Rules for sign in Algebra and practice, Rules for calculating (BODMAS) and Practice

- **Rules for sign in Algebra and practice**

The basic mathematical operators are addition, subtraction , multiplication division , order or exponents and brackets. They are called operators because they 'operator on' the quantities or the numbers.

1. Addition
   It is the process of combining two or more quantities. The sign of the addition operator is ' +'
   Ex. : 2 + 3 = 5
2. Subtraction
   It is the process of removing one quantity from another. The sign of the subtraction operation is ' -'.
   Ex. : 5 – 3 = 2
3. Multiplication
   It is repeated addition. The sign of the multiplication operator is 'x'.
   Ex. : 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 means
   8 times 5
   So it is 5 * 8 = 40
4. Division
   It is separating something into equal parts. The sign of division

operator is '÷'

Ex. $40 \div 5 = 8$

Orders / Exponents

They are the number of times the entity must be multiplied with itself

Ex. : a^3 means $a \times a \times a$ etc.

5. Brackets

They are used to break the general order of operations. The commonly used brackets are :

(i) $\overline{\quad}$ Bar Bracket or Vinculum

(ii) ( ) Parentheses, Small brackets

(iii) { } Curly Brackets, middle bracket , Braces

(iv) [ ] Square Bracket

Operands

An entity or a quantity, upon which a mathematical operator is performed is called as an operand.

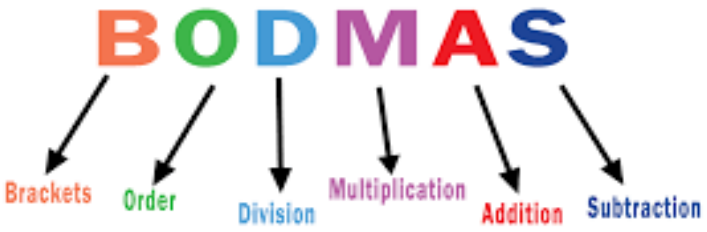
For ex. : In the expression

7 + 4 the numbers 7 , and 4 are operands while (+) sign is the operator.

"BODMAS RULE"

'BODMAS' is the order of operations to simplify expressions is mathematics.

"BODMAS" rule is :



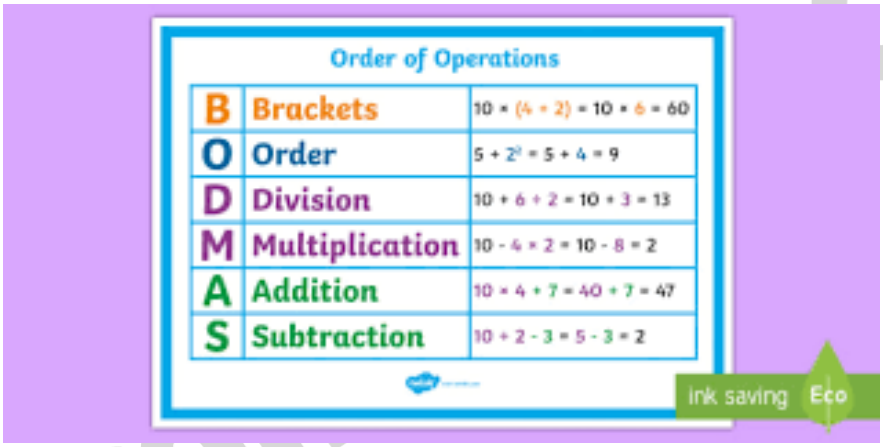
According so this rule, In an expression that has all the operators , we would first solve operations with in the ' Brackets'. This is called 'opening the bracket',

Next we solve exponents (order) or 'of ' , then 'Division' and 'Multiplication' operators would be solved. After which we will solve for 'Addition' and 'Subtraction'.

Ex. $7 \times 3 + 8 \div 2 - 12 = ?$

This equation would be solved using the BODMAS rule as

$$= 7 \times 3 + 8 \div 2 - 12$$
$$= 21 + 4 - 12$$
$$= 25 - 12$$
$$= 1$$



- Simultaneous Equations

Equation – Equations signify relation of equality between two algebraic expressions symbolized by the sign of equality '='. In other words, an equation is statement which says that the two algebraic expressions are equal and is satisfied only for certain values of the variables.

Identify – When equality of two algebraic expressions hold true for all values of variables then it is called an identity.

Root of an Equation – The value of unknown or variable for which the equation is true is known as the root of the equation. To find the roots of an equation means to solve the equations.

Degree of an Equation – The degree of an equation is the highest exponent of the variable x or variables (x, y, …) present in the equation is called the degree of an equation.

Linear Equation – An equation which involves power of an unknown quantity not higher than unity (one) is called a linear equation.

One variable Linear Equation – A linear equation in one variable (x, say) in which the highest degree of the variable x is 1. A linear equation in one variable is, in general, written as ax+by = c or ax = c. This equation is also called, "First degree equation in x" or simple equation.

Two variable equation – A linear equation in two variables (x, y, say) in which the highest degree of the variables x and y each is 1. A linear equation in two variables, is general, is written as ax+by+c = 0 or ax+by=d.

Three variable equation – A linear equation in three variables (x, y, z, say) in which the highest degree of the variables x, y and z each is 1. A linear equation in three variables, in general, is written as $a_1x+b_1y+c_1z=d$.

Types of Simultaneous Equations –

i) Linear Simultaneous Equations in two Variables – Two linear equations in two variables together are linear simultaneous equations in two variables, e.g.:

$$4x+y = 2$$
$$3x-5y = 18$$

ii) Linear Simultaneous Equations in three Variables – Three linear equations in three variables together are linear simultaneous equations in three variables, e.g.:

$$3x+5y-7z = 13$$
$$4x+y-12z = 6$$
$$2x+9y-3z = 20$$

iii) Specific type of Simultaneous Equations – The equations in other than linear form are called specific type equations, e.g.:

i) quadratic equation : $ax^2 + bx + c = 0$

ii) reciprocal equation : $\frac{a}{x} + \frac{b}{y} = c$

iii) a $(\frac{y}{x}) + c = by, etc.$

Characteristics of Simultaneous Equations –

1) A system of linear equations in one variable is not taken under simultaneous equations.
2) The set of values of two variables x and y which satisfy each equation in the system of equations is called the solution of simultaneous equations.
   The solutions of two variable linear simultaneous equations may be –
   i) Infinitely many,
   ii) An unique solution, or
   iii) No solution.
3) For simultaneous equations –
   $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$
   a. If $\frac{a1}{a2} = \frac{b1}{b2} = k \; and \; c1 = k \; C_2$ then there are infinitely many solutions.
   b. If $\frac{a1}{a2} = \frac{b1}{b2} = c1 \neq kc_2$, then there is no solution.
   c. If $c_2 \neq 0$, then $c_1 = kc2 \rightarrow \frac{c1}{c2} = k, hence$

$$\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2} \rightarrow infinitely\ many\ solutions$$

$$and\ \frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2} \rightarrow no\ solution$$

   d. If c_1 and c_2 both are zero (i.e., $c_1=0=c_2$)

Methods of Types of Solving Simultaneous Equation

1. Method of Substitution
2. Method of Elimination
3. Method of Comparison
4. Method of Cross – Multiplication

1. **Method of Substitution :** The substitution method is one of the algebraic methods to solve simultaneous linear equations. It involves substituting the value of any one of the variables from one equation to the other equation.
2. Let us assume two linear equations: 2x+3(y+5)=0 and x+4y+2=0.
3. **Step 1:** Simplify the given equation by expanding the parenthesis if needed. So, here we can simplify the first equation to get 2x + 3y + 15 = 0. Now we have two equations as,
4. 2x + 3y + 15 = 0 _____(1)

5. x + 4y + 2 = 0 _____(2)
6. **Step 2:** Solve any one of the equations for any one of the variables. You can use any variable based on the ease of calculation. Suppose we are solving 2nd equation for x. So, we get x = -4y - 2.
7. **Step 3:** Substitute the obtained value of x in the other equation. So we are substituting x = -4y-2 in the equation 2x + 3y + 15 = 0, we get, 2(-4y-2) + 3y + 15 = 0.
8. **Step 4:** Now, simplify the new equation obtained using arithmetic operations.. We get, -8y-4+3y+15=0
9. -5y + 11 = 0
10. -5y = -11
11. y = 11/5
12. **Step 5:** Now, substitute the value of y in any of the given equations. Let us substitute the value of y in equation (2).
13. x + 4y + 2 = 0
14. x + 4 × (11/5) + 2 = 0
15. x + 44/5 + 2 = 0
16. x + 54/5 = 0
17. x = -54/5
18. Therefore, after solving the given linear equations by substitution method, we get x = -54/5 and y= 11/5.

2. Method of Elimination : The elimination method is useful to solve linear equations containing two or three variables. We can solve three equations as well using this method. But it can only be applied to two equations at a time. Let us look at the steps to solve a system of equations using the elimination method

Ex. : Let, x+y=8 ___(1) and 2x-3y=4 ___(2)

Step 1: To make the coefficients of x equal, multiply equation (1) by 2 and equation (2) by 1. We get,

(x+y=8) × 2 ___(1)

(2x-3y=4) × 1 ___(2)

So, the two equations we have now are 2x+2y=16 __(1) and 2x-3y=4 __(2).

Step 2: Subtract equation 2 from 1, we get, y=12/5.

$$2x + 2y = 16$$
$$2x - 3y = 4$$
$$(-) \quad (+) \quad (-)$$
$$5y = 12$$
$$y = \frac{12}{5}$$

Step 3: Substitute the value of y in equation 1, we get, x + 12/5 = 8

x = 8 - 12/5

x = 28/5

Therefore, x = 28/5 and y=12/5.

3. Method of Comparison : Steps to solve the system of linear equations by using the comparison method **to find the value of x and y**. Therefore, we have compared the values of x obtained from equation (i) and (ii) and formed an equation in y, so this method of solving simultaneous equations is known as the comparison method

Ex. : 3x – 2y = 2---------- (i)

7x + 3y = 43 --------- (ii)

Now for solving the above simultaneous linear equations by using the method of comparison follow the instructions and the method of solution.

Step I: From equation 3x – 2y = 2---------- (i), express **x** in terms of **y**.

Likewise, from equation 7x + 3y = 43 ---------(ii), express **x** in terms of **y**.

From equation (i) 3x – 2y = 2 we get;

3x – 2y + 2y = 2 + 2y (adding both sides by 2y)

or, 3x = 2 + 2y

or, 3x/3 = (2 + 2y)/3 (dividing both sides by 3)

or, x = (2 + 2y)/3

Therefore, x = (2y + 2)/3 ---------- (iii)

From equation (ii) 7x + 3y = 43 we get;

7x + 3y – 3y = 43 – 3y (subtracting both sides by 3y)

or, 7x = 43 – 3y

or, 7x/7 = (43 – 3y)/7 (dividing both sides by 7)

or, x = (43 – 3y)/7

Therefore, x = (–3y + 43)/7 ----------(iv)

Step II: Equate the values of **x** in equation (iii) and equation (iv) forming the equation in **y**
From equation (iii) and (iv), we get;

(2y + 2)/3 = (–3y + 43)/7 ---------- (v)

Step III: Solve the linear equation (v) in **y**
(2y + 2)/3 = (–3y + 43)/7---------- (v) Simplifying we get;

or, 7(2y + 2) = 3(–3y + 43)

or, 14y + 14 = –9y + 129

or, 14y + 14 – 14 = –9y + 129 – 14

or, 14y = -9y + 115

or, 14y + 9y = –9y + 9y + 115

or, 23y = 115

or, 23y/23 = 115/23

Therefore, y = 5

Step IV: Putting the value of **y** in equation (iii) or equation (iv), find the value of **x**
Putting the value of **y** = 5 in equation (iii) we get;

x = (2 × 5 + 2)/3

or, x = (10 + 2)/3

or, x = 12/3

Therefore, x = 4

Step V: Required solution of the two equations

Therefore, x = 4 and y = 5

Method of Cross Multiplication : Cross-multiplication is a technique to determine the solution of linear equations in two variables. It proves to be the fastest method to solve a pair of linear equations. For a given pair of linear equations in two variables:

$a_1x+b_1y+c_1=0$

$a_2x+b_2y+c_2=0$

By using cross multiplication, the values x and y will be:

$$\frac{X}{B_1C_2 - B_2C_1} = \frac{Y}{A_2C_1 - A_1C_2} = \frac{1}{A_1B_2 - A_2B_1}$$

UNIT-4
RATIO

A ratio can exist only between two quantities of the same type. If x and y are any two numbers and y ≠ 0 then the fraction $\frac{x}{y}$ is called the ratio of x and y is written as x:y.

Characteristics of Ratio –

The following characteristics are attributed to ratio relationship:

i) Ratio is a cross relation found between two or more quantities of same type.

ii) It must be expressed in the same units.

iii) By the fraction laws a ratio can be expressed as below:

$$\frac{y}{x} = x:y$$

$$\frac{10}{5} = 10:5 \text{ or } 2:1$$

iv) A ratio expresses the number of times that one quantity contains another.

v) Two or more ratios may be compared by reducing their equivalent fractions to a common denominator.

Different types of Ratio –

Ratio can be divided into following ways –

1) Unit Ratio – When homogeneous items are same on the basis of unit, it is called unit ratio.
For example – Ram and Shyam are getting Rs. 5 each.

$$\frac{x}{y} = \frac{5}{5} \; or \; 5:5 \; or \; 1:1$$

2) Duplicate Ratio – When the homogeneous items are shown in unit with square, it is called duplicate ratio.
For Example, 2:3 square means $2^2:3^2$ or 4:9

3) Triplicate ratio – When homogenous item is multiplied by 3, it is known as triplicate ratio.
For example, $2^3:3^3$ = x2x2x2:3x3x3 8:27

4) Sub triplicate ratio – When ratio is expressed in cube root it is known as sub triplicate ratio.
For example, $\sqrt[3]{8}:\sqrt[2]{27} = 2:3$

5) Ratio of greater in equality – In this type of ratio the first item of given ratio is greater than other items.
For example, 8:3, 13:8.

6) Ratio of less in equality – When first item of given ratio is less than the other items of ratio, it is called ratio of less of equality.
For example, 2:7, 5:12, 1:3

7) Equality ratio – In this type of ratio first item is equal to other item of ratio.
For example, 5:5, 8:8, 12:12

Proportion

Relationship between the two ratio's is called proportion. Here, quantity ratio of first two items is equality to rest two terms.

For example, 2:5::6:15

Proportion is expressed by four parallel points (::).

In the simple proportion here its not necessary that two items of first ratio and the items of second ratio should be homogeneous. But the items of second set of ratio has the same relationship which is found between the items of first ratio. For example 2:5::6:15. Here 5 is 2.5 times of 2 in case of first ratio. In the same 15 is 2.5 times of 6 in the second set of ratio.

Characteristics of Proportion –

i) Proportion is given in four parts. So first number is known as first item, second number is second item, third number is third item and fourth number is known as fourth item.

ii) First and fourth items are known as extremes items and second and third items are known as mean items.

iii) It is not necessary in proportion that all four items should be homogenous. But the ratios of first and second and third and fourth should be the same.

Types of Proportion –

1) **Continued proportion** –
If ratio of items is going on continuously, e.g., ratio of first and two is equal to two and three and ratio of two and three is equal to three and fourth item and so on, thus, ratio is known as continued ratio.
For example, $\frac{A}{B} = \frac{B}{C} = \frac{C}{D} = \frac{D}{E} = \frac{E}{F}$....
Here A, B, C, D, E and F are in continued ratio.

2) **Direct Proportion** –
In this type of ratio, two different items has the such relation that if the one is increased or decreased, another will change accordingly in the same ratio.

Difference Between Ratio and Proportion –

S.No.	Ratio	Proportion
1	There are two terms in a ratio.	There are four terms in a proportion.
2	Comparison of two quantities of same type.	Comparison of two ratios.
3	Two quantities must be of same type.	All four quantities are not of same type but the first two are of one type and the last two may be of another type.
4	There is not a product rule	The product of extremes is equal to product of the means.

- **Brokerage –**

This is the remuneration paid to the broker. It is actually a commission paid to the broker. It is calculated on the basis of percentage of the total value of the business transacted by the broker.

Del Credere Agent –

A del-credere agent is a person who guarantees collection of dues for the principal from the customers. They got a special type of commission known as del-credere commission. Usually they deduct the commission on the dues collected and remit the remaining amount to the principal.

Travelling Agent –

This is a person who moves round the trading zone of the principal doing the selling proceeds.

Important formulae –

i) Amount of commission $= \frac{Rate\ of\ commission\ X\ Amount\ of\ sales}{100}$

ii) Rate of commission $= \frac{Rate\ of\ commission\ X\ 100}{Amount\ of\ Sales}$

iii) Amount of Sales $= \frac{Rate\ of\ commission\ X\ 100}{Rate\ of\ commission}$

iv) Amount of Del-cradere commission $= \frac{Credit\ Sales\ X\ Rate\ of\ del-credare\ commission}{100}$

DISCOUNT

The allowance or deduction from the market price of goods sold given by the vendor (Seller) to the purchaser (Buyer) is called discount. Discount is also known as allowance. The objective of allowing discount are –

- To increase the sales
- To retain the customership
- To encourage the customers to make the payment early

Kinds of Discount –

General there are two types of discounts are allowed to the customers –
Trade Discount and Cash Discount

1) **Trade Discount –** The Discount which is allowed by the seller according to the customs and traditions of the Business and which is allowed to all the customers irrespective of the payments conditions is called Trade Discount. The objective allowing Trade Discount is to increase the sales.

2) **Cash Discount –** The deduction on the marked price or invoice price or the selling price to the customer to encourage them to pay in cash or to make earlier cash payments is called cash discount.

   In general Trade discount is given on marked price and cash discount is given on the remaining amount after deducting trade discount. In this way the purchaser in cash is entitled to get both type of discount.

   Apart from these two discounts, there are some more types of discount.
   Bulk discount or Quantity discount – It is allowed to the customers on purchasing on good in big quantity or bulk quantity.

   Successive discount – When another discount is given after a discount, then the combination of these two discounts are known as successive discounts.

   Equivalent Rate of Discount – The discount for which the amount due is equal o the amount due for successive discount is called their equivalent discount. Equivalent discount rate is also called single rate of equivalent discount.

It is to be noted that the total amount of successive discount is equal to the among of equivalent discount.

For example:
If a trader allows successive discount of 20% and 5% then the single rate/equivalent rate of discount will be –
D = 20+5 – 20x5 / 100 = 24%

NINE-VALUE TABLE

It is a method of calculating discount on a certain sum of list price/marked price. In this method on the basis of rate given first of all we have to calculate the discount for Rupee 1 and accordingly for Rupees 2, 3, 4, 5, 6, 7, 8 and 9.

With the help of this table we can calculate the commission or discount on any quantity.

Questions to be prepared

1) Give the definition and characteristics of Ratio and also explain its types.
2) Describe the various type of Proportion.
3) Distinguish between Ratio and Proportion.
4) Explain the importance/significance of Percentage.
5) Explain the terms Commission, Discount & Brokerage.
6) What is successive discount?
7) Explain equivalent rate of discount with example.
8) Explain Nine-Values Table with example.

UNIT - V
AVERAGE

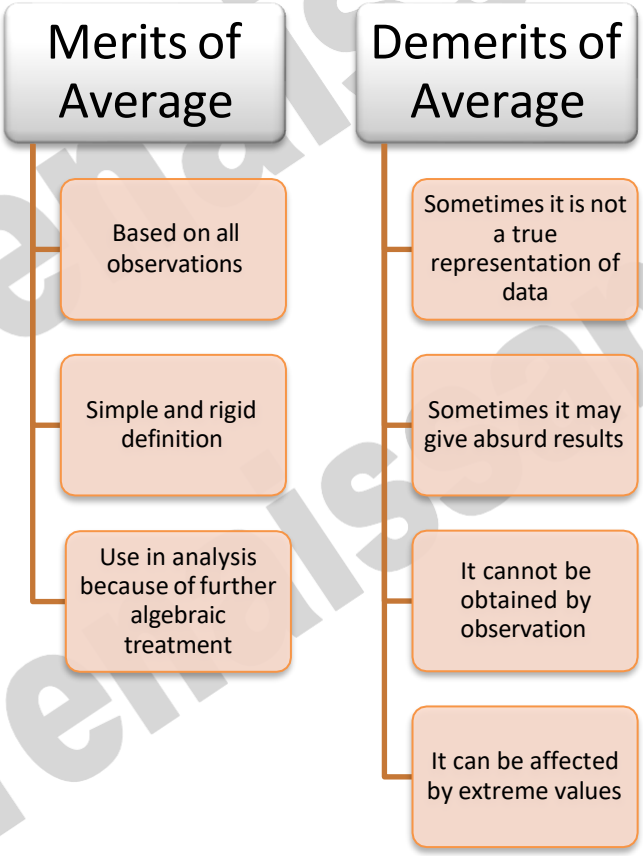
The average of the number of quantities of observations of the same kind is their sum divided by their number. The average is also called average value or mean value or arithmetic mean.

$$\text{Average} = \frac{\text{Sum of all Elements}}{\text{Total No. of Elements}}$$

Average = $\frac{x_1 + x_2 + x_3 + \ldots\ldots\ldots\ldots + x_n}{n}$, for observations x1 ,x2, x3,.....xn

Functions of Average

a) To present the salient features of data in simple and summarized form
b) To compare and draw conclusion
c) To get a simple value that describes the characteristics of the entire group
d) To help in statistical analysis



UNIT – V & VI

SIMPLE INTEREST

Interest –Whenever we borrow a certain sum of money (known as the principal), we pay back the original amount accompanied with a certain amount of interest on that amount. In a way, those are the charges of borrowing that sum of money.

Simple interest is one method of determining the amount due at the end of loan duration.

Definitions of Usual Words –

Principal (P): The original sum of money loaned/deposited.

Interest (I): The amount of money that you pay to borrow money or the amount of money that you earn on a deposit.

Time (T): The duration for which the money is borrowed/deposited.

Rate of Interest (R): The percent of interest that you pay for money borrowed, or earn for money deposited

$$Simple\ Interest\ (SI) = \frac{P \times R \times T}{100}$$

Where:
P: Principal (original amount)
R: Rate of Interest (in %)
T: Time period (yearly, half-yearly etc.)

Amount Due at the end of the time period, **A = P (original amount) + SI**

$$A = P + \left\{ \frac{P \times R \times T}{100} \right\}$$

If you have a close look, Simple Interest is nothing else but an application of the concept of percentages.

Meaning of Compound Interest –
By compound interest we mean when interest becomes due after a certain period, it is added to the principal amount and interest on succeeding years is based on the principal and the interest added. The difference between the amount and the original principal is called the compound interest.

It means that in compound interest, the principal doesn't remain fixed at the original sum but increase at the end of each interest period. Interest period is the period at which the interest becomes due. It may be a year, half year or quarter year.

Methods for Calculation of Compound Interest –

Basis of Difference	Simple Interest	Compound Interest
Principal and Interest	Calculated on original amount	Calculated with interest included
calculation of interest	Calculated on overall period in single time.	Calculated yearly, half yearly, quarterly or even monthly.
Principal Amount	Always same on whole period.	Changes from year to year, month to month etc.
Difference in amount of interest	Less than that of compound interest.	It is more than that of small interest.

The following are some of the methods used to calculate compound interest –

1) Simple interest method.
2) Interest table method.
3) Decimal point method.
4) Compound interest formula method.
5) By Logarithm method.

1) Simple Interest Method –

When the time of the interest is not so long, i.e.; when interest is calculated for only a few years then we use this method. It is just similar to that used to find out simple interest. Follow the steps below –

i) Calculate interest on principal at the end of every year.
ii) Add the interest got in step (i) above to the original principal. This amount is principal for the next year.
iii) Calculate compound interest by adding each year's interest for the entire period.
iv) Finally subtract the original from the compounded amount and this gives the compound interest.

2) Compound Interest Formula Method –

When the number of years involved to calculate the compound interest are many, we use the above method. The formula used is –

$$A = P\left(1 + \frac{R}{100}\right)^n$$

Where P denotes = Principal (original)
n = number of years (interest period)
r = rate of interest (in percentage)
A = Amount after n years.

PROFIT AND LOSS

SOME IMPORTANT DEFINITIONSRELATED WITH PROFIT AND LOSS

Cost Price (CP)

The price, which is paid to acquire a product, is called cost price. All the overhead expenses (transportation, taxes etc.) are also included in the cost price.

Selling Price (SP)

The sum of money, which is finally received for the product i.e. the price at which the product is finally disposed off is called the Selling price.

Marked Price (MP)

The price, which is listed or marked on the product, is also known as quotation price/printed price/catalogue price/invoice price.

Profit

If selling price is greater than Cost price, then excess of SP to CP is called Gain or Profit.
PROFIT = SELLING PRICE – COST PRICE

Loss

If selling price is less than Cost price, then excess of CP to SP is called Loss.
LOSS = COST PRICE – SELLING PRICE

Profit percentage formula

$$\text{Profit \%} = 100 \times \text{Profit/Cost Price.}$$

Percentage Loss

$$\text{Loss \%} = 100 \times \text{Loss/Cost Price.}$$

COMMISSION

The terms commission and discount are commonly applicable in the business world. We should clearly understand the terminologies before solving questions related with them.

Who is an Agent?
Usually businessman may not be directly doing the business transactions themselves because of expanded area of business. They may employe persons to be doing the selling or buying on their behalf. Such person are known as agents. Agents get commission against their works performance.

Commission –
Having transacted the business transactions, the agents will require remuneration from their principal such as remuneration is known as commission. Usually the commission is calculated on the basis of the percentage of total sales done by the agent.

Who is a Broker?
The buyer and seller may not come into contact face to face. Their transaction may be made possible by a middleman. He negotiates the sales and purchase proceeds between the buyer and seller such a negotiator is known as broker.

Brokerage –
This is the remuneration paid to the broker. It is actually a commission paid to the broker. It is calculated on the basis of percentage of the total value of the business transacted by the broker.

Del Credere Agent –
A del-credere agent is a person who guarantees collection of dues for the principal from the customers. They got a special type of commission known as del-credere commission. Usually they deduct the commission on the dues collected and remit the remaining amount to the principal.

Travelling Agent –
This is a person who moves round the trading zone of the principal doing the selling proceeds.

Important formulae –

i. Amount of commission = Rate of commission X Amount of sales100

ii. Rate of commission = Rate of commission X 100Amount of Sales

iii. Amount of Sales = Rate of commission X 100Rate of commission

iv. Amount of Del-cradere commission = Credit Sales X Rate of del-credare commission100