SPREADSHEET

A spreadsheet is a computer program that allows the user to store data in a grid of Rows and Columns. It is used to record, calculate and compare numerical or financial data.

There are a lot of Spreadsheet programs like LibreOffice Calc, MS Excel, Lotus 1-2-3 etc.

LibreOffice Calc is a spreadsheet application that we can use to calculate, analyse and manage data. It is ncluded in LibreOffice Package, which is a Free and Open Source Software (FOSS) under the General Public Licence (GPL).

Workbook – A file that contains one or more worksheets is called a workbook. In this we can enter, store and manipulate data.

Worksheet - A page in a workbook is called Worksheet which contains rows and columns.

Features of LibreOffice Calc

1. Easy Calculations – This software provides a lot of tools to perform complex calculations very easily.

2. What-If Calculations – The users can predict what will happen if certain conditions are changed. Eg. How the changes in interest rates will affect the instalment amount of a loan.

3. Serves as a database – A spredsheet can be used as a databae as we can store a huge volume of data in it.

4. Arranging Data – The data stored in a spreadsheet can be organized or reorganized based on the requirement of the users. Eg: formatting, sorting, filtering etc.

5. Dynamic Charts – With the help of inbuilt charts and graphs, the users can present their data in different manner. Eg: Bar chart, Pie chart etc.

Components of LibreOffice Calc

1. Rows & Columns – A row is the range of cells that go horizontally in a worksheet. Rows are identified by numbers like 1, 2,3.A column is the range of cells that go vertically in a worksheet. Columns are identified by letters like A, B, C.

2. Cell - The intersection of rows and columns is called Cell. The cell which is clicked is known as **active cell**. **Cell Address –** It is the unique identification of each cell. It is a combination of column name and row number. Eg: A1, B5 etc.

3. Range - Range is a group of selected cells. Ranges are identified by the cell references of the cells in the upper left and lower right corners of the range. For example, the range D1:E10 includes a block of 20 cells starting from D1 and ending to E10.

Naming a Range – In spreadsheet, we can assign suitable names for the ranges and these names can be used instead of complicated range references in the formulas and functions.

Eg: Scores obtained by a commerce student in his subjects are given in the range C2:C7. To get the total scores in the cell C8, we have to give a formula in C8 as '= SUM(C2:C7)'. But it is difficult to remember this range reference. Hence we named the range as 'Marks'. Then we can use the formula in C8 as '=SUM(Marks)'.

	A	B	C	D	E	F	G	H	I	J
1		Subject	Scores Obtained							
2		English	76							
3		Malayalam	78							
4		Business Studies	65							
5		Computerised Accounting	72							
6		Economics	69							
7		Computer Application	64							
8		**Total Marks**	=SUM(Marks)							
9										

Range C2:C7 is named as 'Marks'

This formula will give the total of scores in the range C2:C7

Steps for Naming a Range

   a. Select the range of cells, that we want to assign name
   b. Click on 'Data' tab
   c. Select the 'Define Range' option
   d. Give name for the range
   e. Click on OK button
            Select the cells – Data – Define Range – Enter the Name - OK

Spreadsheet Operations

1. Open Workbook – To open a new workbook, Applications – Office – LibreOffice Calc.

2.Save a Workbook – To save a workbook, select the option **Save** or **Save as** from the **File Menu** or by using **Ctrl + S.**

3. Close the Workbook – To close the workbook select the option **Close** from the File Menu.

4. Quit LibreOffice Calc – Select the option Exit LibreOffice from File Menu or Ctrl Q.

5. Add Worksheet - To **add** a new worksheet, click on the 'Insert Worksheet button' available near to the sheet tab. A new blank worksheet will be created. Alternatively, you can right click on any sheet tab and select "Insert" from the menu.

6. Delete Worksheet - To **delete** an existing sheet, right click on the sheet tab of the desired sheet and select 'Delete' from the menu.

7. Rename Worksheet - By default Calc sheets are named as 'Sheet1', 'Sheet2, etc. To change the name of a worksheet right click on a sheet tab, select **"rename"** and type in a new name followed by the Enter key.

Spreadsheet Navigation – Moving within the worksheet is known as spreadsheet navigation. Following navigation methods are available:

1. Using Mouse – Place the mouse on a cell and click on it.

2. Using a cell reference – We can go to any cell by entering the Cell Address in the name box on the top left corner of the worksheet.

3. Using the navigator – Drag the vertical or horizontal navigator button on the right hand side or on the bottom of the worksheet. Also use the function key F5 and enter the column number and row number.

Key Board Short Cuts to navigate around the sheet.

Action	Key Stroke
One cell down	Down arrow key or Enter Key
One cell up	Up arrow key
One cell left	Left arrow key or Shift + Tab
One cell right	Right arrow key or Tab
Go to cell A1	Ctrl + Home
Go to right bottom cell of a range	Ctrl + End
Go to beginning cell of a row (Column A)	Home Key
Go to one screen up	Page Up
Go to one screen down	Page down
Go to the last column of the sheet	Ctrl + Right arrow
Go to the last row of the sheet	Ctrl + Down arrow

Types of Worksheet Data

1. Values – It is a number that we enter in a cell. Therefore, it is a numerical data, it also includes currency symbol, minus sign, plus sign, decimal point and comma. Eg. Salary of employees. They are normally right aligned.

2. Labels – In spreadsheet programs, <u>a label is any descriptive text placed in a cell</u>. It consists of Alphabets and Special Characters. Labels can't be used for mathematical operations. For example in an employee database the First Name, Middle Name, Last Name, Address etc. can be labels, because these are not used for any mathematical operations. They are normally left aligned.

3. Formula – Formulas are <u>self-defined instructions entered in cell for performing calculations</u>. Formula should begin with an '=' sign. After entering the formula in a cell, we can see only the result of the formula in the cell. To see the formula again, we have to double click on the cell or just click on the cell and see the formula bar on the top of the window.

Components of a Formula – A formula may have three components, such as Cell Reference, Mathematical Operators and Functions.

1. Cell Reference – A cell reference identifies the location of a cell or group of cells, which is also called cell address. Eg: A1, C10 etc.

a. Relative Cell Reference - Normally, when a formula or function from one cell is copied to another, <u>the references given in the formula or function automatically changes to suit the new location</u>. For example in the cell C1, we have given a formula as '=A1+B1' to add values in A1 and B1. If we copy the formula to C2, the formula is converted as '=A2+B2 '. This type of reference is called Relative Reference.

b. Absolute Cell Reference - Unlike relative references, <u>absolute references do not change when copied to another location</u>. Eg. The formula =$A$1+$B$1 will not change its references if we copy the formula to any part of the worksheet.

c. Mixed Cell Reference - If we assign the constant reference either for column or for row, it is called Mixed Reference. E.g. The cell reference $A1, makes the column A constant, but the row 1 changes according to the new location. In the same way the reference A$1, makes the row constant, but the column reference relative.

2. Mathematical Operators – It may consists of Arithmetic Operators, Comparison Operators and Reference Operators.

Arithmetic Operators	Operator Symbol	Comparison Operators	Operator Symbol	Reference Operators	Operator Symbol
Addition	**+**	Equal to	**=**	Range operator	**:**
Subtraction	**–**	Greater than	**>**	Union operator	**,**
Multiplication	*****	Less than	**<**		
Division	**/**	Greater than or equal to	**>=**		
Percent	**%**	Less than or equal to	**<=**		
Exponential*	**^**	Not equal to	**<>**		

*Exponential is used to give power to a numerical data. Eg. 5^2, 10^3 etc.

3. Functions – A function is a <u>pre-set formula which can be written directly into a cell, to display an outcome</u>. Some examples are given below:

=Sum(A1:A5)   gives the total of the figures in the range

=Average(A1:A5)   gives the average value of the figures in the range

=Max(A1:A5)   gives the Maximum value from the figures in the range

=Min(A1:A5)   gives the Minimum (lowest) value in the range

Autosum ($\sum$)   gives the total (sum) of various numbers in the range

Components of a function in spreadsheet

Initial Operator	Function Name	Arguments
=	Sum	(A1:A5)

Basic and Derived Values

If we directly enter a value or piece of data in a cell, it is called Basic Value. If the data in a cell is generated by an arithmetical expression or as the result of a function or formula, it is called derived value.

Eg. We entered Basic Salary in A1, DA in A2, HRA in A3 and the formula =A1+A2+A3 in the cell A4 to get Gross Salary. Here Cells A1, A2 and A3 has Basic Values, whereas, A4 has Derived Value.

Classification of Functions in Spreadsheet

1. Date and Time Functions
2. Statistical Functions
3. Logical Functions
4. Mathematical Functions
5. Text Manipulation Functions
6. Spreadsheet Functions
7. Financial Functions

Date and Time Functions

Spreadsheet takes 30/12/1899 as a base for calculating the dates. It assigns a serial number for each date taking 30/12/1899 as0, 31/12/1899 as 1, 01/01/1900 as 2 etc.

1. Today - This function gives the current date in the cell.   **Syntax: Today( )**

2. Now – It shows the current time along with date   **Syntax: Now( )**

3. DATEVALUE(date_text) - This function converts the date into the corresponding value. In LibreOffice Calc 30/12/1899 has been set as the default date with the date value as zero (0). Thus January 1, 2000 has the value as 36526. Its syntax is **=Datevalue("date").** Eg: To find the date value of 15-05-2015, give the formula as =Datevalue("15/05/2015"). The result will be 42139.

4. DATE – This function returns a date when the Year, Month and Day parameters are given.

  Syntax: Date(Year,Month,Day) Example: =date(2022,10,03) returns the date as 03/10/2022

5. Day(Serial_number) – This returns the day of a date ranging from 1 to 31

Syntax: Day(Serial no.)

Eg: 1. If we enter **=Day(42139)** in a cell, the result will be 15 as it is the 15th day of that month.

2. If A1 = "23/07/2015", the **Day(A1**) will result in 23.

6. Month(Serial_number) – This function returns the serial number of the month. It ranges from 1 to 12. For example in the above case Month(A1) returns 7, i.e. the 7th month.

Syntax: Month(A1)

7. Year(Serial_number) – This function returns the serial number of the year. It ranges from 1900 to 9999. For example in the above case Year(A1) results in 2015. Ie; the 2015th year.

Syntax : Year(A1)

Statistical Functions

1. COUNT( ) – This function will count cells that contain numbers or count the numbers given in the arguments separated by commas.

Syntax: =Count (Value1, Value2, Value3…..)

Eg: 1. =Count(25,38,450,365,12) Results 5

      2. =Count(A1:A10) gives the count of cells in the range A1 to A10, that contain numbers

2. COUNTA( ) – This function counts the number of cells that contain any type of data such as numbers, formula (with or without result), text etc. It doesn't count empty cells.

      Syntax: =Counta(Range of cells)   Eg: =Counta(A1:E10)

3. COUNTBLANK( ) – This function counts the number of cells which are empty in a range. It is an opposite function of COUNTA. A cell that contains formula is not treated as empty, even if its result is empty.

Syntax: =Countblank(Range of cells)   Eg: =Countblank(A1:E10)

4. COUNTIF( ) – This function is used to count the number of cells that meet a criteria. The criteria can be a number, expression, cell reference, or text string. For example, you can use a number like 32, a comparison like ">32", a cell like B44, or a word like "apples".

Syntax: =Countif(Range,Criteria) Eg: =Countif(A1:A10,">=90")

Apply all the above Count functions based on the given table.

	A	B	C	D
1	105	APPLE		LAPTOP
2	FLOWER	70	MANGO	500
3	APPLE		45	
4		850	RED	APPLE

Logical Functions

A logical function can return only one of two values: TRUE or FALSE

1. If - IF returns one value if the condition is true, and another value if the condition is false.

Syntax: =IF(logical_test, value_if true, value_if_false)

Logical test = The condition that is determined to be true or false

Value if true = If the condition is true, this value will be returned

Value if false = If the condition is false, this value will be returned

The operators in the logical_test of the IF function may be:

=	Equals to	<>	Not Equals to	>	Greater than
>=	Greater than or Equals to	<	Less than	<=	Less than or Equals to

Examples:

1) =If(B1="Male","He","She") Results - "He"
2) =If(B2>=18,"Adult","Child") Results - "Child"
3) =if(B3<20000,B3*10%,B3*20%) Results – 5000
4) =if(B4>=18,"Passed","Failed")
     Results – "Passed"
5) =if(B5>300000,"Rich","Poor")
     Results – "Rich"
6) =if(B3<50000,100,50) Results – 100
7) =if(B4<>30,1,2) Results -1

	A	B
1	Gender	Male
2	Age	16
3	Basic Salary	25000
4	Mark of Computerised Accounting	32
5	Annual Income	360000
6		

2. Nested IF

The IF function can be nested, when we have multiple conditions to meet. The FALSE value is being replaced by another If function to make a further test.

Syntax: =IF(Condition_1,Value_if_True_1,(Condition_2,Value_if_True_2,Value_if_False_2))

Eg: 1. =if(A1=1,"Average",if(A1=2,"Good","Very Good")

At first the formula checks the first condition i.e. whether the cell contains the value 1 or not. If it contains '1' the condition becomes true, it gives the result 'Average" and stops the formula.

But if the cell A1 does not contain the value '1' the condition results FALSE. Then instead of giving a value for the FALSE, it starts checking another condition i.e. whether it contains the value 2.

If the second condition satisfies it gives the result "Good". Otherwise it gives the result "Very Good". In this way we can nest up to 64 ifs in spreadsheet.

Remember to close all if statement by putting as many closing brackets at the end of the statement based on the number of IF Statements.

Eg: 2. Grade Calculation   =IF(A1>89,"A+",IF(A1>79,"A",IF(A1>69,"B+","D")))

3. AND

It checks more than one condition at the same time and returns TRUE if all the conditions are satisfied. Otherwise it returns FALSE.

Syntax: =AND(Condition 1, Condition 2……Condition 255)

Eg:

=AND(B1>200000, B2>35000) Returns FALSE
(Because 2nd condition not satisfied)

	A	B
1	Sales	325000
2	Gross Profit	30000
3	Net Profit	24000

=AND(B2<10000, B3>25000) Returns FALSE
(Because both conditions are not satisfied)

=AND(A1="Sales", B3<60000) Returns TRUE (Because both conditions are satisfied)

=AND(A2="Gross Profit", B2=32000, B3<25000) Returns FALSE (Because one condition is not satisfied)

AND Function will be more useful when it is combined with IF Function. Consider the following examples based on the above table.

=if(AND(B1>250000,B2<50,000,B3=24000),"Yes","No")

This function checks three conditions and returns the result. They are:

(1) Is the value in B1 is greater than 250000

(2) Is the value in B2 is less than 50000

(3) Is the value in B3 is equal to 24000

4. OR – If any of the argument is true, it return the result **True** and if all the arguments are wrong, it returns the result as **False**.

Syntax: Or(logical test 1, logical test 2, ….. logical test 255)

Eg: =Or(B1>200000,B2=30000) The result will be True as the first condition is correct.

Mathematical Functions

1. SUM( ) – This function adds together a supplied set of numbers or numbers in a given range and returns the sum of these values.

Syntax: 1. =Sum(10,20,40)   2. =Sum(A1,A2,A3)   3. =Sum(A1:A3)

2. SUMIF( ) – This function adds all numbers in a range of cells, only if it meets the given criteria.

Syntax: =Sumif(Range,Criteria,Sum_range)

Range   = The range of cells in which the criteria is to be applied.

Criteria   = The condition by which the cells to be added.

Sum-range   = The actual cells to be added in the range.

E.g. 1.   =SUMIF(A1:A10,">50")

E.g.2. **=SUMIF(B2:B7,"Salesman",C2:C7)**
This function will add the data in C2 to C7, only if the corresponding data in B2 to B7 is "Salesman".

	A	B	C
1	Name of Employee	Designation	Salary
2	Ajith	Manager	65000
3	Biji	Salesman	35000
4	Chandran	Manager	40000
5	Darvin	Salesman	18000
6	Eldo	Salesman	35000
7	Farhan	Manager	32000
8			
9	**Total Salary of Salesmen**		**88000**

3. ROUND( ) – This function rounds a number to a specified number of digits following normal rounding rules, i.e.; round down if the decimal portion is < 5, and round up if the decimal portion is ≥ 5.

Syntax : **=Round(Number, count)**

Number   = The number that we want to round.

Count   = The number of digits to which we want to round the number.

Eg: =Round(210.5633,2) The result will be 210.56

Num_digits	-3	-2	-1	0	1	2	3
Rounds to	Nearest 1000	Nearest 100	Nearest 10	Nearest 1	1 Decimal	2 Decimal	3 Decimal
Examples	2795.285	1885.81	412.654	528.654	32.654	185.9214	5.1478
Result	3000	1900	410	529	32.7	185.92	5.148

4. ROUNDUP( ) – This function always round a number to upward, without considering the value next to the rounding digit.

Syntax: =Roundup**(**number, count**)**

Eg: 1.   =Roundup(85.462,2) results in 85.47
        2.   =Roundup(85.462,0) results in 86
        3.   =Roundup(1430,-3) results in 2000

5. ROUNDDOWN( ) – This function always round a number to downward, without considering the value next to the rounding digit.

Syntax: =Rounddown(number,count)

Eg: 1.   =Rounddown(85.462,2) results in 85.46
        2.   =Rounddown(85.462,0) results in 85
        3.   =Rounddown(1430,-3) results in 1000

Text Functions

1. Text( ) – This function converts a numeric value into text. It will be helpful to convert the numbers into more readable format or to combine numbers with text or symbols.

> **Syntax: =Text (value, format_text)**

Eg_1: =Text(A1,"00-00-0000") If A1 cell contains the value of 1122007, the result will be 01/12/2007

Eg_2: =Text(A2,"0.00"), If the cell A2 contains the value of 25, the result will be 25.00

2. CONCATENATE( ) – This function allows to join 2 or more strings together. The item can be a text value, number, or cell reference

> **Syntax: =Concatenate (text1, [text2], ...)**

Eg: = Concatenate("Good","Morning") give the result "GoodMorning"

Here there is no space between "Good" and "Morning". So in order to put a space we should use a space in quotes between these two texts.

So the formula = Concatenate("Good", " ", "Morning") gives the result "Good Morning"

Have a look on the following table and view the results of the formulas:

	A	B	C	Formula	Result
1	Today	Is	Holiday	=Concatenate(A1," ", B1," ",C1)	Today is Holiday
2	500	250		=Concatenate(A2,B2)	500250
3	Mohan	Kumar	Mishra	=Concatenate(A3," ",B3," ",C3)	Mohan Kumar Mishra
				=Concatenate("My Total Mark is ",B2)	My Total Mark is 250

We can do the same function by using ampersand sign (&) instead of Concatenate function.

Ie;   '=A1&" "&B1&" "&C1 ' gives the result as "Today is Holiday"

Spreadsheet Functions

Lookup function is used for searching certain values from a data table. Three important lookup and reference functions are available viz. LOOKUP, VLOOKUP, and HLOOKUP

1. LOOKUP (Vector Form) – This function is used to search one column of data and find another data in the corresponding row.

Syntax:=LOOKUP(search criterion, lookup vector, result vector)

(Vector means a single row or column range contains values)

Eg: =Lookup(102,A2:A6,B2:B6)

	A	B
1	**Employee No.**	**Name of Employee**
2	101	Sunithabai
3	102	Ajith
4	103	Vishwesh
5	104	Syal
6	105	Beena

It returns the result as "Ajith"

Note: 1. The values in the lookup vector must be placed in <u>ascending order.</u>

*2. It can also be used as an alternative for **nested if** function.*

Eg: =Lookup(C1,A2:A5,B2:B5)   Result: B+

Steps:

	A	B	C
1	**Score**	**Grade**	78
2	0	D	B+
3	70	B+	
4	80	A	
5	90	A+	
6			

1. Enter the score obtained by a student in C1
2. Type the above function in C2
3. Press down Enter Key
4. The result (Grade) will be displayed

2. LOOKUP(Array Form) – This function is used to search a data in the first column of array and brings out the value in the last column of corresponding data in that range.

(Array means the range of cells contains values in more than one column or row)

	A	B	C
1	**Employee No.**	**Name of Employee**	**Place**
2	101	Vivek	Kalpetta
3	102	Prasad	Bathery
4	103	Jasheena	Kannur
5	104	Kavitha	Kozhikode
6	105	Shajee	Mattanur

Eg: Lookup(103,A2:C6)
It returns the result as Kannur.

Note: Lookup (array form) can also be used for the above example – Grade Calculation)
Syntax: Lookup(C1,A2:C6)

3. VLOOKUP

The VLOOKUP function performs a <u>vertical</u> lookup by searching for a value in the left-most column of the table and returns the value in the same row in the index_number position.

Syntax:=VLOOKUP (search criterion, array, index, sort order)

Search criterion = Value to search in the first column

Array = The range (two or more columns)

Index = Column index number, from which the matching value is to be returned

Sort order = either 0 or 1, 0 stands for exact value and 1 stands for approximate value. It is optional.

Let us have a look on the table

Adm No.	Name	Community	DOB	Guardian
2560	DEEPTHI VENUGOPAL	OBC	03/09/1997	VENUGOPAL VP
2579	JILSHA DAS P P	OBC	13/01/1997	DEVADAS P P
2580	HARITHA A P	SC	26/04/1998	HARIDASAN A P
2634	ANJU E	OBC	25/12/1997	SUBRAMANIAN E
2656	JASNI JAYAPRAKASH A	OBC	17/04/1998	JAYAPRAKASH A
2680	AASHIK NASRIN	OBC	07/10/1996	HAMSA T
2711	AKHILA A K	SC	13/02/1998	MOHANAN A K
2775	FARISHA M K	OBC	03/08/1997	ABOOBACKER M K
2780	ATHULIA R	OBC	16/06/1997	SUKUMARAN R

=Vlookup(2775,A2:E10,2,0) will give the result – "FARISHA.M.K"

Here this formula will search for the value '2775' in the first column of the table, which Is arranged in the range A2:E10. Then it retrieves corresponding value of that row in the 2nd column ie. the Name of Pupil.

In the same manner, the formula =Vlookup(2775,A2:E10,3,0) retrieves the result – 'OBC' ie. the value in 3rd Column.

(0 indicates the sort order of the data and brings out the exact match, if we do not enter 0 or enter 1 instead of 0, it gives the nearest match, in such a case the result may be wrong if the data is not in ascending order)

4. Hlookup – This function performs a horizontal lookup by searching for a value in the top row of the table and returns the value in the same column based on the index_number

<p align="center">Syntax: =HLOOKUP(search criteria, array, index, sorted)</p>

Example:

1. =Hlookup(101,B1:D4,4,0)
     Result: 120
2. = Hlookup(102,B1:D4,2,0)
     Result: Rice

	A	B	C	D
1	Product ID	100	101	102
2	Product Name	Sugar	Coffee	Rice
3	Stock in Kg.	500	50	850
4	Price Rs.	45	120	40

5. ROWS – This function counts the number of rows in an array or range.
       Syntax: =Rows(A1:F10)

6.COLUMNS – This function counts the number of columns in an array or range.
       Syntax: **=**Columns(A1:F10)

Financial Functions

1. ACCRINT – This function is useful in calculating the accrued interest for a loan / security (debenture) that pays periodic interest. Accrued interest means the interest due but not received / paid.

Ms. Anusha is holding 10% Debentues of a Company worth Rs.240,000 issued on 01/01/2020. The interest due every half year and first interest due on 30/06/2020. Anusha sold these debentures to Mr. Faris on 01/03/2020. Calculate the amount of interest accrued using ACCRINT function.

	A	B
1	Issue date	01/01/2020
2	First Interest date	30/06/2020
3	Settlement date	01/03/2020
4	Rate	10%
5	Par value	240000
6	Frequency	2
7	Basis	0
8	**Accrued Interest**	**4000**

Here Mr. Faris has to pay Rs. 244,000 to Anusha (240000+4000) including accrued interest on these debentures for 2 months.

<p align="center">Syntax: =ACCRINT(issue,first interest, settlement, rate, par, frequency, basis)</p>

Issue   **:** The date on which the security is issued
First interest : The date when the initial interest is paid
Settlement   : The settlement date of security
Rate   : The annual interest rate
Par   : The face value or issue price of the security
Frequency   : The number of coupon (interest) payments (1 = annual, 2 = half yearly, 4 = quarterly)
Basis   : Day counting method (it is optional). By default it is 0
                0 = US 30/360 (default)   1 = Actual days in month / Actual days in the year
                2 = Actual / 360   3 = Actual / 365   4 = 30/360 European

(IFS-RPFB)

2. RATE – This function is used to calculate the rate of return on investment or the rate of interest on a loan taken from a bank.

Syntax: =Rate(NPer,Pmt,PV,FV,Type)

NPer   : Total number of payments (**N**umber of **Per**iods)
Pmt   : Fixed amount paid during each period (minus figure)
PV   : Present Value of Loan or Investment
FV   : Future Value of the loan or investment at the end (if omitted it will be taken as 0)
Type   : (Optional) is the due date of periodic payment (0 = end of period, 1 = beginning)
Guess   : Not required

Example: Sindhu Traders took a loan of Rs. 200,000 from a bank for a period of 5 years and agreed to repay Rs. 4,000 at the end of each month.

a) Calculate the rate of interest using RATE function. Also calculate the annual rate of interest.

b) Calculate the rate of interest if the repayment is made at the beginning of each month.

Solution:

Rate Function **=Rate(NPer,Pmt,PV,FV,Type)**

a) =RATE(60,-4000,200000,0) :. The rate of interest = 0.62%

Annual rate of interest = 0.62 * 12 = 7.42%

b) Repayment is made at the beginning of each month

=RATE(60,-4000,200000,0,1) :. The rate of interest = 0.64%

Annual rate of interest = 0.64% * 12 = 7.69%

3. CUMIPMT – This function is used to find out how much interest is to be paid on a loan / investment over multiple payments. It returns the cumulative interest paid on a loan between two dates.

Syntax: **=CUMIPMT(Rate, NPER, pv,S,E,Type)**

Rate   : Interest Rate

NPER   : Number of Periods (Eg: 4 years = 48 months)

PV   : Present value of the loan / investment

S   : Start Period (Eg: 1, if interest is to be calculated from the 1st month)

E   : End Period (Eg: 8, if interest is to be calculated for 8 months)

(If the interest for 4th year is to be calculated, S = 37 and E = 48)

Type   : 0 or 1 (0 = the payment is made at the end of the period and 1 = payment at the beginning of the period)

Divide the interest rate by 12 to get a monthly rate. Multiply the years by 12 to get the number of period in months.

Example:

A loan Rs. 5,00,000 was taken on 01-01-2013. The annual interest rate is 10%. The loan is repayable in monthly installments over 4 years.

To calculate the interest payable in first 8 months, the following formula is used in cell B8

=CUMIPMT(B1/12,B2*12,B3,B4,B5,B6)

	A	B
1	Rate	10%
2	NPER	4
3	PV (Loan amount)	500000
4	Start Period (1st month)	1
5	End Period (8th month)	8
6	Type	0
7		

Here the rate is divided by 12 to get monthly rate and the NPER multiplied by 12 to get the number of payments. The Cumulative interest is -31313.18

4. PV( ) - This function calculates the Present Value of an investment, based on a series of future payments. It can also be used to calculate the amount of money needed to be invested at a fixed rate today, to receive a specific amount in future.

Syntax: = PV(Rate, NPER, Pmt, FV, Type)

Rate - The interest rate (discount rate), per period

NPER - The number of periods for the lifetime of the annuity or investment

Pmt - The amount paid in each period – it is optional, if PMT is omitted, FV must be included

FV   - It is the Future Value to attain after the last payment. If FV is omitted it assumes 0 (zero).   If FV is omitted, PMT must be included.

Type - An optional argument 0 or 1, that defines whether the payment is made at the start or the end of the period.(0 = End, 1 = Start)

Eg: Calculate the Present value of an investment of Rs.2,000 p.a for a period of 4 years. The interest is 10% per year and each payment is made at the start of the year.

Here Present Value is calculated as =PV(B1,B2,B3,B4,B5)

(It means if we invest Rs.2000 per year for the coming 4 years, and the interest rate is 10%, the future value will be Rs.8000 + interest (Rs.10210.20 see FV calculated below), but its purchasing power after 4 years will be equal to Rs.6974 of the current year)

	A	B
1	Rate	10%
2	NPER	4
3	PMT	-2000
4	FV	0
5	Type	1
6		
7	**Present Value**	**6974**

5. PMT( ) – This function calculates the constant periodic payment required to pay off a loan or investment, with a constant interest rate, over a specified period.

Syntax: =PMT(rate, nper, pv, fv, type)

Here, fv and type are optional

Eg: Calculate the monthly payments of a Bank loan of Rs 10,000 for interest rate @ 5% and the number of monthly Installments is 48 with the help of PMT function.

	A	B
1	Rate	5%
2	NPER (no. of payments)	48
3	PV (Loan amount)	10000
4		
5	**Monthly Payment**	**-230.29**

Here PMT is calculated by the formula, =PMT(B1/12,B2,B3)

6. **FV( ) –** This function calculates the future value of an investment

Syntax:=FV(Rate, NPER, PMT, PV, Type)

Eg: Calculate the future value of an investment of Rs.2,000 p.a for a period of 4 years. The interest is 10% per year and each payment is made at the start of the year.

Here FV is calculated as =FV(B1,B2,B3,B4,B5)

	A	B
1	Rate	10%
2	NPER (no. of payments)	4
3	PMT	-2000
4	Present Value	0
5	Type	1
6		
7	**Future Value**	**10210.20**

7. **NPV( ) –** This function calculates the net present value of an investment by using a discount rate and a series of future payments (negative values) and income (positive values).

Syntax: =NPV(rate,value1,[value2],...)

For example , if interest rate is 10%, the value of Rs.1000 received after one year is only Rs.909 i.e. 1000/110*100=909.09. That means if we invest Rs.909 today, we will get Rs.909+10% interest (Rs.999.9) after one year. Thus the value of Rs.1000 receivable after one year can be calculated by the following formula:

=NPV(10%,1000)   Result: 909.09

Eg: A company invested Rs.50,000 in a project at the end of this year. It brings inflow of Rs.20000, 32000 and 28000 respectively at the end of next three years. Calculate the NPV if interest rate is 10%.

Here Net Present Value (NPV) is calculated as =NPV(B1,B2,B3,B4,B5)

	A	B
1	Rate of Interest	10%
2	Initial Investment	-50000
3	Return after one year	20000
4	Return after two years	32000
5	Return after three years	28000
6	**Net Present Value (NPV)**	**14241**

Note: In the above case the company invested Rs.50,000 and they expect a return of Rs.80,000 (20,000+32,000+28,000) after three years. At a glance we can say there will be a profit of Rs.30,000 (80,000-50,000), but its present value is only Rs.14241.

Data Entry, Text Management and Cell Formatting

Data entry in a worksheet can be done in three ways:
1. Direct data entry using key board
2. Data fill option
3. Import data from other sources.

Direct data entry – By using key board we can enter the labels, values and formulae, using alphabets, numbers and special characters. By default the values are right aligned and labels are left aligned.

Data Fill Options

a) Auto Fill - In order to copy data in one cell to the adjacent cells (column or row) Fill Handle feature available in spreadsheet. Fill handle is a small black rectangle seen in the right bottom of the cell or range when it is selected.

Instead of entering data manually on a worksheet, just click and drag the Fill Handle in desired direction to copy data to adjacent cells. If we are copying numbers it will automatically fill the series. If the same number is to be filled in a range, press down **Ctrl+Fill Handle**.

	A	B	C	D	E	F	G
1	10	100	Monday	01-01-18	Jan	Subject – 1	Quarter 1
2	11	100	Tuesday	02-01-18	Feb	Subject – 2	Quarter 2
3	12	100	Wednesday	03-01-18	March	Subject – 3	Quarter 3
4	13						
5	14	Ctrl + Fill Handle					

In addition to this we can copy data in a series as we desire, by entering data in two or more cells and dragging this to adjacent cells. For example enter '10' in A1 and enter '20' in A2. Then select the range A1:A2 and drag it down by clicking on the fill handle. Here we can see that the data are filled down with a difference of 10. See the following sheet for similar examples.

	A	B	C	D	E	F
1	10	2	05/05/2018	01/01/2018	500	200
2	20	5	10/05/2018	05/01/2018	600	150
3	30	8	15/05/2018	09/01/2018	700	100
4	40	11	20/05/2018	13/01/2018	800	50
5	50					0
6	60					-50

Here data are entered in first two rows and copied to the remaining rows using fill handle.

b) Defined Series - Data can be filled into adjacent cells by using Fill Button available in the Edit tab from the menu bar.   Here options are available to fill data Up, Down, Left, Right, series etc.

Steps: Select the range to fill the data – Sheet – Fill Cells - Down / Right / Up / Left / Series etc. (This sequence may be different in different versions of LibreOffice Package)

Import / Copy data from other sources

If we have data in an alternative source, we can import it into Spreadsheet, instead of re-entering all the information again.

Steps:

1. Create a text data file: Applications – Accessories – Text Editor

2. Enter the data in CSV format (Comma Separated Values) Eg: 10, 20, 30, 40

3. Save Text Editor file: File – Save

4. Open a new LibreOffice Calc: Applications – Office – LibreOffice Calc

5. Import data: Sheet – Sheet from File – Select the Text Editor File – Open – Separator option "Comma" must be checked – OK – Check the option Before (or After) Current Sheet - OK

6. Save the Calc File: File – Save

Data Validation – Data validation is a feature to define restrictions on what data can be entered in a cell. It is used to prevent users from entering invalid data, to restrict them to select the data from a drop-down list or to warn them while entering such data with an input message or error alert. Data validation window has three tabs viz. Criteria, Input help and Error Alert.

To set the text length (Eg: 10 digits for bank account or phone number) – Select the Cells – Data – Validity – Criteria – Text Length – Data (Equal) – Value (10) – Then enter the data.

Suppose we want to enter the age of students who got admission in Plus One course. The age must be in between 15 to 20.

Steps:
1. Enter the label, **Age** in the cell B1.
2. Select the cell B2 in which we want to enter the age.
3. Click Data from **Menu** Bar – Validity.
4. Criteria – Click the Criteria Tab and select the following:

   Allow   : Whole numbers
   Data   : valid range
   Minimum   : 15
   Maximum   : 20
5. Input Help – Check (✓) Show input help when cell is selected – Enter the help message in Title and Input help as shown in the figure.

6. Error Alert – Check (✓) the Show error message when invalid values are entered – Select Action (Stop, Warning etc.) Enter the Title and error message as shown in the figure.

7. Click on OK button.

To create a drop-down list:

   Select the Cells – Data – Validity – Criteria – **List** – Enter the Data – OK

Data Form - The data form is used to add, edit and delete records instead of doing the same directly in the cells in a worksheet. It is more useful when there are a large number of rows and columns to be filled in which repeated scrolling to the right and left or up and down is needed.

Steps:
1. Enter the labels (Column Headings) in appropriate cells in the first row.
2. Select the above cells.
3. Data – Form.
4. Enter the data in appropriate fields using Tab Key.
5. Press down Enter Key after all the fields is filled.
6. To Edit a record: Select the entire data – Data – Form – Previous Record / Next Record – Make necessary changes – Press down Enter Key.
7. To Delete a record: Follow step no. 6 – Find the data by using Previous Record / Next Record – Click Delete Button.

Data Formatting – Formatting of data makes it easier to read and identify important information.

Formatting Tools – Number, Percent, Currency, Date, Time, Text etc.

Number Formatting: It helps to add thousand separator, decimal places etc.

Step: Select the data in cells – Format – Cells – Numbers – Select appropriate category.

Text Formatting – It is needed for presentation of final output in a different style. The different tools available on the ribbon are Font Type, Font Size, Bold, Italics, Underline, Font Color, Background Color etc.
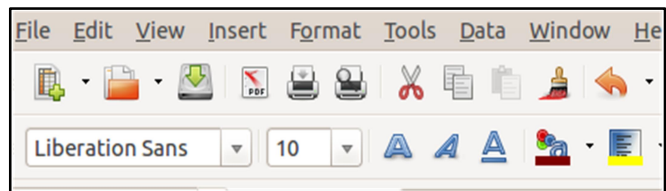
Cell Formatting – Changing Cell Colours

Steps: Select the range of cells – Format – Cells – Background – Select a Colour - OK

Conditional Formatting – Formatting the cells based on certain conditions is called conditional formatting.

Steps:
1. Enter the data and select the cells.
2. Format – Conditional Formatting – Condition.
3. Enter the condition in dialogue box. Eg. Cell value is greater than or equal to **100** or **"ACC"** (if it is alphabets use double quotes).
4. Apply – New Style – Background – Select a color.
5. Click OK button.

Other options in Conditional Formatting: Condition, Color Scale, Data Bar, Icon Set etc.

Table Formatting – A number of predefined table styles are available in spreadsheet that we can use to quickly format a table.

Steps: Select a range which contains data – Format – Auto Format – Select a suitable format.

Output Reports – Report is a document that conveys specific information to others. So it should be attractive, legible and systematically presented. We can customize the output reports by editing Page Style.

Steps: Format – Page

Available options in Page Format:

1. Page Format (Page Size): A4, A3, B3, Letter, Legal etc.

2. Paper Orientation: Portrait and Landscape.

3. Margins: Left, Right, Top and Bottom Margins can be set.

Print Out – We can print the entire or partial worksheets and workbooks one at a time or several at once. The various possibilities are:

1. Print a partial or entire worksheet or workbook.

2. Print several worksheets at once.

3. Several workbooks at once.

4. Print a LibreOffice Calc Table.

5. Print a workbook to a file.

6. Print a graphic charts and pivot table.

Before printing we should verify the Print Preview which gives an idea about how the print out may come. So that we can make necessary changes. **Page Break Preview** under **View** Tab will also give a clear picture of the print out.

Defining Print Area – In a Calc file, it is easily possible to set the print area, which we want to print.

To set print area: Format – Print Range – Define
To clear the print area: Format – Print Range – Clear
To add another area in a separate sheet: Format – Print Range – Add
To Edit print area: Format – Print Range – Edit

Print non-contiguous ranges

Select the first range – Press down Ctrl Key – Select the other ranges – Print option from File Menu – Select the option "Selected Cells" - OK

Preparation of Reports using Data Tables

Data Tables can be used as a decision making tool. Spreadsheet gives such a facility to prepare data or information based on certain conditions in volatile situations.

Data table gives the answer for the question, what will be the result if **(What if?)** certain elements are varied. Therefore, it is also called **What if analysis**. There are two types of Data Tables: One Variable and Two Variable Data Tables.

One Variable Data Table – The One-Variable Data Table gives us necessary information to take decisions under a particular situation in which one element is variable and the other one is static.

Eg: ABC Ltd. has five salesmen, their sales in April 2018 are given here:

They got 10% commission on sales in addition to their salary. Find out salesmen commission by using one variable table.

Salesman	Sales in Rs.
Abhijith	200000
Deva Kiran	230000
Ajith	200000
Eldo	180000
Rasheed	220000

Solution:

1. Enter the input data (Rate of Commission in B1 andSales amount of first salesman in B2.
2. Enter the formula =B1*B2 in B3, so that it will display the commission amount of first salesman.
3. Enter the data given in the above table in C1:D6 range.
4. Enter the Label "Commission" in E1
5. Select the range D2:E6.
6. **Data – Multiple Operations** – Enter the cell address in 'Formulas" $B$3 and enter Column input cell $B$2.
7. Click OK.
8. Output: The cells E2:E6 will be automatically filled with Commission of each salesman.

	A	B	C	D	E
1	Rate of Commission	10%	**Salesman**	**Sales in Rs.**	**Commission**
2	Sales Amount	200000	Abhijith	200000	
3	Commission in Rs.	=B1*B2	Deva Kiran	230000	
4			Ajith	200000	Result Area
5			Eldo	180000	
6			Rasheed	220000	

Note: In the above case the amount of sales by each salesmen are variable but the percentage of commission is static.

Two Variable Data Table – It works similar to one variable table which specifies two decision variables and variety of inputs and only a single formula. It gives us necessary information to take decisions under a particular situation in which both the elements are variable.

Let us see, how to calculate commission of above salesmen in different rates such as 10%, 11%,12%,13% and 14%. Here both the elements, sales amount and percentage of commission are varying.

Solution:

1. Enter the heading "Two Variable Data Table" in A1. *(see next page for illustrated table)*
2. Enter the Input Data (Rate of commission and sales amount of first salesman in B2 and B3.
3. Enter the formula =B2*B3 in B4, so that it will display the commission amount of first salesman.
4. Enter the data given in the above table in C4:D8 range.
5. Enter the Label "Commission" in E2
6. Enter the Labels 10%, 11% ….. 14% (Percentage of Commission) in E3:I3 range.
7. Select the range D4:I8
8. **Data – Multiple Operations** – Enter the cell address in 'Formulas" $B$4 (Commission), enter the Row Input Cell $B$2 (Rate) and enter the Column input cell $B$3 (Sales).
9. Click OK.
10. Output: The cells E3:I8 will be automatically filled with Commission of each salesman at different rate.

	A	B	C	D	E	F	G	H	I
1	TWO VARIABLE DATA TABLE								
2					Commission				
3	Rate of Commission	10.00%	**Salesman**	**Sales Rs.**	10.00%	11.00%	12.00%	13.00%	14.00%
4	Sales Amount	200000	Abhijith	200000					
5	Commission in Rs.	20000	Kiran	230000					
6			Ajith	200000		Result Area			
7			Eldo	180000					
8			Rasheed	220000					

Note: In this case both the amount of sales by each salesmen and the percentage of commission are varying.

Preparation of Reports using Pivot Table – Pivot Table is the way to present information in a report format. It often provides enhanced layout, attractive and formatted report with improved readability. It provides the facility to create cross tabulation summary of data in which headings can be subsequently moved to give different view of data.

When we look the data through a pivot table, it provides an opportunity to see the data in different perspective.

Eg: From the following details of M/s Sindhu E-Shop Ltd., help them to identify the sales of each brand in different districts by preparing Pivot Table.

Solution:

1. Enter the data in a spreadsheet.

2. Select the range of cells containing data.

3. Select: Data – Pivot Table – Create.

4. Select Current Selection and click OK.

District	Brand	Sales
Trivandrum	Vivo	25000
Kozhikode	Oppo	22000
Wayanad	Oppo	24000
Wayanad	Oppo	20000
Kozhikode	Vivo	32000
Trivandrum	Oppo	26000
Kozhikode	Oppo	21000
Wayanad	Vivo	19000
Trivandrum	Vivo	30000

5. The table headings are shown as buttons in the Pivot Table window. Drag these buttons as required and drop them into the layout areas "Column Fields", "Row Fields" and "Data Fields". (Data field should contain only numerical values).

6. Click OK – Then the Pivot Table will be displayed in a new sheet.

Pivot Table

Sum of Sales	Column Labels			
Row Labels	**Kozhikode**	**Trivandrum**	**Wayanad**	**Grand Total**
Oppo	43000	26000	44000	113000
Vivo	32000	55000	19000	106000
Grand Total	**75000**	**81000**	**63000**	**219000**

Uses of Pivot Table

a. Sub totaling and aggregating numeric data.

b. Summarizing the data according to the requirement of the users.

c. Moving rows to columns or columns to rows to show different summaries of data.

d. Filtering, sorting, grouping and conditionally formatting the most useful data.

e. Presenting concise and attractive reports.

Common Errors in Spreadsheet

1. ###   - Column width is not enough – applicable to numerical values.

2. #DIV/0!   - Number divided by zero. Eg: =10/0

3. #NAME?   - Text in formula is not recognized.

                 Eg: Sum(A1:A2) is entered as =Su(A1:A2)

4. #REF!   - Invalid cell reference in a formula.

                 Eg: =A1+B1+C1 after entering this formula in D1, column A is deleted.

5. #VALUE!   - Wrong argument in the formula.

                 Eg: =A1+A2 in which A1 contains 25 and A2 contains "Rs.10".

6. #NUM!   - It will show when the selected range is more than the required, to fill a series.

     Eg. Enter the value 1 in A1, Select A1 to A10,

     Sheet – Fill Cells – Series – Down – Start value 1 – End Value 5 – OK (Here we have selected 10 cells, but we have to fill only 5 cells)

Note: The above errors are subject to changes based on new versions of Ubuntu

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Prepared by:

Ajith Kanthi @ Ajith P P

SKMJ HSS Kalpetta

Wayanad – Kerala

Ph: 9446162771, 7907712665