Unit 4. Spreadsheet Basics:

Spreadsheet Concepts: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, cell referencing.

Functions and Formulae: SUM, AVERAGE, IF, COUNT. Charts and Graphs: Creating visual representations

Data Handling: Sorting, filtering, conditional formatting.

Text Functions: LEFT, RIGHT, MID, LEN, TRIM, CONCAT, TEXTJOIN **Advanced Functions: Logical:** IF, AND, OR, IFERROR, **Lookup:** VLOOKUP, HLOOKUP, XLOOKUP, INDEX, MATCH

Spreadsheet:-

A **spreadsheet** is an important application in **MS Office** used to store, organize, calculate, and analyze data in a tabular form. In MS Office, the spreadsheet software is called **Microsoft Excel**. It is widely used in offices, schools, colleges, and businesses for performing calculations and managing data efficiently.

A spreadsheet is made up of **rows and columns**. The intersection of a row and a column is called a **cell**. Each cell is identified by a unique address such as **A1, B2, C5**, etc. Users can enter data such as text, numbers, or formulas into cells.

Rows and Columns in MS Excel

MS Excel is a spreadsheet application that organizes data in the form of **rows and columns**. These two are the basic building blocks of a worksheet and help in storing, arranging, and analyzing data easily.

Rows in MS Excel:-

A **row** is a **horizontal line of cells** in a worksheet. Rows are identified by **numbers** starting from **1, 2, 3, …** and appear on the left side of the sheet.

Rows are mainly used to enter **records or individual entries**. Each row usually contains detailed information related to one item or person.

Example:
Each row can store details of one student such as Name, Roll No, and Marks.

Columns in MS Excel:-

A **column** is a **vertical line of cells** in a worksheet. Columns are identified by **letters** such as **A, B, C, …, Z, AA, AB**, etc., and appear at the top of the sheet.

Columns are used to represent **types of data or fields**. Each column contains similar types of information.

Example:
One column for student names, another for roll numbers, and one more for marks.

Cells in MS Excel

A **cell** is the **basic and smallest unit** of a worksheet in **MS Excel**. It is formed at the **intersection of a row and a column**. All data such as text, numbers, formulas, and dates are entered and stored in cells.

Cell Address (Cell Reference)

Each cell has a **unique address**, made using the **column letter and row number**.

Example:

- **A1** → Column A and Row 1
- **B5** → Column B and Row 5

This cell address helps Excel identify the location of data.

Types of Data Stored in a Cell

A cell can store different types of data:

- **Text** (Names, titles)

- **Numbers** (Marks, prices)
- **Formulas** (=SUM(A1:A5))
- **Dates and Time**

Active Cell:-

The **active cell** is the currently selected cell where data is entered. It is highlighted with a **thick border**.

Range of Cells

A **range** is a group of selected cells.

Example:

- **A1:A10** – Vertical range
- **A1:D5** – Rectangular range

Ranges are commonly used in formulas.

Functions and Formulas in MS Excel:-

In **MS Excel**, **functions and formulas** are used to perform **calculations and logical operations** efficiently.
A **formula** always starts with an **equals sign (=)**, while a **function** is a predefined formula provided by Excel.

1. SUM Function

The **SUM** function is used to **add numbers** in selected cells.

Ex:- =SUM(A1:A5)

2. AVERAGE Function

The **AVERAGE** function calculates the **mean value** of numbers.

Ex:- =AVERAGE(B1:B5)

3. IF Function

The **IF** function performs a **logical test** and returns different results based on the condition.

Ex:- =IF(A1>=40,"Pass","Fail")

4. COUNT Function

The **COUNT** function counts the **number of cells containing numeric values**.

Ex:- =COUNT(A1:A10)

Text Functions in MS Excel:-

Text functions in MS Excel are used to **manipulate, extract, and organize text data**. These functions are very useful while working with names, codes, and formatted text in worksheets.

1. LEFT Function

The **LEFT** function extracts a specific number of characters **from the beginning (left side)** of a text.

Ex:- =LEFT("Computer",4)

Result: Comp

2. RIGHT Function

The **RIGHT** function extracts characters **from the end (right side)** of a text.

Ex:- =RIGHT("Computer",4)

Result: uter

3. MID Function

The **MID** function extracts characters **from the middle** of a text.

Ex:- =MID("Computer",2,3)

Result: omp

4. LEN Function

The **LEN** function returns the **total number of characters** in a text (including spaces).

Ex:- =LEN("MS Excel")

Result: 8

5. TRIM Function

The **TRIM** function removes **extra spaces** from text, leaving only single spaces between words.

Ex:- =TRIM(" MS Excel ")

Result: MS Excel

6. CONCAT Function

The **CONCAT** function combines two or more text strings into one.

Ex:- =CONCAT("MS"," ","Excel")

Result: MS Excel

7. TEXTJOIN Function

The **TEXTJOIN** function joins text from multiple cells using a **delimiter** (symbol) and can ignore empty cells.

Ex:- =TEXTJOIN("-",TRUE,A1:A3)

Charts and graphs :-

A chart or graph is a visual representation of worksheet data. Excel allows users to convert selected data into different types of charts. This helps in understanding the information more clearly.
For example, a chart can show how student marks vary, how sales increased over months, or how expenses are distributed.

Importance of Charts in Excel

Charts play a very important role in data analysis:

- They present complex data in a simple visual form.
- Help identify trends, patterns, and relationships.
- Make reports attractive and professional.
- Useful for business analysis, academic projects, and presentations.
- Allow easy comparison between different sets of data.

Types of Charts in Excel:-

- **a) Column Chart**
- A column chart displays data using vertical bars. It is useful for comparing values across categories.
  Example: Comparing marks of students in different subjects.

b) Bar Chart

- A bar chart uses horizontal bars instead of vertical ones. It is useful when category names are long or when you want to show comparisons clearly.
  Example: Comparing population of different districts.

c) Line Chart

- A line chart shows data points connected by lines. It is perfect for displaying trends over time.
  Example: Sales growth for 12 months.

d) Pie Chart

- A pie chart shows data as slices of a circle. Each slice represents a percentage of the total.
  Example: Percentage of expenses like food, travel, rent, etc.

- **e) Area Chart**
- This chart is similar to a line chart but the area below the line is filled with color.
  Useful for showing volume or total values.
  Example: Total rainfall recorded in different months.

f) Scatter Chart

- A scatter chart shows the relationship between two variables.
  Example: Relationship between temperature and electricity usage.

Steps to Create a Chart in Excel

Step 1: Select Data

Highlight the data range you want to convert into a chart, including headings.

Step 2: Go to Insert Tab

Click on **Insert** → **Charts Group**.

Step 3: Choose Chart Type

Select the type of chart like Column, Line, Pie, Bar, etc.

Step 4: Customize Chart

You can edit:

- Chart title
- Axis labels
- Colors and styles
- Legends
- Data labels

Step 5: Final Presentation

Move the chart to a suitable position or sheet to improve data presentation.

Advantages of Using Charts

- Makes data easy to understand at a glance.
- Helps in better decision-making.
- Enhances visual appeal of reports.
- Reduces confusion from large numbers.
- Suitable for business meetings, school projects, and research work.

Data Handling:-

MS Excel provides powerful tools for handling and analyzing large amounts of data. Three important data handling features are **Sorting**, **Filtering**, and **Conditional Formatting**. These tools help users organize, analyze, and present data effectively.

1. Sorting in MS Excel

Sorting is used to arrange data in a specific order. It helps users quickly understand and analyze information.

Sorting can be done in:

- **Ascending order** (A to Z, smallest to largest)
- **Descending order** (Z to A, largest to smallest)

Excel allows sorting based on:

- Text
- Numbers
- Dates
- Cell color or font color

Sorting makes data neat and easy to read, especially in tables and reports.
Example: Sorting student marks from highest to lowest to find toppers.

Step-by-Step Procedure (Menu Path):

1. Select the **data range** (including headings).
2. Go to **Data tab**.
3. Click **Sort & Filter** group.
4. Click **Sort A to Z** or **Sort Z to A**
   OR
   Click **Sort** for advanced options.
5. Choose:
   - Column to sort by

- Sort order (Ascending / Descending)

6. Click **OK**.

2. Filtering in MS Excel

Filtering is used to display only the required data while hiding the rest. It is very useful when working with large datasets.

Using filters, users can:

- View specific values
- Filter numbers greater or less than a value
- Filter text containing specific words
- Filter dates (today, last month, etc.)

Filtering does not delete data; it only hides unwanted records temporarily.
Example: Displaying only students who scored more than 60 marks.

Step-by-Step Procedure (Menu Path):

1. Select the data with headings.
2. Go to **Data tab**.
3. Click **Filter** (funnel icon).
4. Drop-down arrows appear in column headers.
5. Click the arrow and select required values.
6. Click **OK**.

3. Conditional Formatting in MS Excel

Conditional Formatting automatically changes the appearance of cells based on certain conditions.

It helps in:

- Highlighting important values
- Identifying trends and patterns
- Detecting errors quickly

Common conditional formatting options include:

- Changing cell color
- Data bars
- Color scales
- Icon sets

This feature improves data visualization and makes analysis easier.

Example: Highlighting marks below 35 in red color to identify failed students.

Step-by-Step Procedure:-

1. Select the required cells.
2. Go to **Home tab**.
3. Click **Conditional Formatting**.
4. Choose any option:
    - Highlight Cells Rules
    - Data Bars
    - Color Scales
    - Icon Sets
5. Set condition and click **OK**.

4. Importance of Data Handling Tools

Sorting, filtering, and conditional formatting together make Excel a powerful data analysis tool. They save time, reduce errors, and improve decision-making. These features are widely used in offices, schools, businesses, and research work.

Advanced Logical Functions in MS Excel

Logical functions are used to **make decisions** in Excel. They check conditions and return results based on whether the condition is **TRUE or FALSE**. These functions are very useful in marks calculation, result analysis, salary sheets, and reports.

1. IF Function

Meaning

The **IF function** checks a condition and returns **one value if the condition is TRUE** and **another value if it is FALSE**.

Syntax

=IF(condition, value_if_true, value_if_false)

Example

=IF(A1>=35,"Pass","Fail")

Explanation

- If marks in cell A1 are **35 or more**, result will be **Pass**
- If marks are **less than 35**, result will be **Fail**

Uses

- Result calculation
- Salary bonus calculation
- Grade assignment

2. AND Function

Meaning

The **AND function** checks **multiple conditions**. It returns **TRUE only if all conditions are TRUE**.

Syntax

=AND(condition1, condition2, ...)

Example

=AND(A1>=35, B1>=35)

Explanation

- Returns TRUE only if **both subjects are passed**
- If any one condition fails, result will be FALSE

Use with IF

=IF(AND(A1>=35,B1>=35),"Pass","Fail")

Uses

- Multiple subject pass condition
- Eligibility checking

3. OR Function

Meaning

The **OR function** returns **TRUE if any one condition is TRUE**.

Syntax

=OR(condition1, condition2, ...)

Example

=OR(A1>=35, B1>=35)

Explanation

- Returns TRUE if **at least one subject is passed**
- Returns FALSE only if **both fail**

Use with IF

=IF(OR(A1>=35,B1>=35),"Eligible","Not Eligible")

Uses

- Entrance eligibility
- Offer qualification rules

4. IFERROR Function

Meaning

The **IFERROR function** handles errors and displays a **custom message instead of error values** like #DIV/0!, #VALUE!, etc.

Syntax

=IFERROR(value, value_if_error)

Example

=IFERROR(A1/B1,"Invalid")

Explanation

- If division is valid → shows result
- If error occurs → shows **"Invalid"** instead of error

Uses

- Error handling in formulas
- Clean and professional reports

5. Combined Logical Functions

Example

=IF(AND(A1>=35, B1>=35), "Pass", "Fail")

Explanation

- AND checks both conditions
- IF displays result based on AND output

Lookup Functions in MS Excel:-

Lookup functions in MS Excel are used to **search for a value in a table or range** and **return a related value** from another column or row. These functions are very useful when working with **large datasets**, such as student records, employee details, marks lists, salary sheets, etc. Lookup functions help in **saving time**, **reducing errors**, and **automating data retrieval**.

1. VLOOKUP (Vertical Lookup)

Meaning

VLOOKUP searches for a value **vertically (top to bottom)** in the **first column** of a table and returns a value from another column in the same row.

Syntax

=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

Explanation

- lookup_value → Value to search (e.g., Student ID)

- table_array → Data table range
- col_index_num → Column number to return data from
- range_lookup → FALSE (exact match), TRUE (approximate match)

Example

=VLOOKUP(101, A2:D10, 3, FALSE)

This formula finds Student ID **101** and returns marks from column 3.

Uses

- Finding student marks
- Employee salary details
- Product prices

Limitation

- Can search only **from left to right**
- Slower for large data

2. HLOOKUP (Horizontal Lookup)

Meaning

HLOOKUP searches for a value **horizontally (left to right)** in the **first row** of a table and returns a value from a specified row.

Syntax

=HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

Example

=HLOOKUP("Maths", A1:E5, 3, FALSE)

Finds “Maths” in the first row and returns the value from row 3.

Uses

- Data arranged in rows
- Subject-wise marks stored horizontally

3. XLOOKUP (Advanced Lookup Function)

Meaning

XLOOKUP is a **modern and powerful replacement** for VLOOKUP and HLOOKUP. It can search **both vertically and horizontally** and has no left-right limitation.

Syntax

=XLOOKUP(lookup_value, lookup_array, return_array)

Example

=XLOOKUP(101, A2:A10, C2:C10)

Finds Student ID **101** and returns marks.

Advantages

- Works in any direction
- Faster and flexible
- Handles missing values
- No column number needed

4. INDEX Function

Meaning

INDEX returns the value of a cell based on **row number and column number** in a table.

Syntax

=INDEX(array, row_num, [column_num])

Example

=INDEX(A2:D10, 3, 2)

Returns the value from **3rd row, 2nd column**.

Uses

- Exact value retrieval
- Used with MATCH function

5. MATCH Function

Meaning

MATCH finds the **position of a value** in a range, not the value itself.

Syntax

=MATCH(lookup_value, lookup_array, [match_type])

Example

=MATCH(101, A2:A10, 0)

Returns the position of Student ID 101.

6. INDEX + MATCH

Meaning

INDEX and MATCH together work like an **advanced VLOOKUP** and overcome its limitations.

Formula

=INDEX(return_range, MATCH(lookup_value, lookup_range, 0))

Example

=INDEX(C2:C10, MATCH(101, A2:A10, 0))

Returns marks of Student ID 101.

Advantages

- Faster than VLOOKUP
- Flexible
- Works in any direction

Function	Search Direction	Flexibility	Usage
VLOOKUP	Vertical	Limited	Basic lookup
HLOOKUP	Horizontal	Limited	Row-wise lookup
XLOOKUP	Any direction	High	Advanced lookup
INDEX	Position-based	High	With MATCH
MATCH	Finds position	High	Used with INDEX

Differences between Ms Word, MS Excel, MS PowerPoint:-

Feature	MS Word	MS Excel	MS PowerPoint
Type	Word Processor	Spreadsheet	Presentation Tool
Main Use	Text documents	Data and calculations	Visual presentations
Data Format	Text-based	Rows & columns	Slides
Calculations	Limited	Advanced	Very limited
Visuals	Images, tables	Charts, graphs	Slides, animations
Best For	Reports, letters	Analysis, accounting	Teaching, meetings