M.A. 3rd Semester
Economics (CBCS)

DSC Course Code: ECON236

Contemporary Economic Issues and Data Handling

Lessons 1-16

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Chapter-1
INTRODUCTION OF MICROSOFT EXCEL

Structure

1.0 LEARNING OBJECTIVES

After going through this lesson, you will be able to:

- Understand the basic of Microsoft Excel
- Understand how to open Microsoft Excel
- Understand the basic function of Microsoft Excel
- Understand the concept of Ribbon

1.1 Introduction

Microsoft Excel is an application for creating spreadsheets that employs tables to store and analyse numerical and statistical data using formulae and functions.

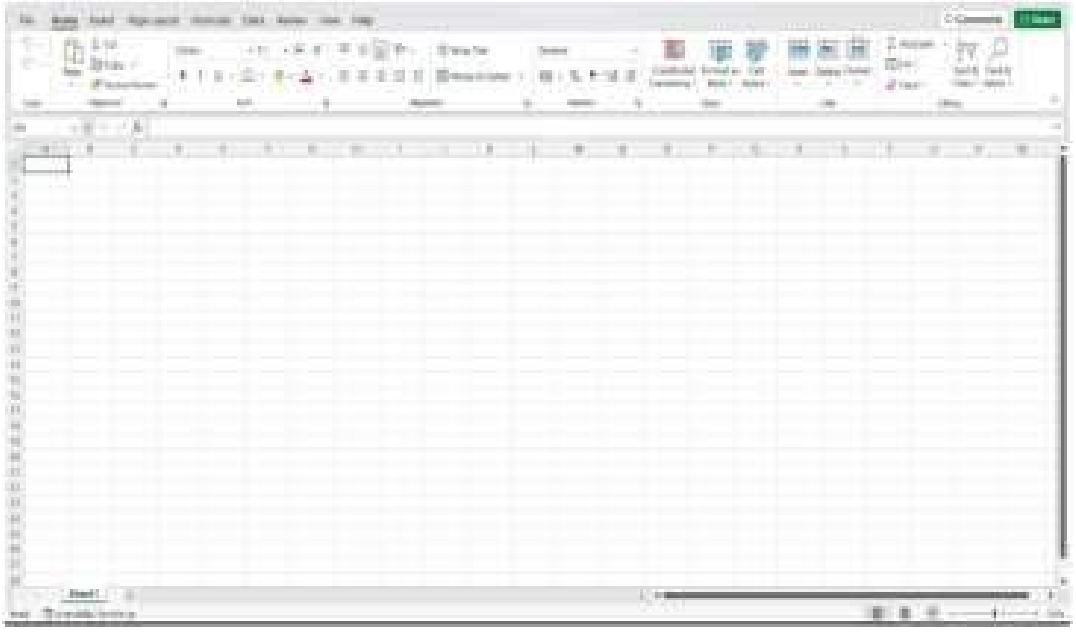
Simply said, MS Excel is a robust spreadsheet application that comes with Microsoft Office and is primarily used to enter data into tables. It has a number of rows and columns where data can be entered. The programme is regarded as useful for a variety of activities, including bookkeeping, creating payslips, sorting and filtering data interactively, and calculating weekly expenses.

1.2 Basic of Microsoft Excel

1.2.1 Microsoft Excel

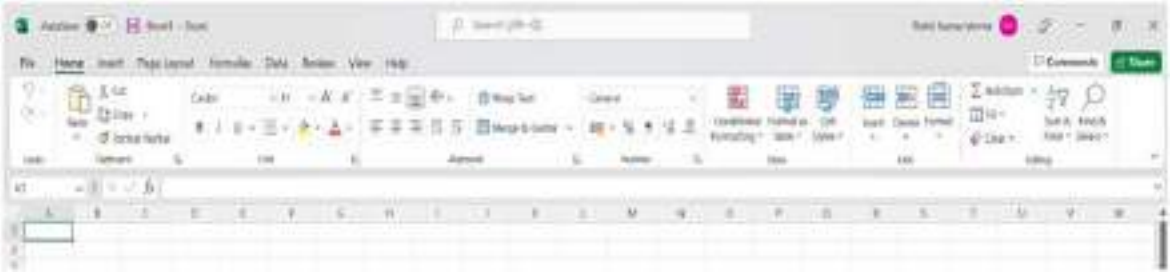
Microsoft's Excel spreadsheet programme is a part of the Office family of business software programmes. Users of Microsoft Excel may format, arrange, and compute data in a spreadsheet.

One can enter data in the form of tables using the spreadsheet tool MS Excel. An Excel spreadsheet makes it simple to analyse data. An Excel spreadsheet looks like this, as shown in the image below:



1.2.2 Features of Microsoft Excel

The following are some of Microsoft Excel's key attributes:



Home

Font size, font styles, font colour, background colour, alignment, formatting options and styles, cell insertion and deletion, and editing options all are available under the home option.

Insert

Insert includes features like table format and style, image and figure insertion, graph, chart, and sparkline addition, header and footer choice, equation and symbol options, and more.

Page Layout

Page Layout comprises options like themes, orientation and page setup.

Formulas

In order to generate a value, a cell can contain formulas, cell references, or functions. Formulas must be introduced with an equal's sign ("=").

Data

This category offers tools for adding external data (from the web), filtering choices, and data.

Review

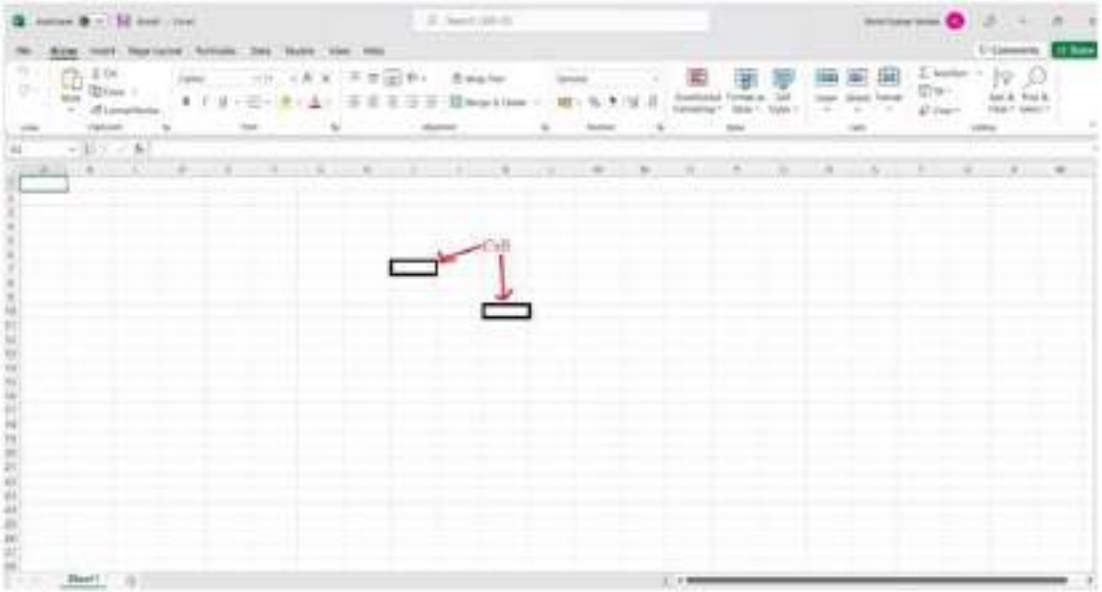
A reader may write comments in this section after proofreading an excel sheet (using a feature similar to spell check).

View

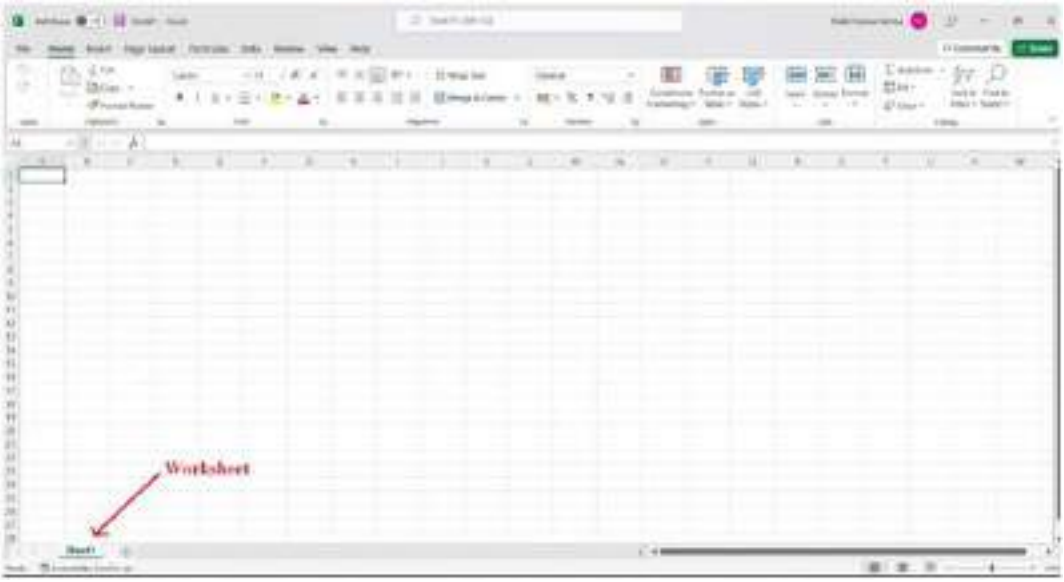
Here, we can adjust the various views in which we want the spreadsheet to be shown. Under this area, options for pane organisation and zooming in and out are provided.

You must first comprehend the three most crucial Excel features:

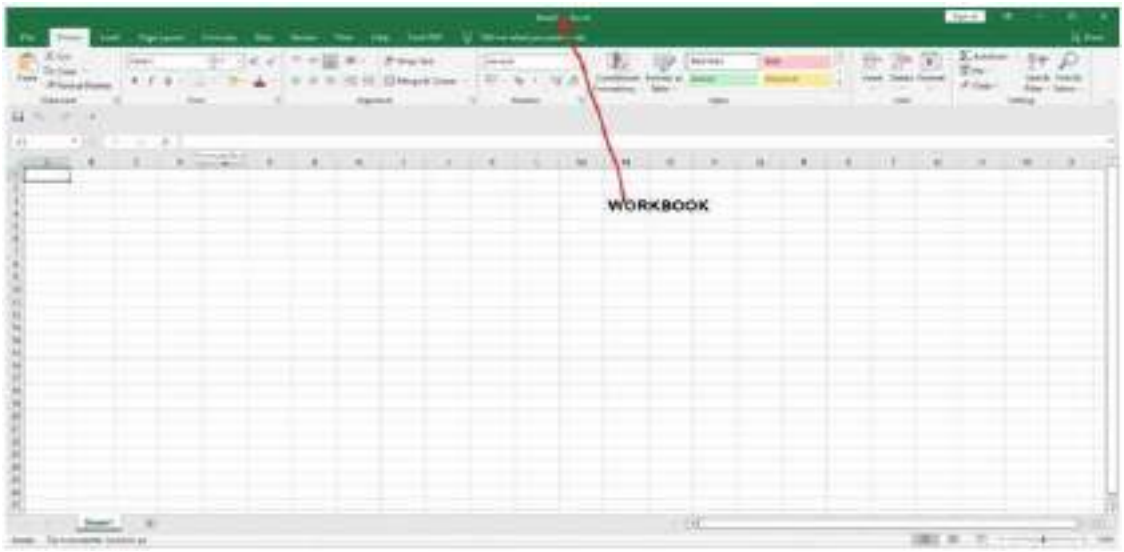
1. **Cell:** The smallest but most useful component of a spreadsheet is a cell. You have the option of typing or copying and pasting your data into a cell. Text, numbers, and dates all qualify as data. Additionally, you can alter its size, font colour, background colour, borders, and other features. A cell's address, which includes its column number and row number, serves as a unique identifier for each individual cell (If a cell is on 11th row and on column AB, then its address will be AB11).



2. **Worksheet:** A worksheet is made up of individual cells may contain text, a formula, or a value. Additionally, it contains an unseen sketch layer that stores diagrams, charts, and photos. Clicking the tab at the bottom of the workbook window will take you to each worksheet in the workbook. A chart sheet, which displays a single chart and is accessed by clicking a tab, can also be stored in a workbook.



3. **Workbook:** Every application has a separate file, just like a workbook does. There are one or more worksheets in every workbook. A workbook is often referred to as a collection of worksheets or as a single worksheet. Worksheets can be added or removed, hidden without being deleted from the workbook, and the arrangement of your worksheets can be modified.



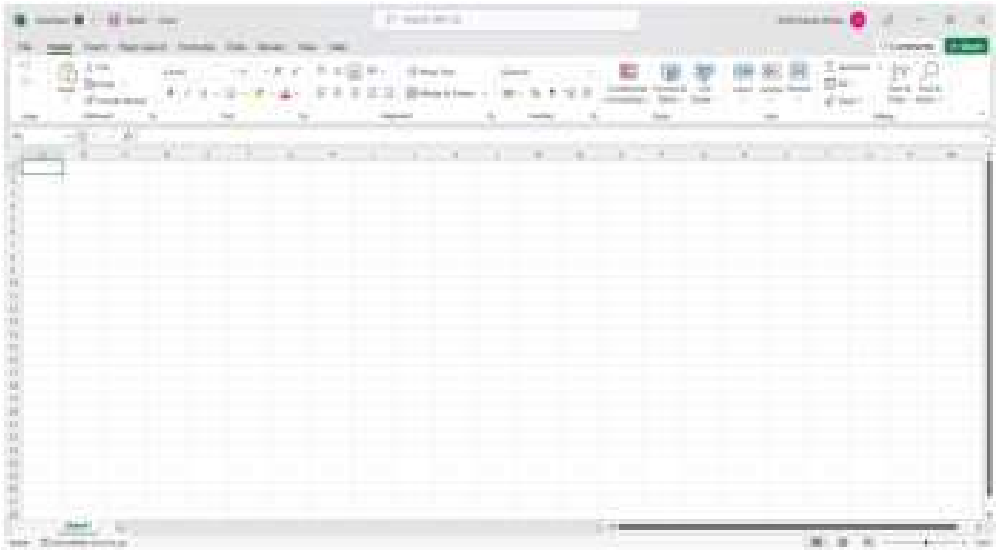
1.3 How to open MS Excel?

1.3.1 Open Microsoft Excel in Windows 7

The procedures listed below should help you open Microsoft Excel on your computer:

- Click Start, followed by All Programs.
- Next step is to click on MS Office
- Finally, select MS-Excel as your output type.

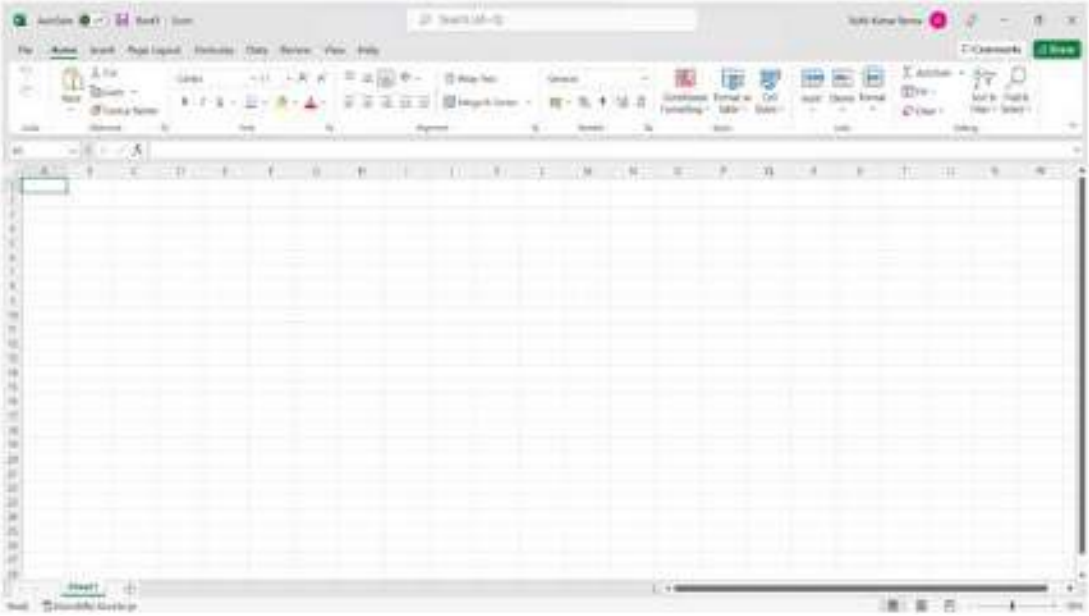
Your Microsoft Excel programme will start, and you'll see the Microsoft Excel window shown below.



1.3.2 Open Microsoft Excel in Windows 8,8.1,10

- Press the Windows key on the keyboard or click the Windows button in the taskbar's lower-left corner.
- In the lower-left corner of the screen, select "Search Box."
- Type "Excel".
- Click the Excel icon as shown in the screenshot below.

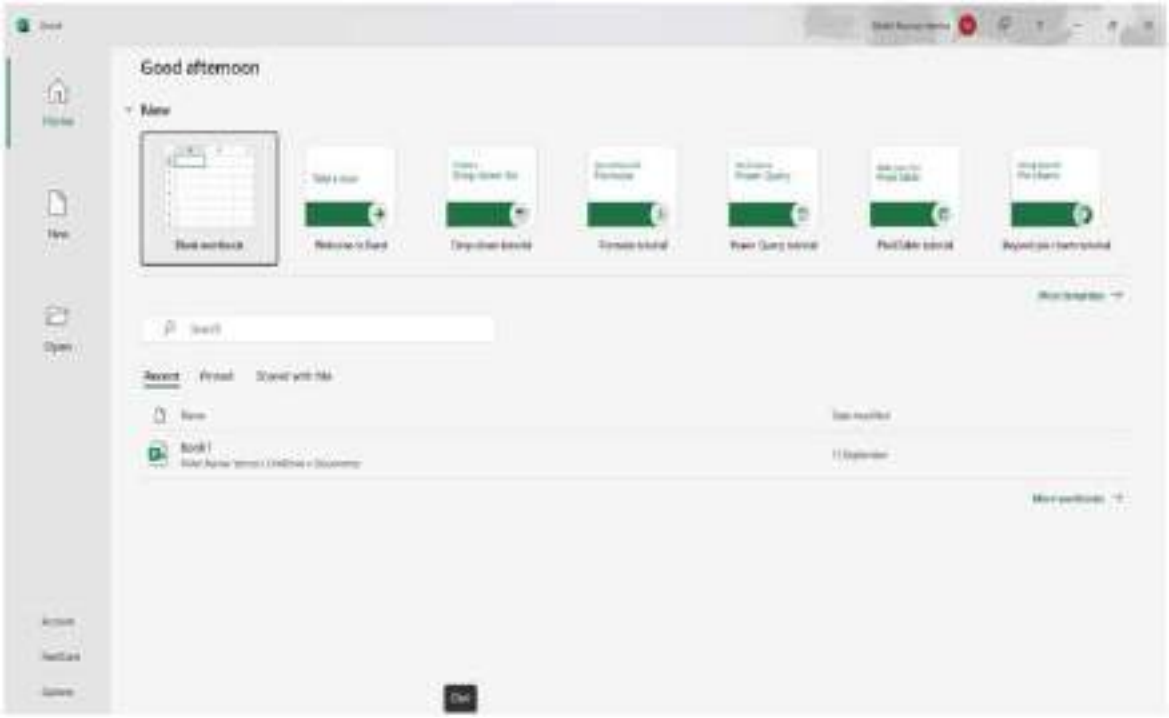
Your Microsoft Excel programme will start, and you'll see the Microsoft Excel window shown below.



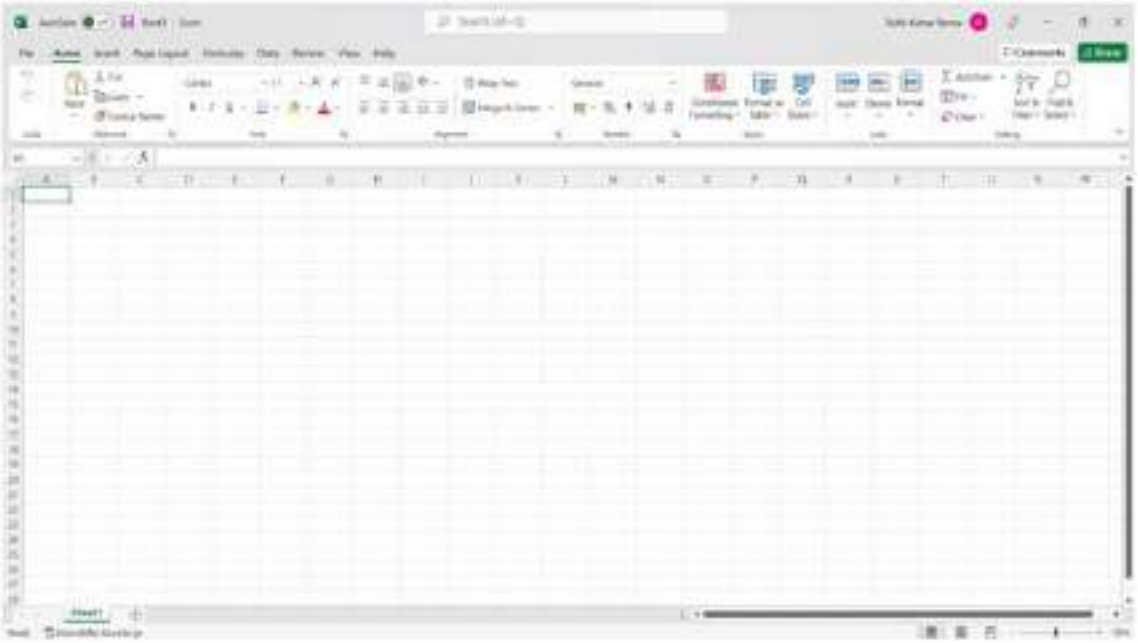
1.3.3 Open Microsoft Excel in Windows 11

- Press the Windows key on the keyboardor click the Windows button in the taskbar's lower-left corner.
- Click the Excel icon as shown in the screenshot below.

- Next step is to click on Blank Workbook as shown in the screenshot below:



- Your Microsoft Excel programme will start, and you'll see the Microsoft Excel window shown below.



1.4 Understanding Microsoft Excel Basic Function

Excel has two primary methods for performing calculations: formulas and functions.

FORMULA:

A formula in Excel is an expression that manipulates values in a cell or a range of cells. Consider the formula =A1+A2+A3, which calculates the sum of the values in cells A1 through A3.

FUNCTIONS:

In Excel, functions are predefined formulas. They provide formulas human-friendly labels and do away with tedious manual entry. for instance, =SUM (A1:A3). The formula adds up each value from A1 to A3, or array A.

One of Excel's most crucial features is the functions. You can use it to conduct both simple and complicated computations.

SUM: It gives back the total of the cell's numerical values. You can insert the values directly into the function or refer to the cells where you have data.Using the Excel AutoSum button is the quickest and most straightforward approach to add a group of cells. The selected cell receives an automatic Excel SUM function entry. With the SUM function, you may add up any number in a set of cells.

COUNT: It gives back the number of numerical values found in a cell. You can insert the values directly into the function or refer to the cells where you have data.The COUNT function counts cells with numbers in a range.

AVERAGE: It gives back the cell's mean of all the numerical values. The AVERAGEIF function calculates the average of a range based on a true or false condition.

TIME: According to Excel's time format, it returns a legitimate time serial number.

Hours, minutes, and seconds must be specified [...]

DATE: It gives back a legitimate date serial number that follows Excel's time format.

You must select the day, month, and year.

LEFT: With the leftmost character coming first, this method extracts particular characters from a cell or string (start). The text and the quantity of characters to be extracted must be specified.

RIGHT: Starting from the right, this method removes particular characters from a cell or string (last). The text and the quantity of characters to be extracted must be specified.

VLOOKUP: When a value is searched for in a column, it can either return that value directly or a value from the adjacent columns using the same row number.A one-column or one-row range is searched for a close match using the Excel LOOKUP function, which then retrieves the comparable value from another one-column or one-row range.

IF: When a value is searched for in a column, it can either return that value directly or a value from the adjacent columns using the same row number.The IF function in Microsoft Excel returns one value if the condition is TRUE and a different value if it is FALSE.

The IF function, an Excel built-in function, falls under the category of a logical function. It can be used in Excel as a worksheet function (WS). The IF function can be used as a worksheet function to input a formula as part of a formula in a worksheet cell.

Syntax:

The syntax for the IF function in Microsoft Excel is:

IF (condition, [value_if_true], [value_if_false])

Parameters or Arguments

condition

The value that you want to test.

value_if_true

It is the value that is returned if condition evaluates to TRUE.

value_if_false

Optional. It is the value that is returned if condition evaluates to FALSE.

Nested IF: Nested **IF** functions, meaning one **IF** function inside of another, allows you to test multiple criteria and increases the number of possible outcomes.

NOW: The cell you insert is updated with the current date and time.It using the settings on your computer [...]

LARGE: When a list is sorted by value in descending order, the Excel LARGE function produces a numeric value based on its position inside the list. In other words, LARGE can return the “nth largest” value, which includes the first, second, third, etc. largest value.

SORT: The SORT function orders the elements of an array or range either in ascending or descending order.

MAX: The MAX function finds the highest number in a range.

SQRT:A number’s square root is a quantity that, when multiplied by itself, yields the original number. Excel’s SQRT function gives the square root of an integer.

Exponential: The EXP function in Excel, which is classified as a Math/Trig function and returns a numerical value equal to e raised to the power of a specified number, is an exponential function. The value of the exponential growth and decay mathematical constant e is roughly 2.71828.

Square: The power function, denoted by the carat sign, in Excel allows you to square a number. Use the equation =N^2, where N might be a number or the value of the cell you want to square. A worksheet can make numerous uses of this formula.

1.5 Understanding the Ribbon

Shortcuts to Excel commands are available via the ribbon. A command is a task that the user carries out. Making a new document, printing a document, etc. are examples of commands. The Excel 2021 ribbon is displayed in the picture below.

Ribbon start button

It is used to access commands, such as those for generating new documents, saving completed work, printing, and accessing Excel customization options, among others.

Ribbon tabs

Similar instructions are grouped together using tabs. The home tab is used for basic operations like sorting and finding specific data inside the spreadsheet as well as formatting the data to make it more attractive.

Ribbon bar

The bars are used to group together similar commands. The instructions used to align data, for instance, are all gathered together in the Alignment ribbon bar.

1.6 Summary

In this chapter, we have studied:

- Microsoft Excel is an effective spreadsheet tool used to collect, process, and store numerical data.
- In Excel, the ribbon is utilised to access multiple commands.
- We've reviewed many procedures for opening Microsoft Excel.

1.7 Answers to self-check exercises

Q.1 Explain various features of Microsoft Excel?

Q.2 What are the various function of Microsoft Excel?

Q.3 Explain the various ways to open Microsoft Excel?

Q.4 How Ribbon tab is different from Ribbon bar?

1.8 Suggested Reading

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication.
- Dienes, Sheila s., Microsoft office, Professional for windows 95.
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365),Microsoft Press Publication.
- Kenneth N. Berk,Data Analysis with Microsoft Excel.
- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling.
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals.
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed:Techmedia.
- John Walken Bach: Excel 97.

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Chapter-2
MICROSOFT EXCEL WORKBOOK AND WORKSHEET

STRUCTURE

2.0 LEARNING OBJECTIVES

After going through this lesson, you will be able to:

- Understand the basic of Microsoft Excel Workbook
- Understand the basic of Microsoft Excel Worksheet
- Understand the basic of Microsoft Excel Row
- Understand the basic of Microsoft Excel Column

2.1 Introduction of Microsoft Excel Workbook

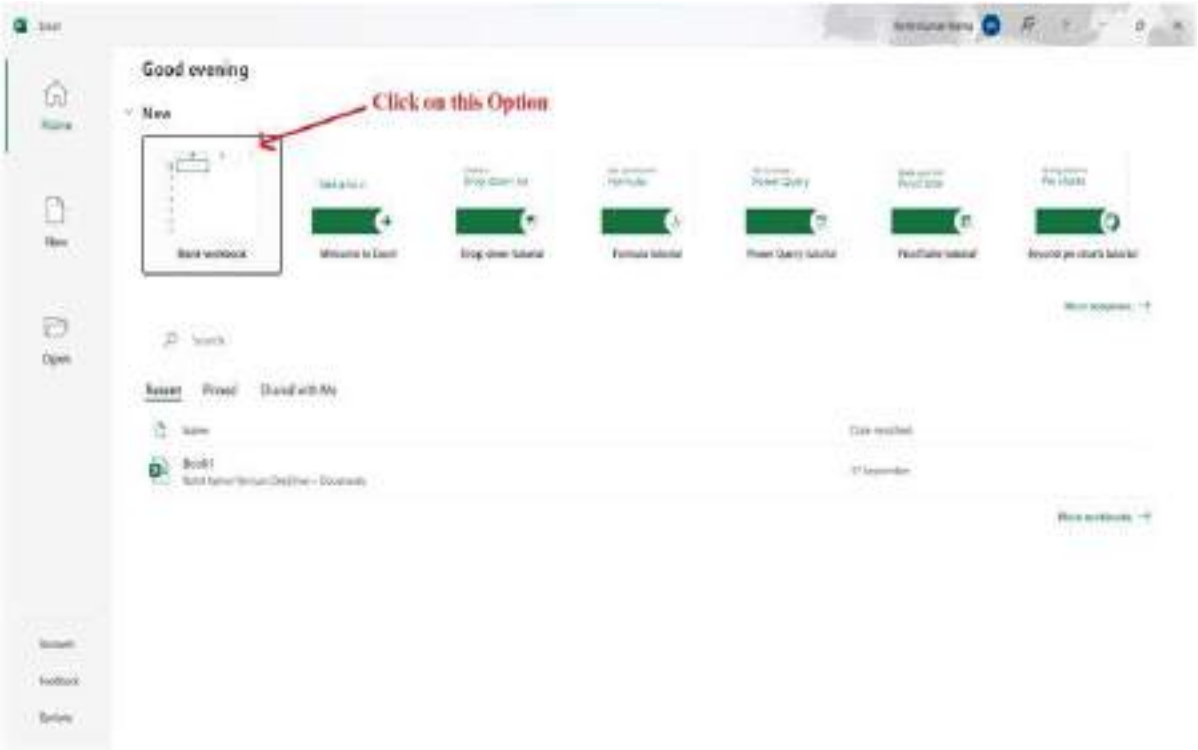
A set of worksheets called an Excel workbook has rows and columns of data storage. By default, a new Excel workbook is titled Book1 (see at the top of the Excel). Depending on the data included inside, you can give and save the workbook. A single Excel worksheet typically has 16,384 columns and 1,048,576 rows.

The worksheets in a workbook are numbered Sheet1, Sheet2, Sheet3,….SheetN. By selecting the + sign next to the worksheets, you can add these worksheets to your workbook. A single worksheet may be in use at once. It indicates that only one worksheet may be active at a time in an Excel spreadsheet. However, a workbook can contain multiple worksheets.

2.1.1 How to create a new workbook?

The procedures listed below should help you to create a new workbook on your computer:

- Open Excel.
- Press Ctrl+N or choose Blank workbook.



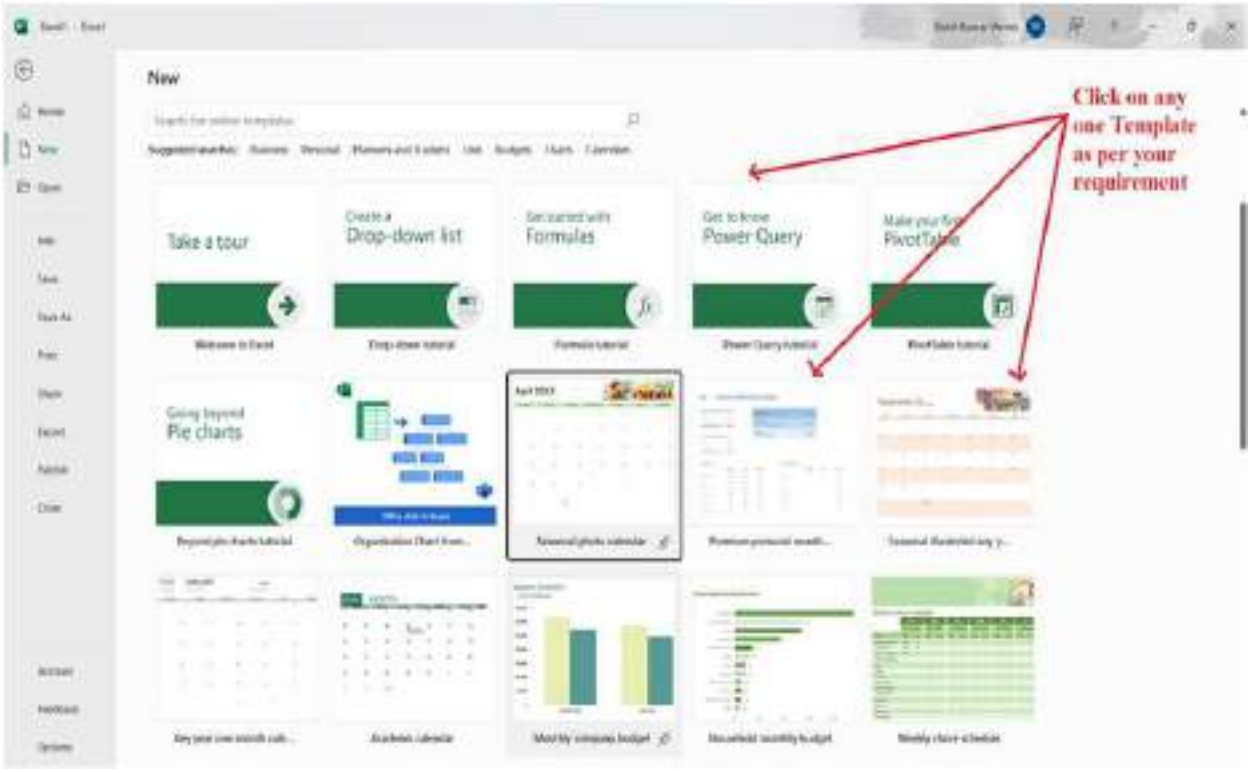
- Start typing

2.1.2 How to create a workbook from a Template?

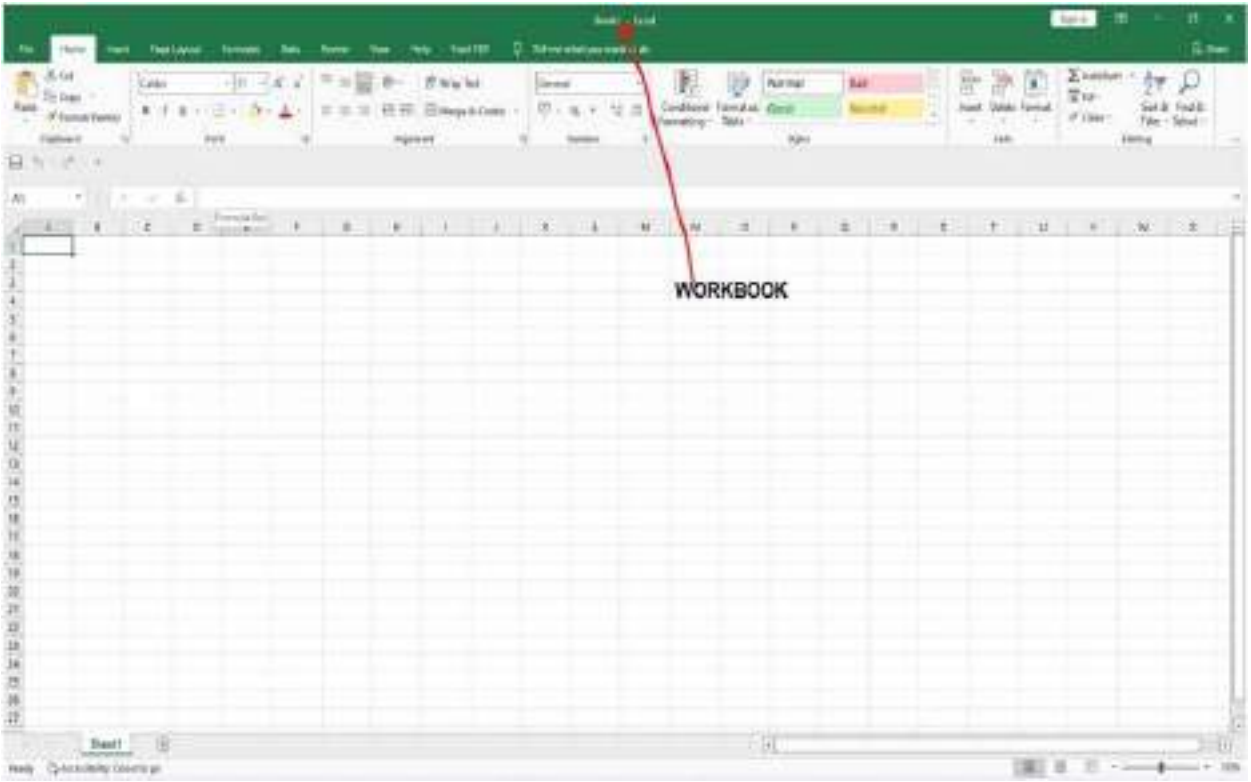
The procedures listed below should help you to create a new workbookfrom a template on your computer:

- Choosing File > New.

- Double-click a template.



- Click and start typing.

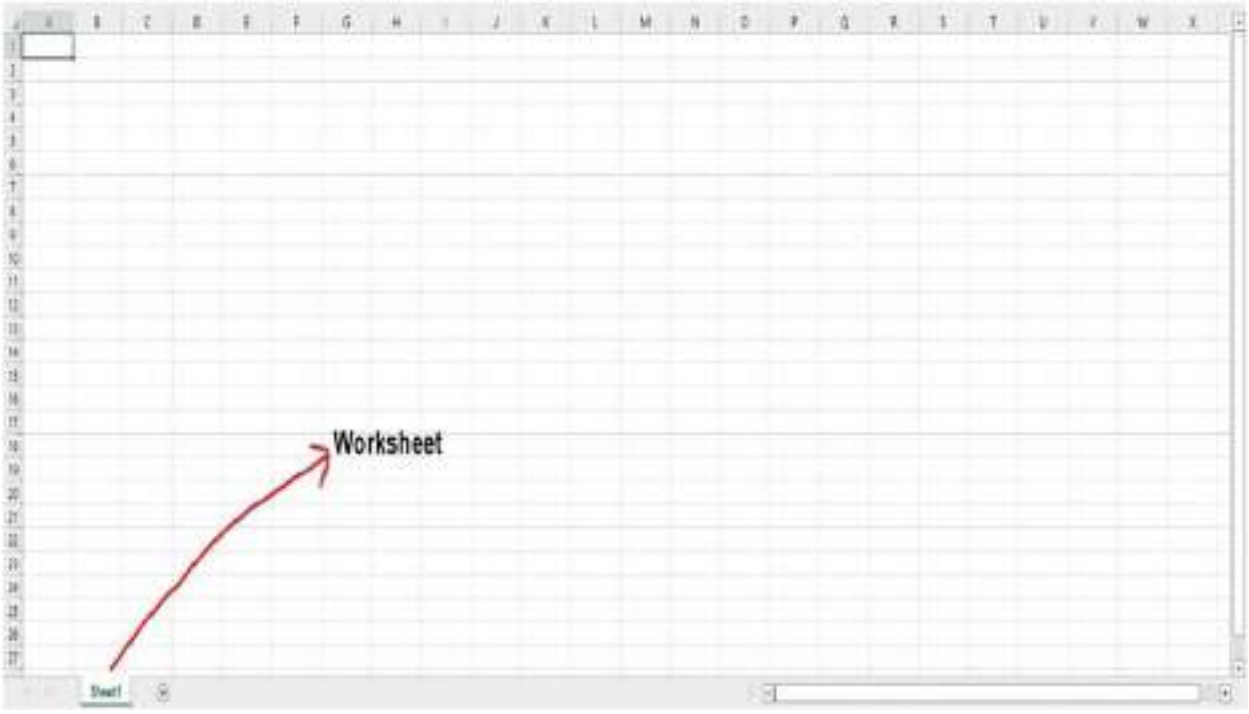


2.1.3 How to rename a workbook?

- To rename a workbook, locate it in Windows Explore, then you can press F2, or right-click and select Rename, then type the new name.
- If your workbook is currently open, you can save it with an alternative name by selecting File > Save As. This will make a duplicate of the current worksheet.

2.2 Introduction of Microsoft Excel Worksheet

A worksheet is a single page with a number of cells where the user can input, modify, and store data. Spreadsheets are also referred to as worksheets. The worksheet has rows, columns, and cells in it.



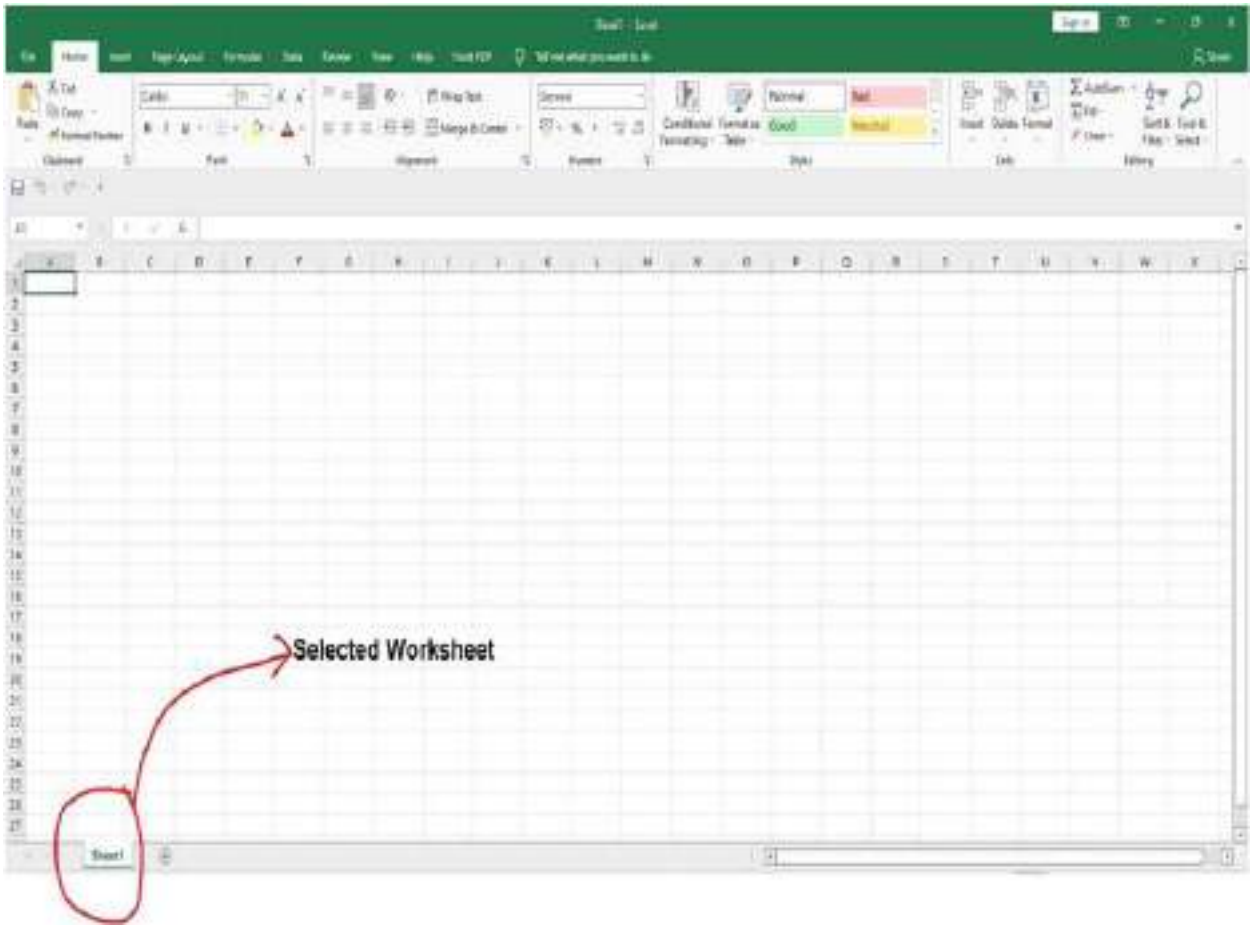
Each individual data cell in an Excel worksheet is defined and arranged with the aid of the vertical column and horizontal row that are combined to produce a cell reference, unlike B1 or A25.

The current versions of Excel Worksheet include the following specifications:

- Each worksheet has 1,048,576 rows.
- There are 16,384 rows per worksheet.
- There are 17,179,869,184 total cells on each worksheet.

2.2.1 How to select a worksheet?

By default, Excel opens the Sheet 1 worksheet whenever you start an Excel workbook. The worksheet's name, "Sheet1," is shown on its sheet tab at the bottom of the windowpane, as seen in the image below.

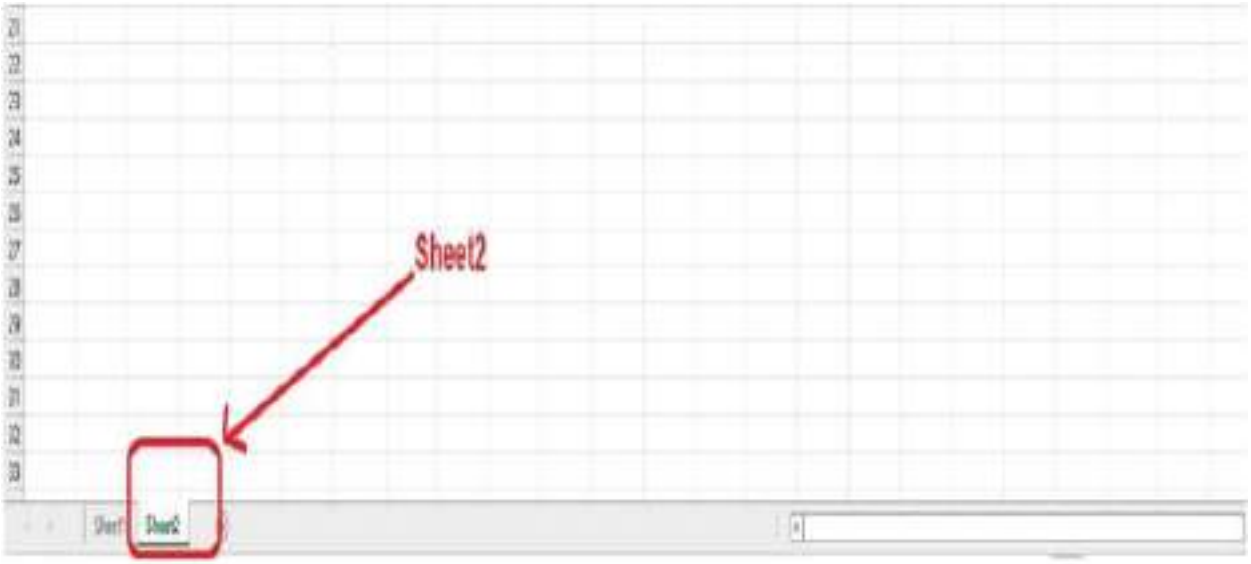


2.2.2 How to insert a worksheet?

Excel gives the user the option to insert as many spreadsheets as they need. Click on the addition (+) sign at the bottom of the window to add a new worksheet to Excel. The default name of the new worksheet is “SheetN,” where N is one of the integers 1, 2, 3, 4, 5, 6, 7,..., n.

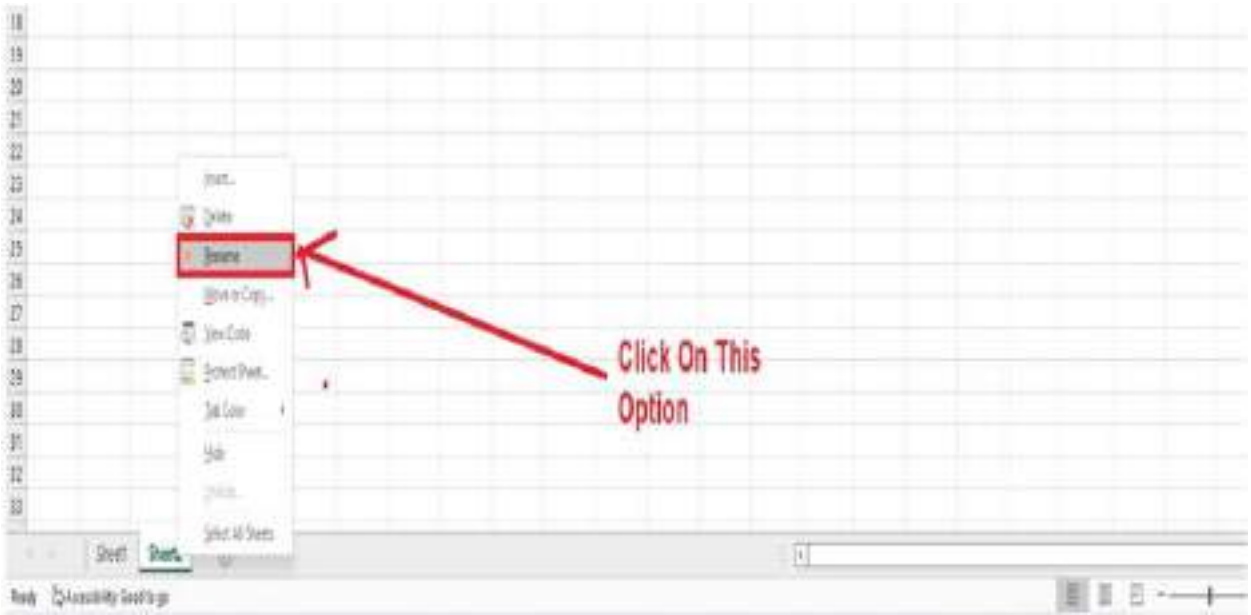
In the example below, Sheet2 is the name of a new worksheet that has been added.

2.2.3 How to rename a worksheet?

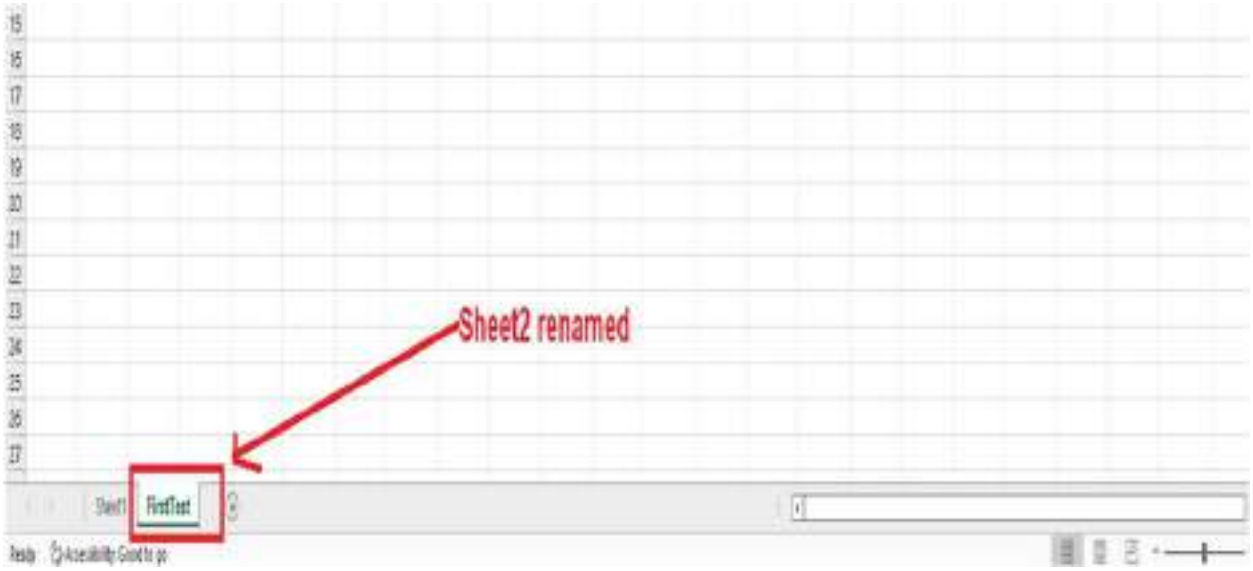


The steps listed below should be followed in order to rename your worksheet with a unique and relevant name.

- Click with your right mouse button on the sheet tab whose name you want to modify.
- You'll see the toolbar window.
- Select Rename from the menu.



- Type the name you like. For instance, we have changed the name of "Sheet1" to "FirstTest" in the screenshot below.



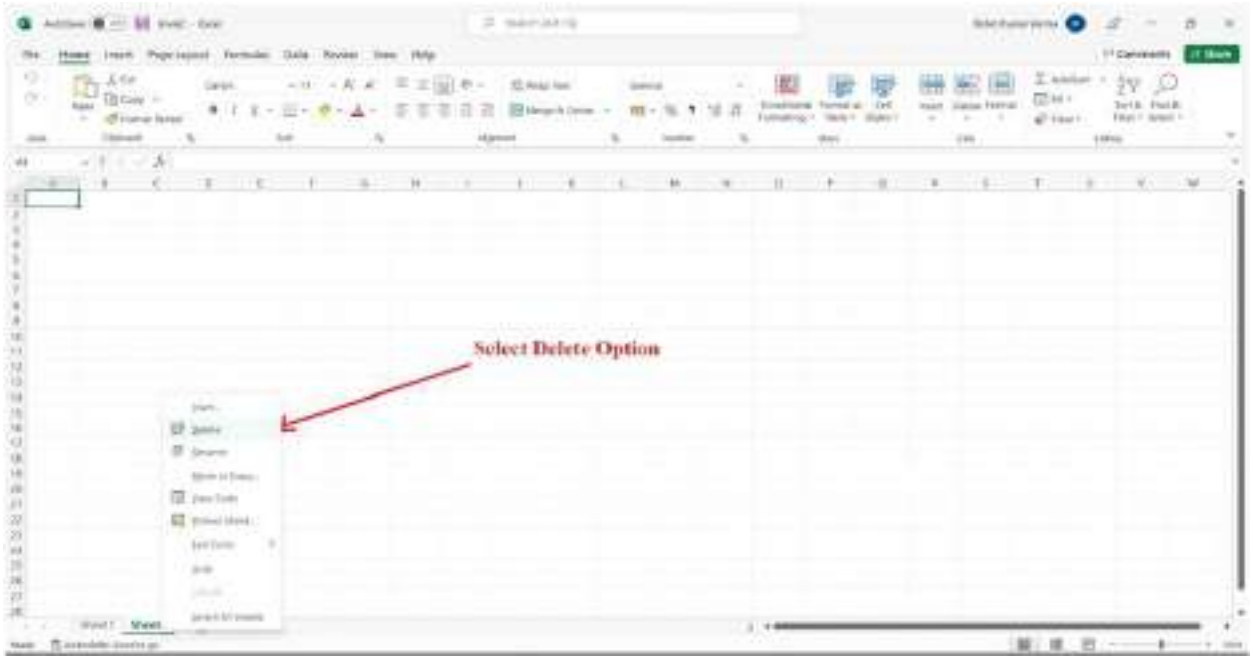
2.2.4 How to move a worksheet?

Excel gives the user complete control over where and how to move their worksheets. Drag the worksheet sheet tab to the desired spot by clicking on it.

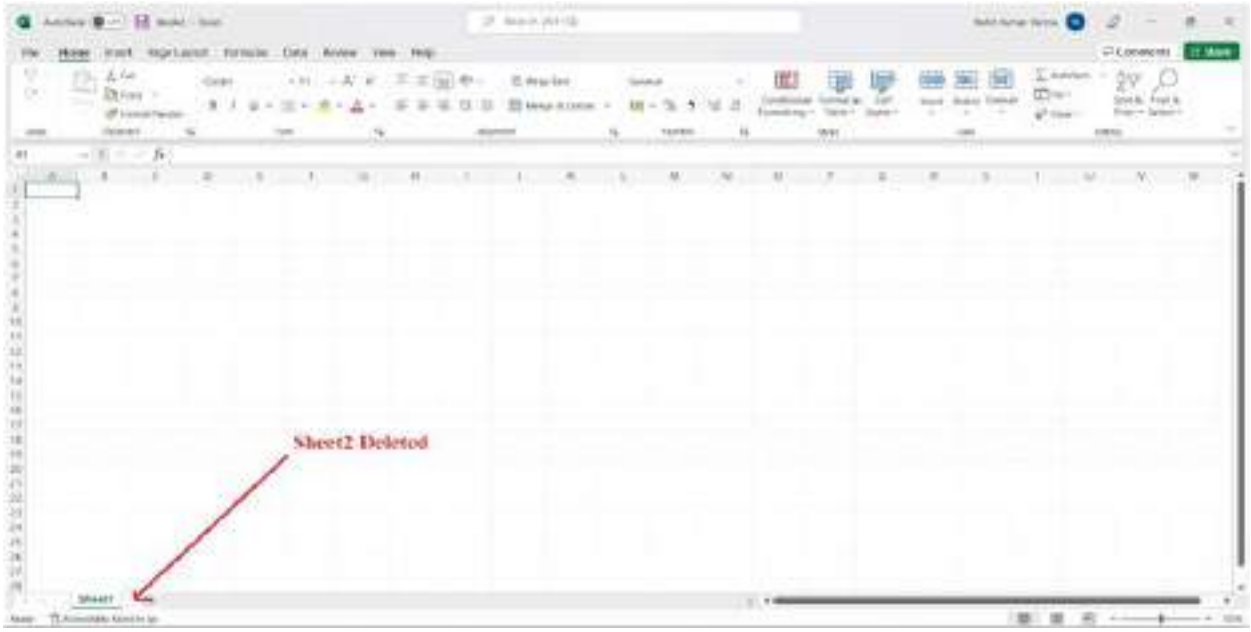
2.2.5 How to delete a worksheet?

The procedures listed below should help you to delete a worksheet:

- Right-click on a sheet tab at the bottom of the page.
- There will be a dialogue box. Select “Delete”



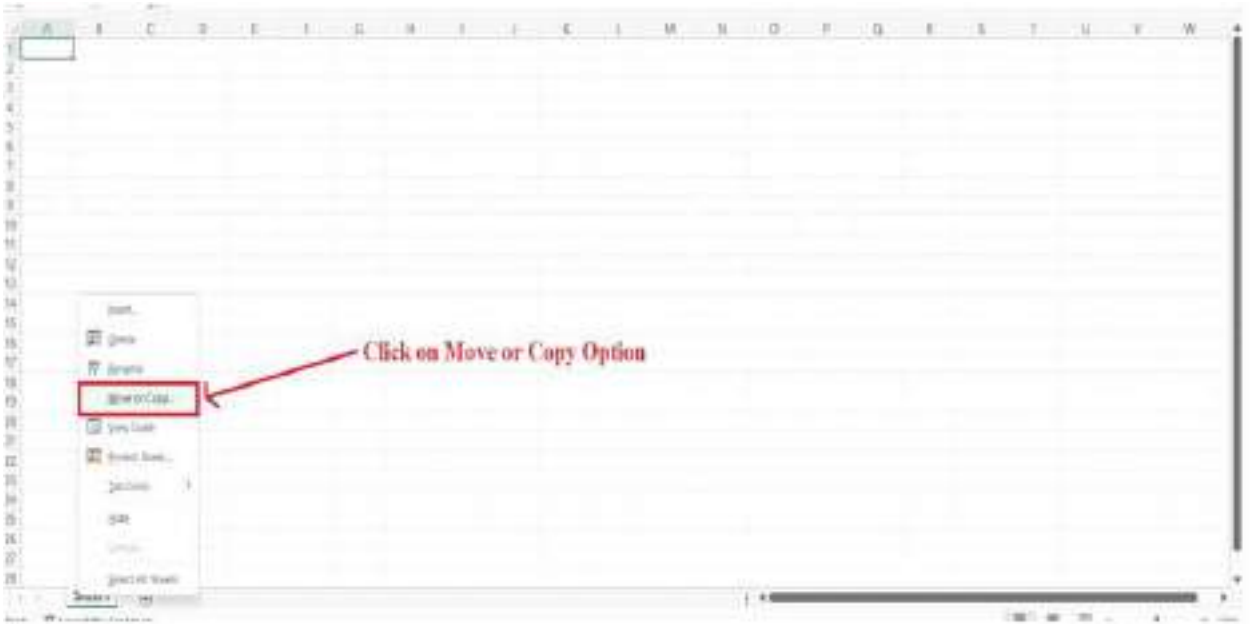
- The sheet will be removed right away as shown below.



2.2.6 How to copy a worksheet?

The procedures listed below should help you to copy a worksheet:

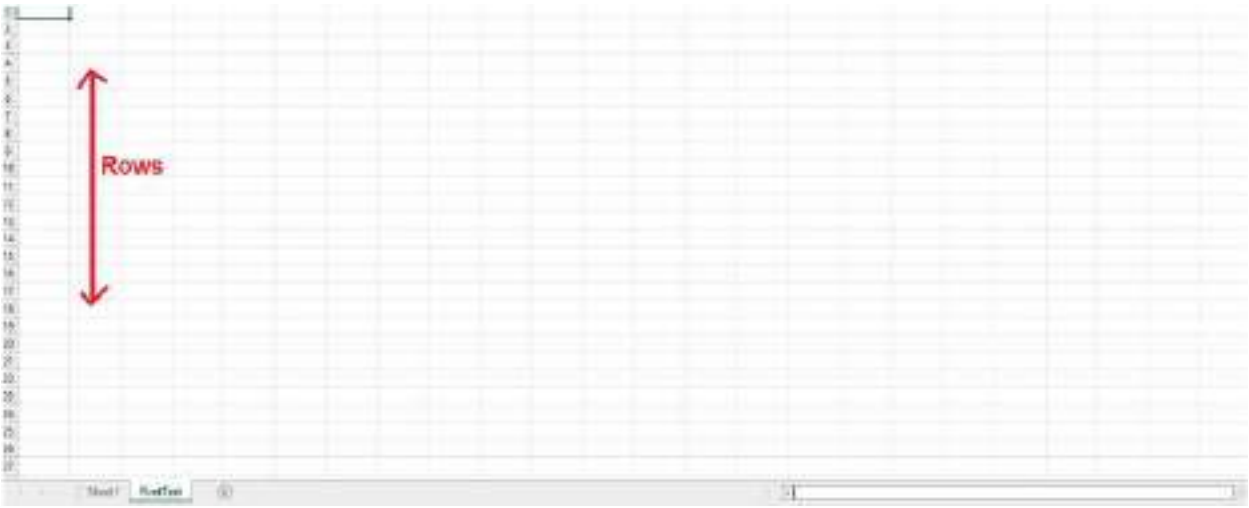
- To copy a sheet tab, use the right-click menu.
- You'll see the toolbar window. Select "Move or Copy" from the menu.



- It will show the "Move or Copy" dialogue box. Make sure to check the "create a copy" box when choosing the "move to end" option in the Before Sheet section.
- Select OK. Your information will be transferred to the new worksheet.

2.3 Introduction to Row

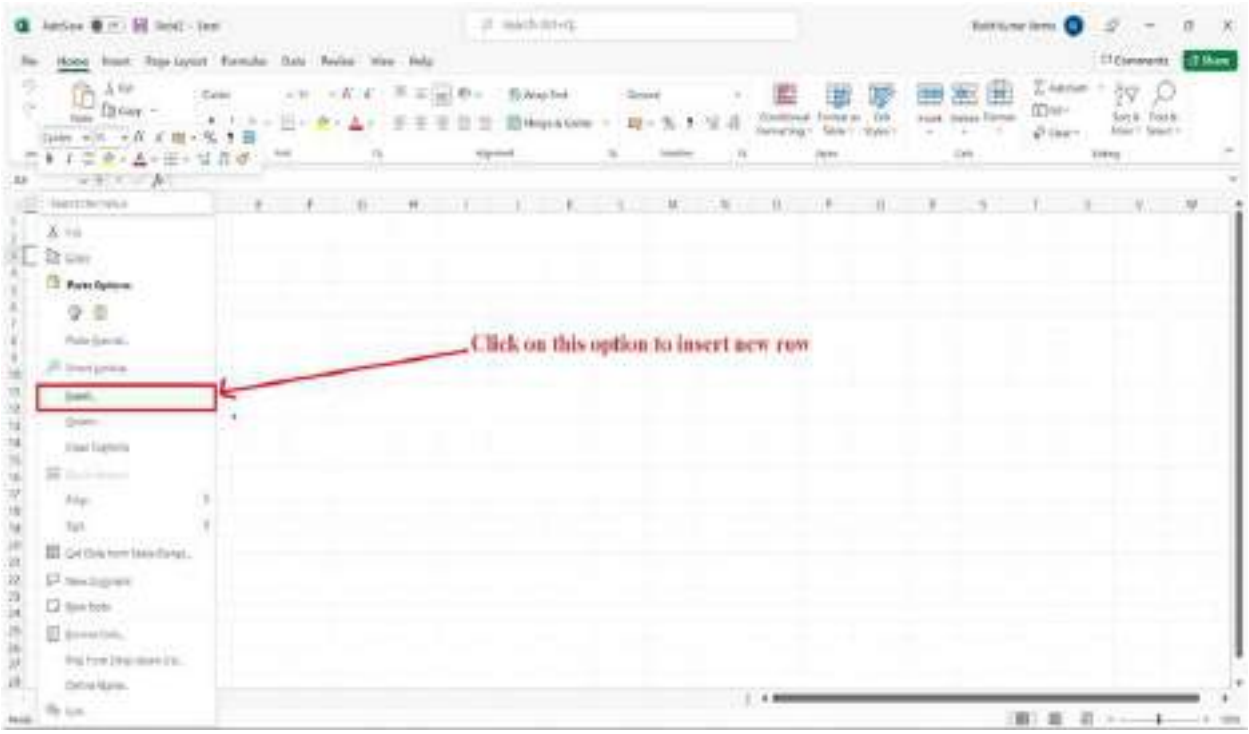
The worksheet has horizontal rows that go from 1 to 1048576. The number on the left side of the row, which indicates where the row came from, is used to identify a row.



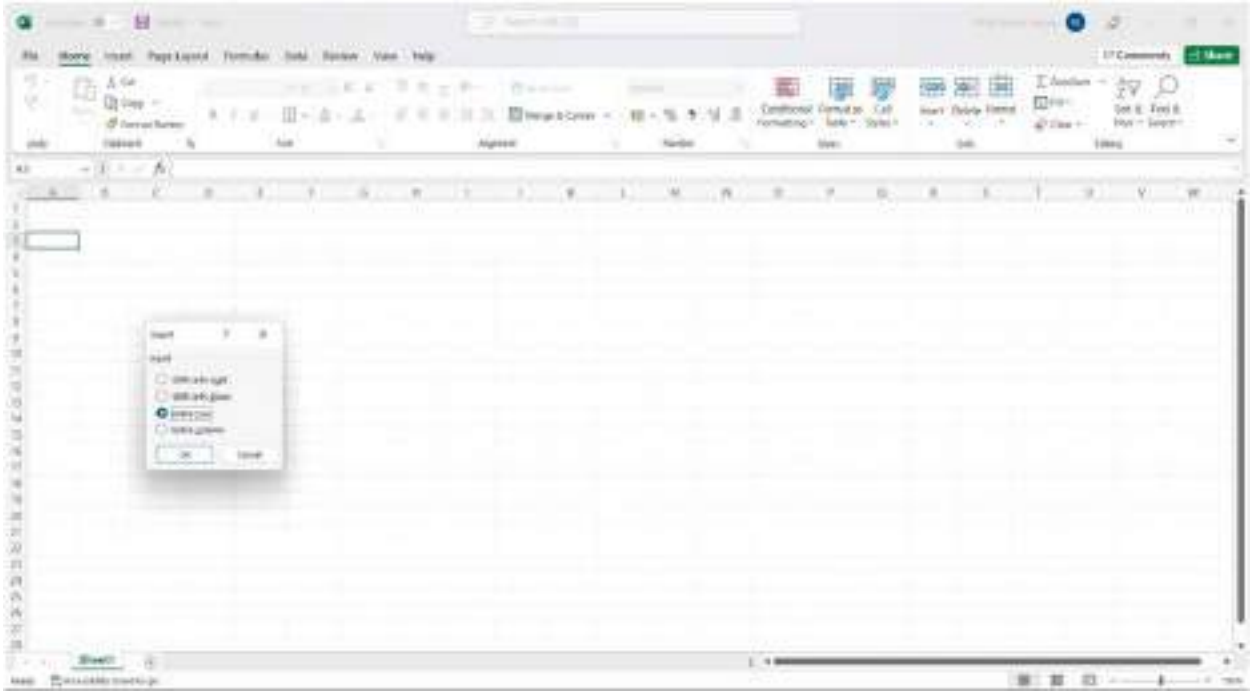
2.3.1 How to insert a row in Excel?

The procedures listed below should help you to insert a row in Excel:

- Choose the cell within the row where you want to introduce a new row by right-clicking it.
- The dialogue box will appear. Pick Insert.



- You'll see the insert dialogue box. Select "Entire row."

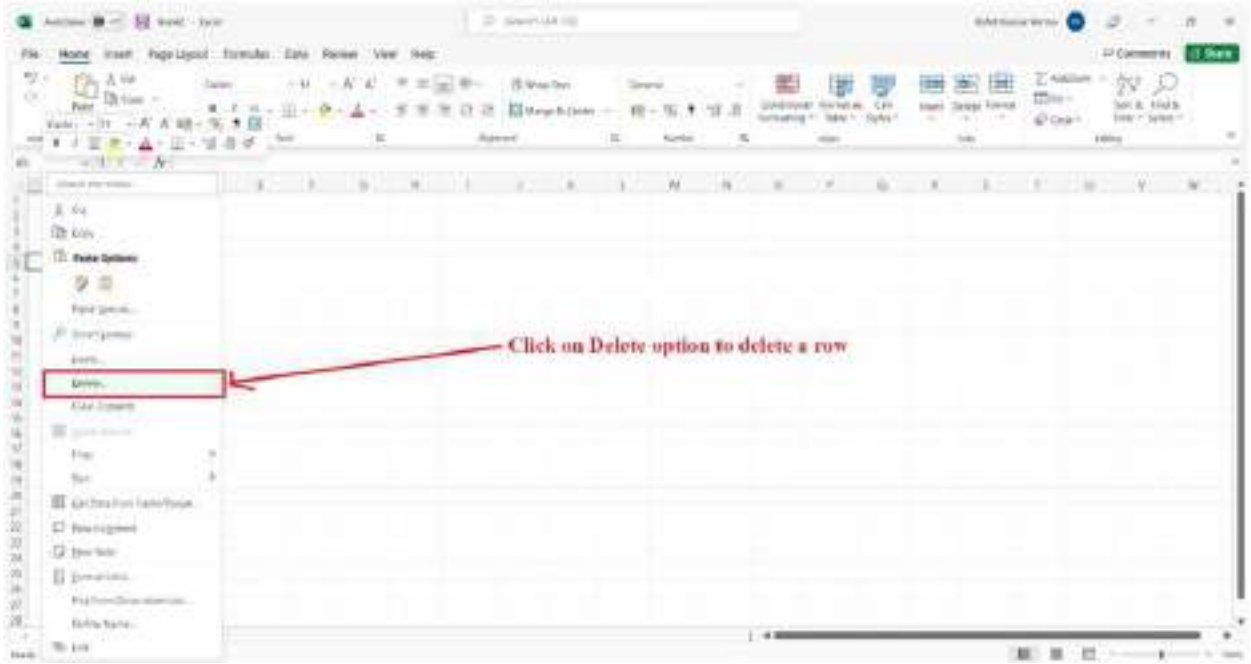


- At the top of the cell you've chosen, it will insert a new row.

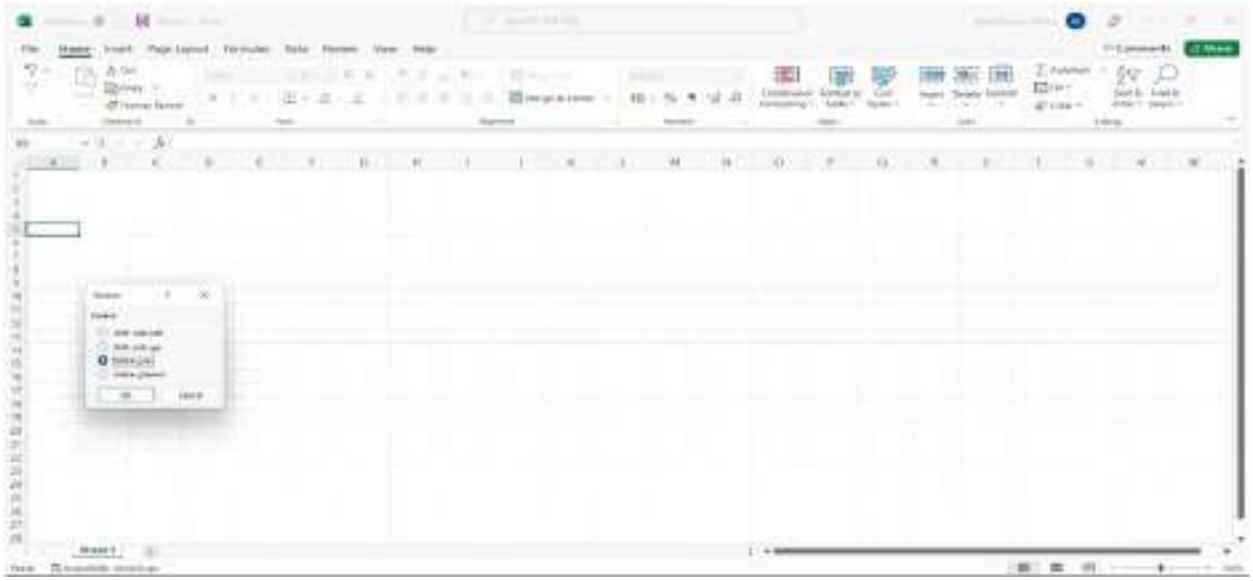
2.3.2 How to delete a row in Excel?

The procedures listed below should help you to delete a row in Excel:

- The cell you want to delete must be chosen from the row. Right-click the cell.
- It will show the dialogue box. Select Delete.



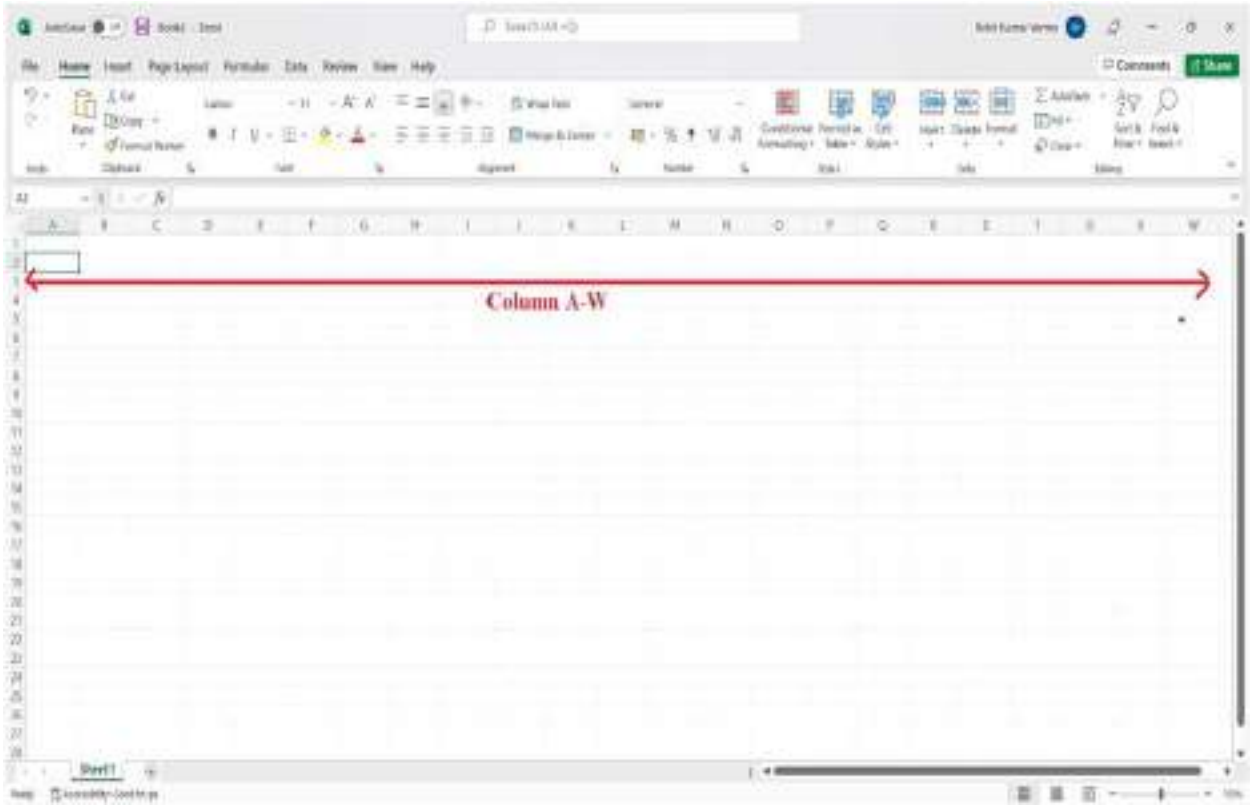
- You'll see the Delete dialogue box. Select "entire row" from the menu.



- It will immediately erase the entire row.

2.4 Introduction to Column

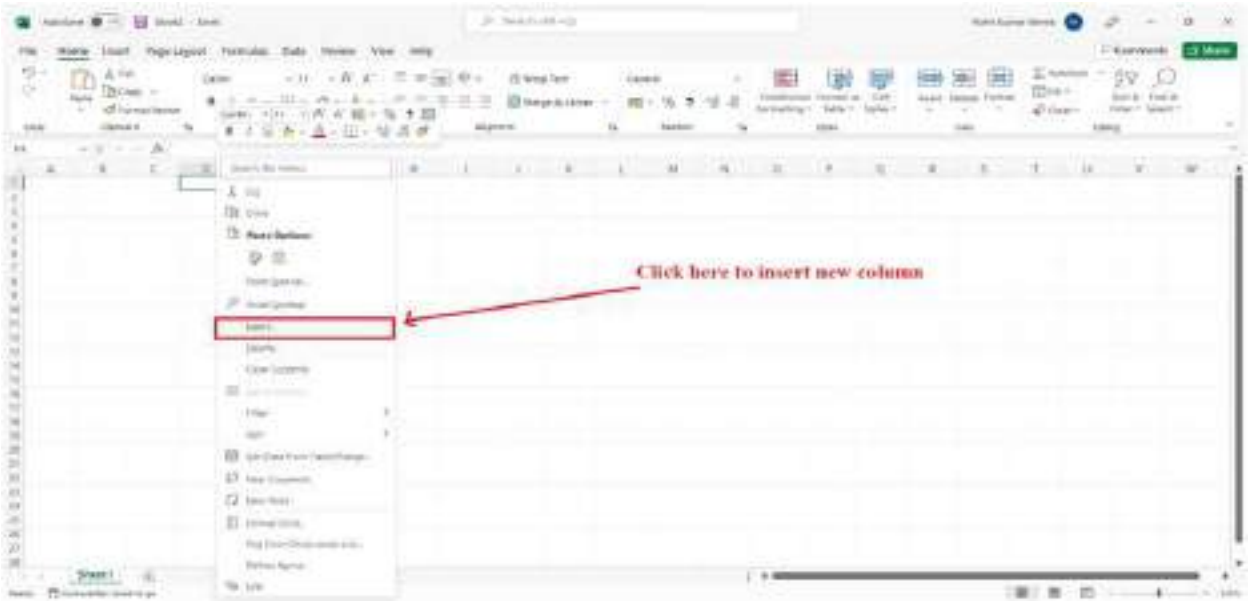
The worksheet is divided vertically into columns from A to XFD (in total 16384 columns). A column's header, which shows where the column comes from, at the top of the column serves as its identifier.



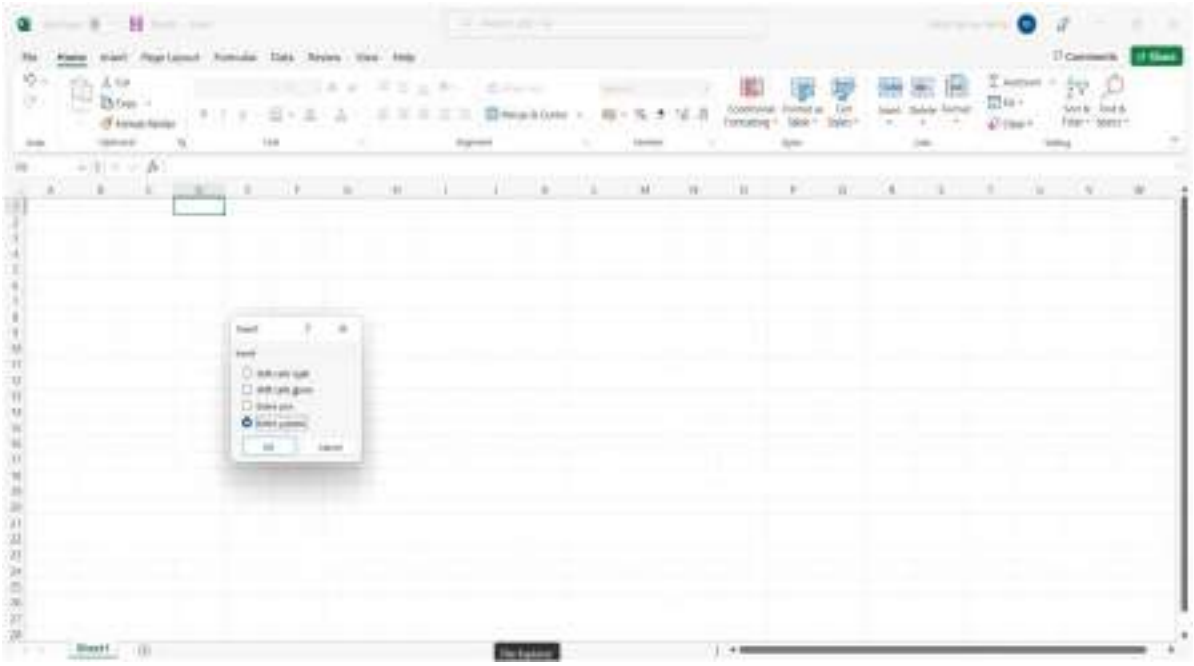
2.4.1 How to insert column in Excel?

The procedures listed below should help you to insert column in Excel:

- Choose the cell within the column you wish to insert a new column in by performing a right-click.
- It will show the dialogue box. Select Insert.



- You'll see the insert dialogue box. Select "Entire column."

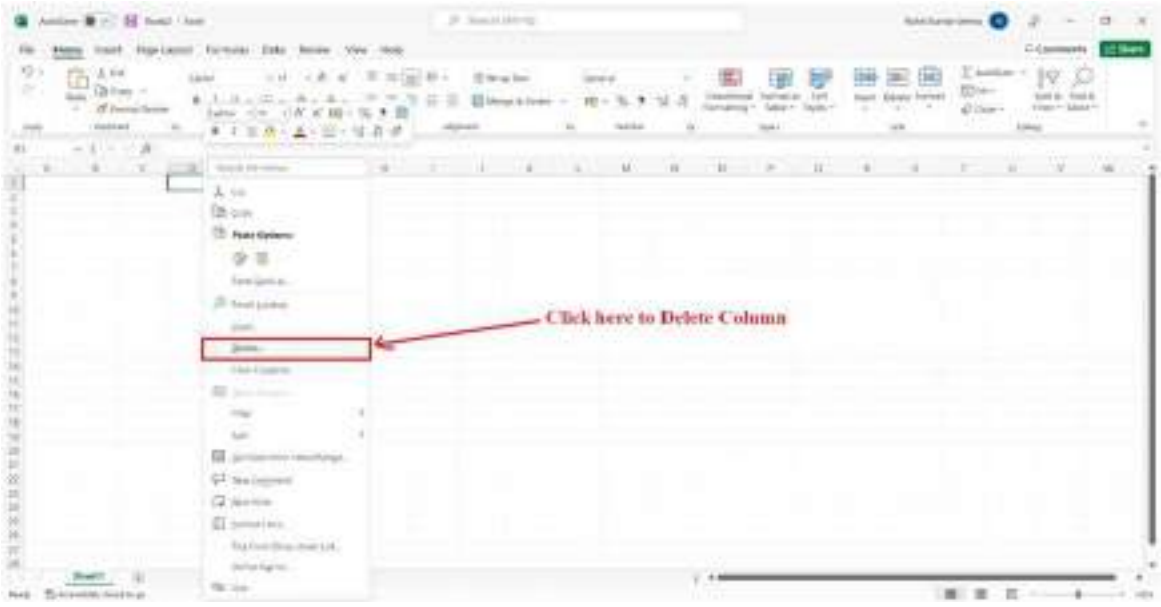


- It will add a new column to the left of the cell you've chosen.

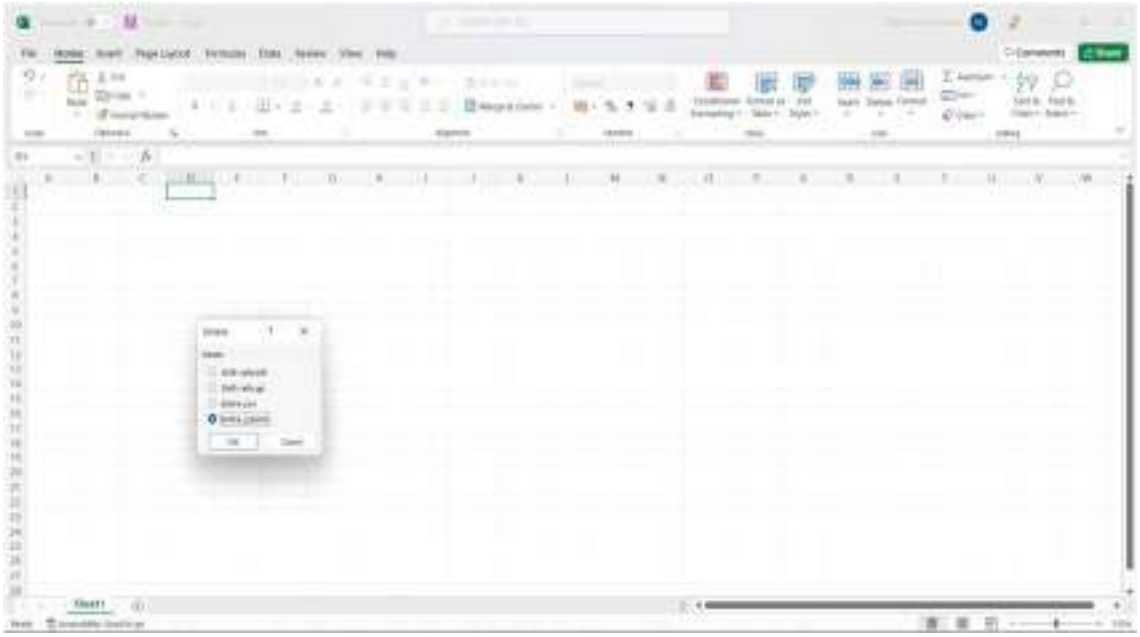
2.4.1 How to delete column in Excel?

The procedures listed below should help you to delete a column in Excel:

- The cell you want to delete must be chosen from the column. Right-click the cell.
- It will show the dialogue box. Select Delete.



- You'll see the delete dialogue box. Select "Entire column."



- It will immediately erase the entire column.

2.5 Summary

In this chapter, we have studied:

- A set of worksheets called an Excel workbook has rows and columns of data storage.
- A worksheet is a single page with a number of cells where the user can input, modify, and store data.
- The worksheet has horizontal rows that go from 1 to 1048576.
- The worksheet is divided vertically into columns from A to XFD (in total 16384 columns).

2.6 Answers to self-check exercises

Q.1 What is the difference between row and column?

Q.2 How workbook is different from worksheet?

Q.3 What are the various ways to create a new workbook?

Q.4 How we can rename a workbook?

Q.5 How we can move a worksheet?

Q.6 Mention various steps to insert a row and a column in Excel?

Q.7 How we can copy a worksheet?

2.7 Suggested Reading

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication.
- Dienes, Sheila s., Microsoft office, Professional for windows 95.
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365), Microsoft Press Publication.
- Kenneth N. Berk, Data Analysis with Microsoft Excel.
- Wayne L. Winston, Microsoft Excel 2013: Data Analysis and Business Modeling.
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals.
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional.
- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-3
MICROSOFT EXCEL WORKSHEETCELL

STRUCTURE

3.0 LEARNING OBJECTIVES

After going through this lesson, you will be able to:

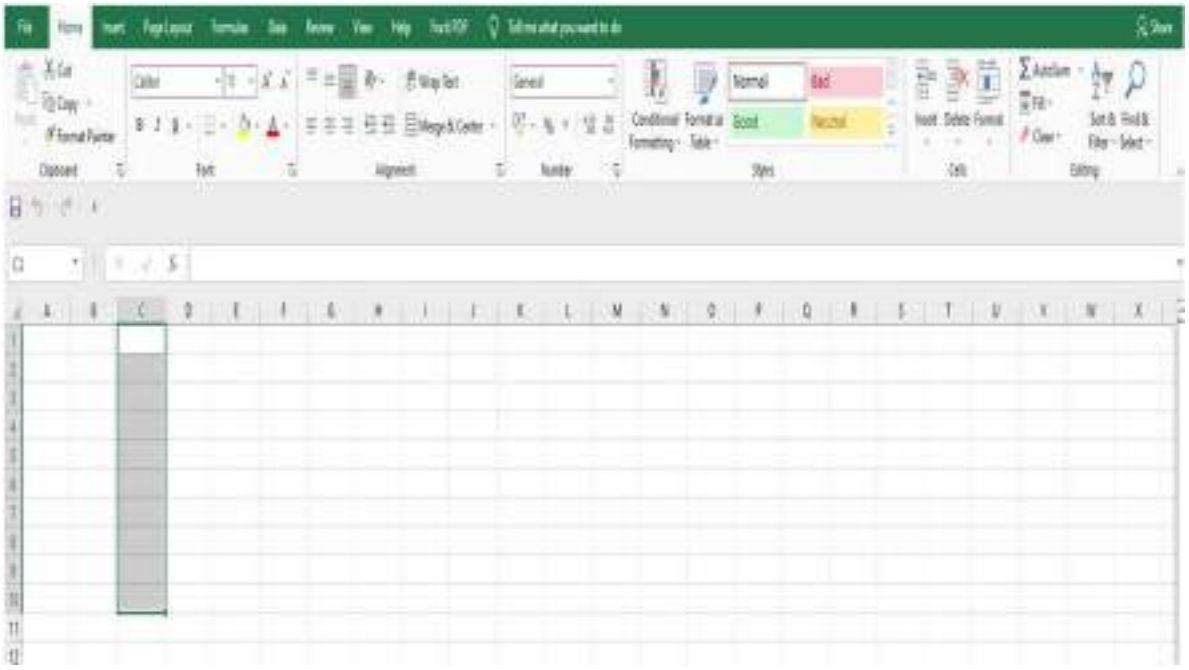
- Understand the basic of Microsoft Excel Worksheet Cell
- Understand the advantages of Microsoft Excel for Statistical Analysis
- Understand the disadvantage of Microsoft Excel for Statistical Analysis

3.1 Introduction of Microsoft Excel Worksheet Cell

The worksheet's cells are the little, rectangular boxes where we enter data. Row and column intersections form cells. The column header and row number serve as identifiers. Using a set of coordinates or positions, such as A1 (where A stands for a column and 1 for a row), C2, or H15, each cell in Excel is uniquely recognized.

Unlike changing the font style, font size, background colour, text alignment, format painter, wrap text, and conditional formatting, Excel cells can be used for a variety of activities.

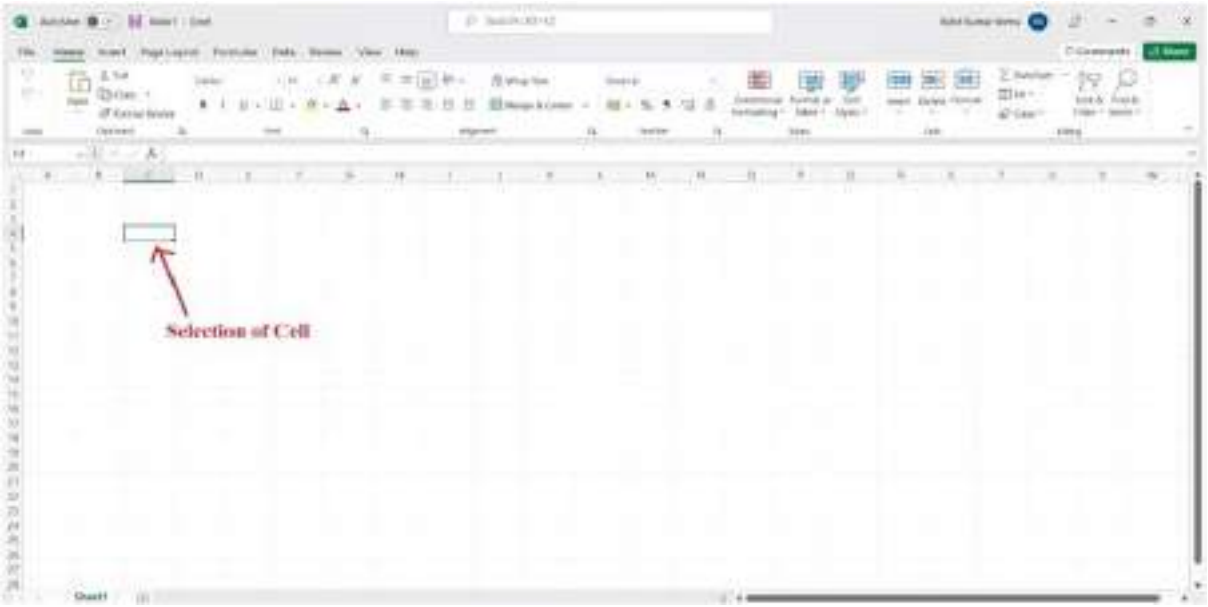
Multiple cells can be selected simultaneously in Excel. Cell range refers to a collection of chosen cells. The user refers to a cell range rather than a single cell address by using the colon-separated cell addresses of the first and final cells they have chosen. As an illustration, C1:C10 would be used to refer to a cell range that includes C2, C3, C4, C5, C6, C7, C8, C9, and C10.



3.1.1 How to select a Cell?

The steps to pick a cell in Excel are listed below:

- Select any cell by clicking it with your pointer.
- Your cell is now highlighted, has a rectangular border around it, and the column and row headings are now highlighted.

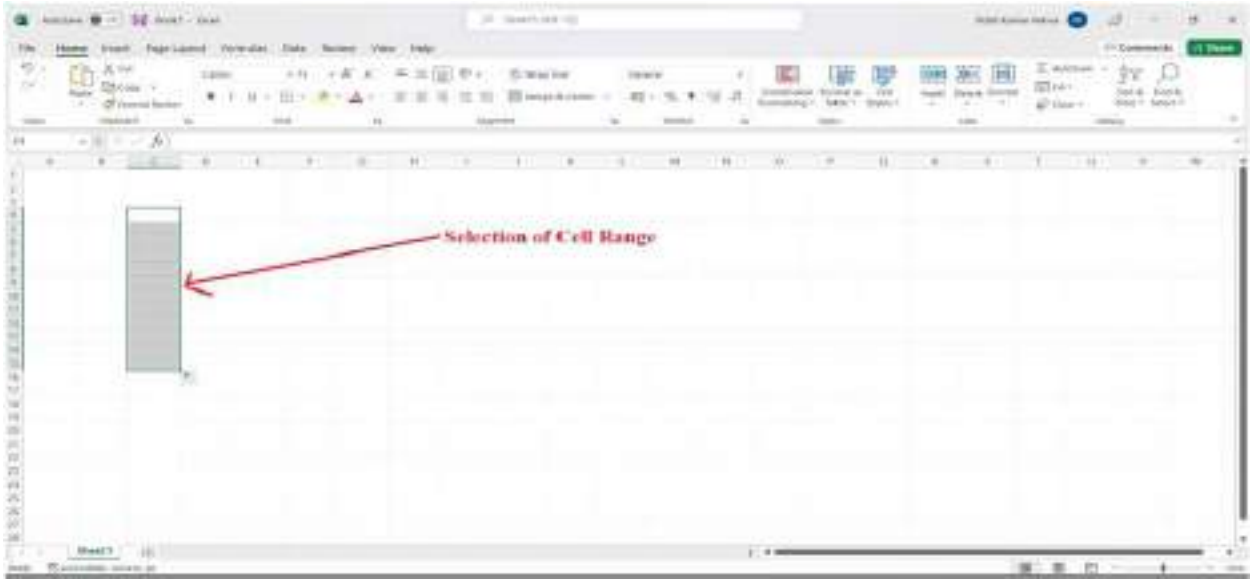


- Until the user moves the cursor to another cell, the selected cell will remain such.

3.1.2 How to select Cell Range?

The steps to select a cell range in Excel are listed below:

- Selecting a cell begins with clicking on the first cell. When you wish to finish the cell range, hold your cursor down and drag it to the final adjacent cells.

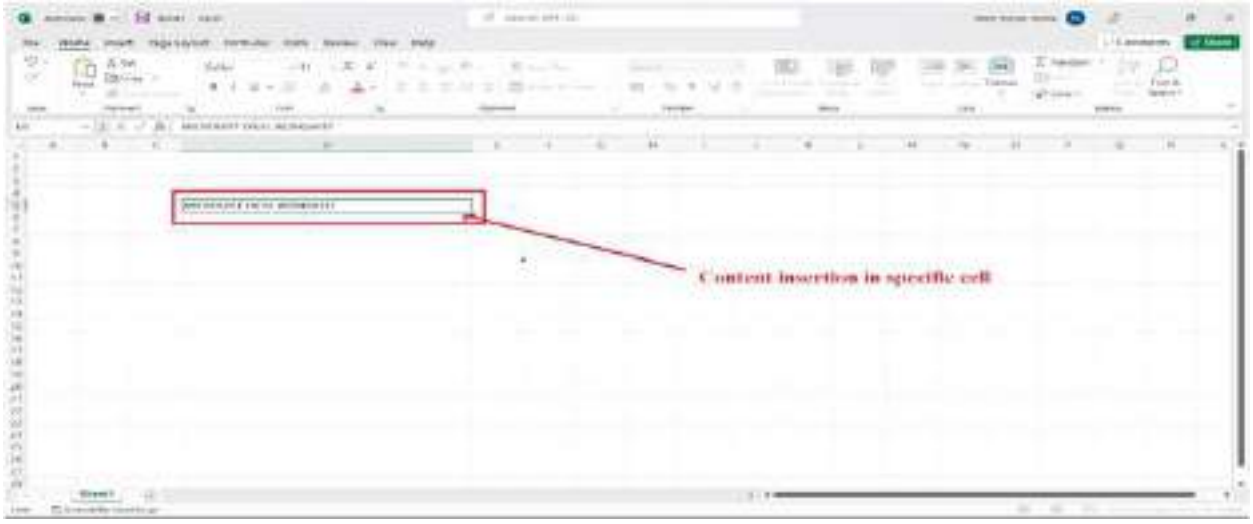


- When you're finished, click and drag the cursor to pick the desired cell range.
- Until the user moves the cursor to another cell, the selected cell will stay selected.

3.1.3 How to insert content to a cell?

The steps to insert content to a cell in Excel are listed below:

- The cell where you want to insert the content should be clicked and selected.
- Enter the required information into the highlighted cell, then press Enter or shift your pointer to a different cell. Both the formula bar and the cell's content will display the content.



3.1.4 How to delete cell content?

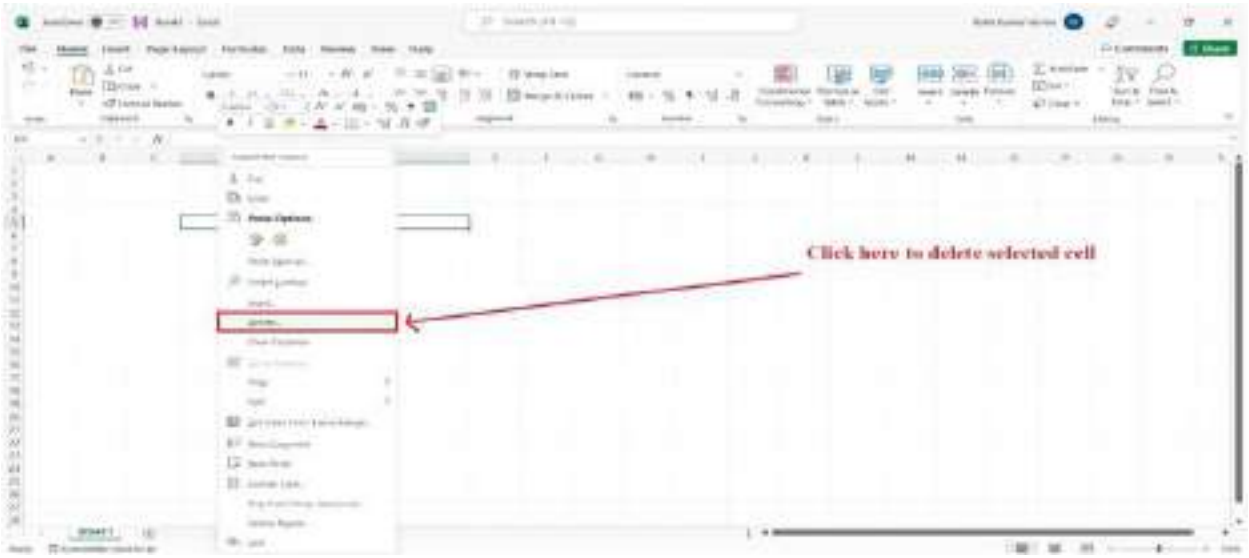
The steps to delete cell content in Excel are listed below:

- Select the cell by clicking.
- Press the Delete or Backspace key on your keyboard to remove the cell's content.
- Select the cell range, then press the Erase key to delete several cells.

3.1.5 How to delete cell?

The steps to delete cell in Excel are listed below:

- Select the cell by clicking it (s).
- Simply right-click the cell. It will show the dialogue box. Select Delete.



- The Delete dialogue box shown below will appear. Select “entire row” from the menu.
- The cells underneath the deleted cell will immediately move upward.

3.1.6 How to drag and drop cell?

The steps to drag and drop cell in Excel are listed below:

- Select the cell by clicking it (s).
- When your cursor turns into a black cross with four arrows, move it over the border of the selected cell or cells. Excel Worksheet, Rows, Columns, and Cells
- To paste the content, move the mouse cursor to the desired cell. The mouse pointer will now appear as a dot-filled rectangle.
- The content will be copied from the source cell and pasted in the chosen location once the cursor is released.

3.2 History of Microsoft Excel

Excel has seen numerous changes in terms of function diversity, functionality, and capacity since its creation. In 1985, Microsoft released the initial version of Excel, which was exclusively compatible with Apple Macintosh computers. The description of Microsoft Excel in all versions is provided below:

Sr. No.	Name	Released	Description
1	Version 1	1985	Excel’s initial release was limited to Macs only. Many Excel lovers are still unaware of this, which may sound unusual. In 1982, Microsoft actually created a spreadsheet tool called Multiplan, but it was a failure. Up to 2016, Excel versions for various operating systems had several names.
2	Excel 2	1987	To match the Mac version, the first Microsoft Excel release for Windows was labeled “2”. It was essentially a port of the Mac “Excel 2,” and it incorporated a run-time version of Windows.
3	Excel 3	1990	Toolbars, drawing capabilities, outlining, support for add-ins, 3D charts, and numerous other additional features were included in the subsequent edition.

4	Excel 4	1992	The first “popular” version of Excel was version 4. Numerous usability features were implemented, such as AutoFill, which was initially made available in this edition.
5	Excel 5	1993	A significant improvement came with Excel version 5. Workbooks with multiple worksheets, support for VBA, and macros were all included. Excel’s vulnerability to macro virus attacks increased as a result of these additional features, and this problem persisted all the way up to the 2007 update.
6	Excel 95	1995	It was the first significant 32-bit version of Excel and was referred to as Excel 95. A 32-bit version of Excel 5 was also available, but due to distribution issues, it was not extensively used. Excel 95 and Excel 5 are quite comparable in terms of features. You might also be perplexed as to why Excel 6 doesn’t exist. Version numbering was altered, and starting with Excel 7, the same version number was implemented throughout all Microsoft Office programmes.
7	Excel 97	1997	This version included many new features, including UserForms, data validation, and a new interface for VBA developers. Do you recall the annoying Office Assistant Clippy? He was part of this version.
8	Excel 2000	1999	The usage of HTML as a native file format, a “self-repair” function, an improved clipboard, pivot charts, and modeless user forms are some of the new features.

9	Excel 2002	2001	This is the first version of Excel included with Office XP. The extensive list of new features wasn't really useful to the typical user. The new option that enables you to recover your work should Excel crash was one of the most important innovations. Additionally, this edition includes a useful feature called product activation technology, sometimes referred to as copy protection, which restricts the use of the software to a single machine. The implications of this should be taken into account before determining whether to update.
10	Microsoft Office Excel 2003	2003	This version added enhanced XML compatibility, a new "list range" feature, improvements to Smart Tags, and rectified statistical functions. The majority of people won't think the upgrade connected to data is desirable.
11	Microsoft Office Excel 2007	2007	Excel had some significant changes with this Windows release. These included the introduction of the Ribbon interface and the switch from the original .xls file format to the more widely used .xlsx and.xlsm. This modification improved Excel's security (remember the issues with macro viruses in earlier versions?) and made greater row data storage possible (over 1 million). Also substantially enhanced were the charting features. The loss of Clippy from Microsoft Excel was a tragic aspect of the upgrade, which caused some people joy and others pain.

12	Microsoft Office Excel 2010		2010 Sparkline graphics, pivot table slicers, an updated Solver, and a 64-bit version were among the new features in this Excel edition. If you're wondering why Microsoft chose version 14 over 13 instead, it's because 13 is regarded as a bad luck number.
13	Microsoft Excel 2013	2013	This version featured the single-document interface, suggested charts and pivot tables, new charting upgrades, and more than 50 new functions.
14	Microsoft Excel 2016	2016	Despite having separate software versions, Excel for Mac and Windows are now referred to by the same name. If you also subscribe to Office 365, certain Internet upgrades for Excel are available that can greatly alter your user experience. Thus, older versions including ones purchased at retail are at a disadvantage. Histograms, Pareto charts, and PowerPivot, which allows for the import of higher levels of data and has its own language, are some of the newly added features in this version. Histograms are used to depict frequency in data.
15	Microsoft Excel 2019	2019	The new charts, which change how data is presented, are one of the more noticeable new additions of this version. Some of the new data presentation charts that help your data look tidy and organised include map charts and funnel diagrams. Additionally, you have the option to add 3D images to your workbooks.

16	Microsoft Excel 2021	2021	As of right now, this is Microsoft Excel's most recent version. Naturally, it has all the functionality of older Excel versions and even more. This version adds numerous features to earlier versions, including Unhide Multiple Sheets, Navigation Pane, Resize Conditional Formatting Box, and LAMBDA Helper Functions.

3.3 Advantages of Microsoft Excel for Statistical Analysis

- **Easy Data Storage:** MS Excel is frequently used to save or analyse data because there is no limit to the amount of information that can be recorded in a spreadsheet. In Excel, information filtering is simple and practical.
- **Simple Data Recovery:** Finding the information might take longer if it were written on paper, but this is not the case with excel spreadsheets. It is simple to locate and retrieve data.
- **Use of Mathematical Formulas:**The MS Excel formulae function has made performing calculations simpler and quicker.
- **Extra Secure:** When compared to data stored on registers or paper, these spreadsheets have a much lower chance of being lost and can be password-secured on a laptop or desktop computer.
- **Data in one location:** When the paperwork was completed, data had to be preserved in various files and registers. Now that multiple worksheets may be added to a single MS Excel file, this has become convenient.
- **Information Visibility Is Sharper and Clearer:** Analysing the data is much simpler when it is recorded as a table. Information is therefore a more readable and intelligible spreadsheet.

3.4 Disadvantages of Microsoft Excel for Statistical Analysis

- **The data source is challenging with Excel:** Excel's difficulty in evaluating real-time unstructured and semi-structured data is one of its biggest drawbacks. On the other hand, a lot of recent and upcoming data analytics technologies are capable of swiftly identifying this kind of data and producing representations. When it comes to data formats like JSON, Excel likewise struggles. JSON is the fastest-growing data type due to the rise of mobile data, apps, and IoT devices. Even the most seasoned Excel users face a hurdle with its intricate structure. However, individuals employing contemporary analytics tools may quickly decode and examine this kind of data in an Excel-like setting.

- **Excel cannot create interactive dashboards:** Utilizing a data visualization tool, you can mix various chart types to produce dynamic dashboards that list all of your KPIs in one location. After that, you can delve more deeply into each chart, examining its level of detail and looking for trends. Excel allows you to create dashboards, but they are static, only display high-level trends, and act as an endpoint rather than the beginning of the additional investigation. When compared to dynamic dashboards, which have the capability of automatic updates, this is a drawback.
- **Excel doesn't provide real-time updates:** Spreadsheets in Excel are used to store stale data. Data gets outdated the instant you import a CSV file and build out a worksheet because it isn't connected to a live data warehouse. Users are compelled by this to endure tedious manual procedures in order to repeatedly submit the same information. A cloud-based data visualization tool may easily connect to dozens of data sources using a cloud data warehouse like Snowflake, whereas Excel can connect to external data sources via plugins. In this way, you can rapidly get the most recent data, display it quickly, distribute it around your organisation, and use it to instantly make smarter business decisions.
- **Excel Is Not a Collaboration Tool:** Most Excel files live locally. While they do have connectivity to the cloud, the worksheets are primarily intended for solitary usage and lack sophisticated collaboration features. Every time someone wants to build on the work of another person, this leads to infinite duplication of effort and chaos from an organisational standpoint. Analyses carried out in a vacuum are a waste of time. Excel can eventually put businesses at a disadvantage since it makes it difficult for teams to properly communicate information, collaborate, and find solutions. Teams may eliminate data silos, work more effectively together, and elevate each other's work by using a data visualisation tool. By first deriving insights from the primary and then deriving insights from those insights, this is how you construct compound interest with data.
- **Sprawling Spreadsheets Poses a Security Risk:** It is risky to download data to a spreadsheet and store it locally. Excel spreadsheets don't require professional SQL coding knowledge, unlike BI tools, which is why so many corporate customers still use them in spite of the dangers. Unfortunately, the risks are numerous, and it also has many drawbacks. There is a lack of security and compliance monitoring when data is downloaded to Excel since the data team is unable to monitor how employees utilise or distribute the data. Vulnerabilities, lost data, and misuse result from this.

3.5 Summary

In this chapter, we have studied:

- The worksheet's cells are the little, rectangular boxes where we enter data.
- Excel has seen numerous changes in terms of function diversity, functionality, and capacity since its creation.

- The MS Excel formulae function has made performing calculations simpler and quicker.
- MS Excel is frequently used to save or analyse data because there is no limit to the amount of information that can be recorded in a spreadsheet.

3.6 Answers to self-check exercises

Q.1 What do you mean by Cell?

Q.2 How to select a Cell?

Q.3 How to drag and drop cell?

Q.4 How to delete cell content?

Q.5 How to insert content to a cell?

Q.6 How to select Cell Range?

Q.7 Explain history of Microsoft Excel.

Q.8 What are various advantages of Microsoft Excel for Statistical Analysis?

Q.9 Explain various disadvantages of Microsoft Excel for Statistical Analysis?

3.7 Suggested Reading

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication.
- Dienes, Sheila s., Microsoft office, Professional for windows 95.
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365), Microsoft Press Publication.
- Kenneth N. Berk, Data Analysis with Microsoft Excel.
- Wayne L. Winston, Microsoft Excel 2013: Data Analysis and Business Modeling.
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals.
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional.
- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-4
MICROSOFT EXCEL TITLE BAR, MENU BAR AND TOOLBAR

STRUCTURE

4.0 LEARNING OBJECTIVES

After going through this lesson, you will be able to:

- Understand the basic of Microsoft Excel Worksheet Title Bar
- Understand the basic of Microsoft Excel Worksheet Menu Bar
- Understand the basic of Microsoft Excel Worksheet Toolbar
- Understand the basic of Formula and Function

4.1 Introduction of Microsoft Excel Worksheet Title Bar

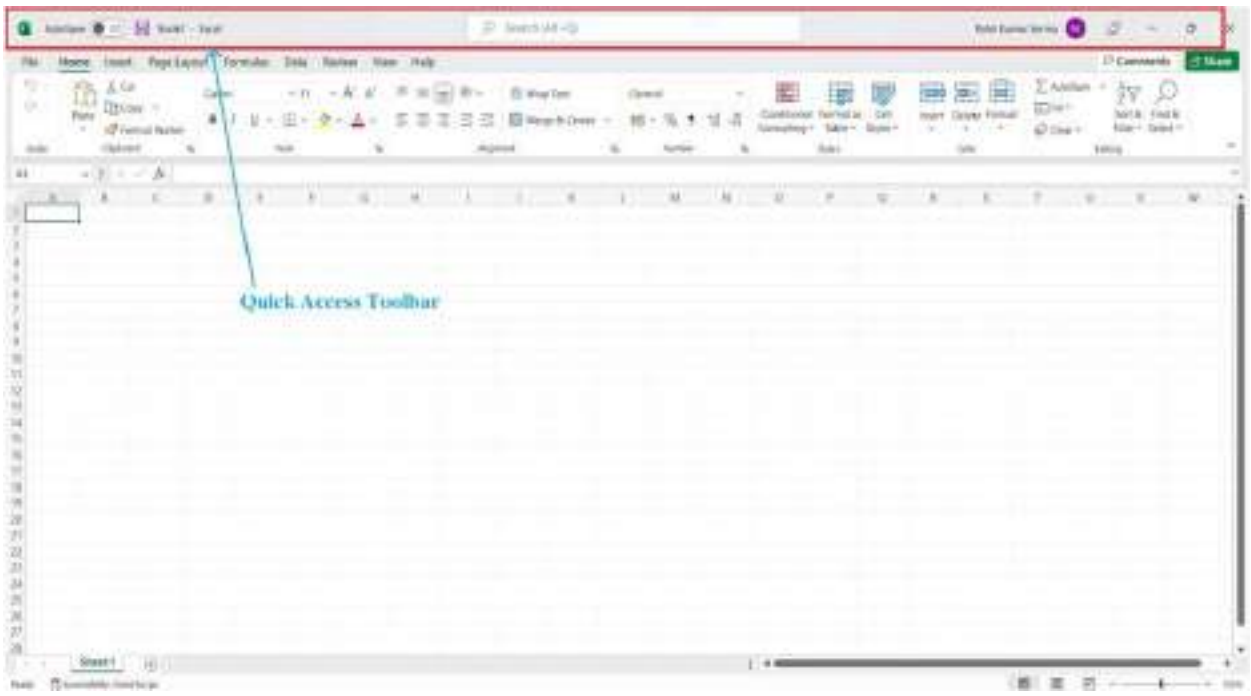
The excel file's title is held by the bar known as the Title Bar. But it also has a lot of other crucial features in addition to presenting the title.

The title bar has three sections:

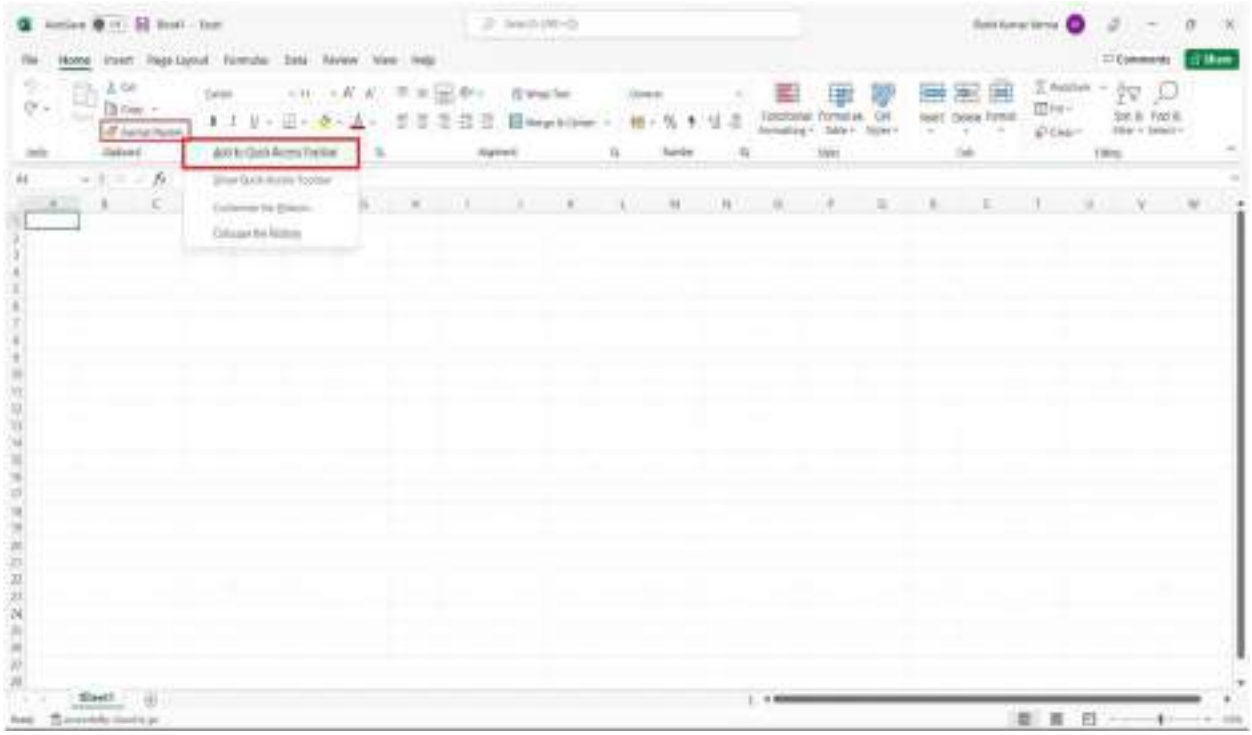
- Quick Access Toolbar
- File Name
- The Minimize, Maximize/Restore, and Close buttons

Quick Access Toolbar

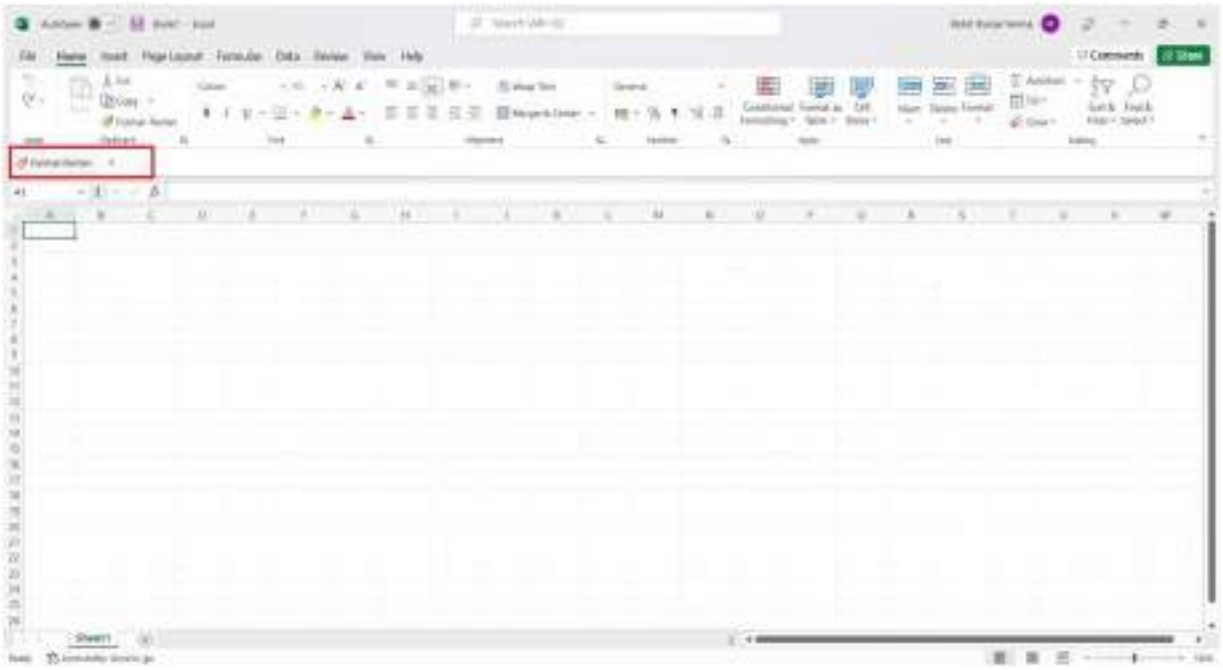
We can add commands to the Quick Access Toolbar that we commonly use. You can add the desired commands here by following these procedures.



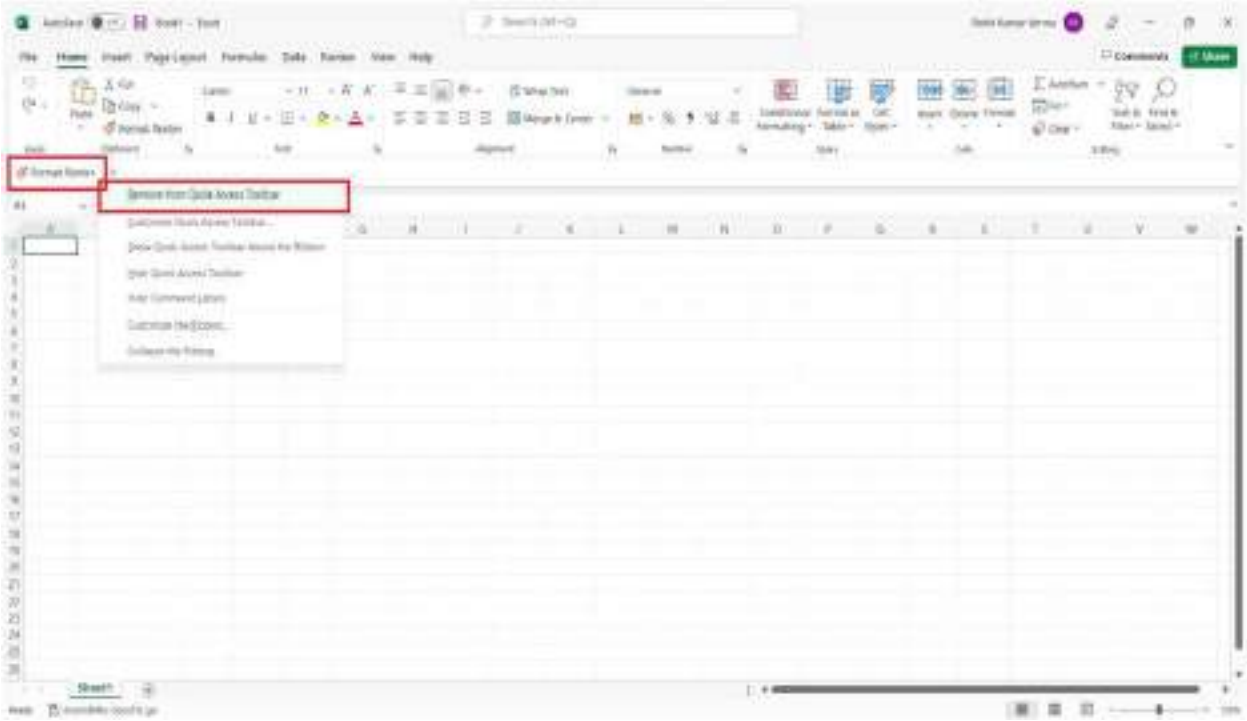
- Right-click the command you want to use. (In the example below, we have “Format Painter” chosen as a desired command.)
- Choose “Add to Quick Access Toolbar” from the menu.



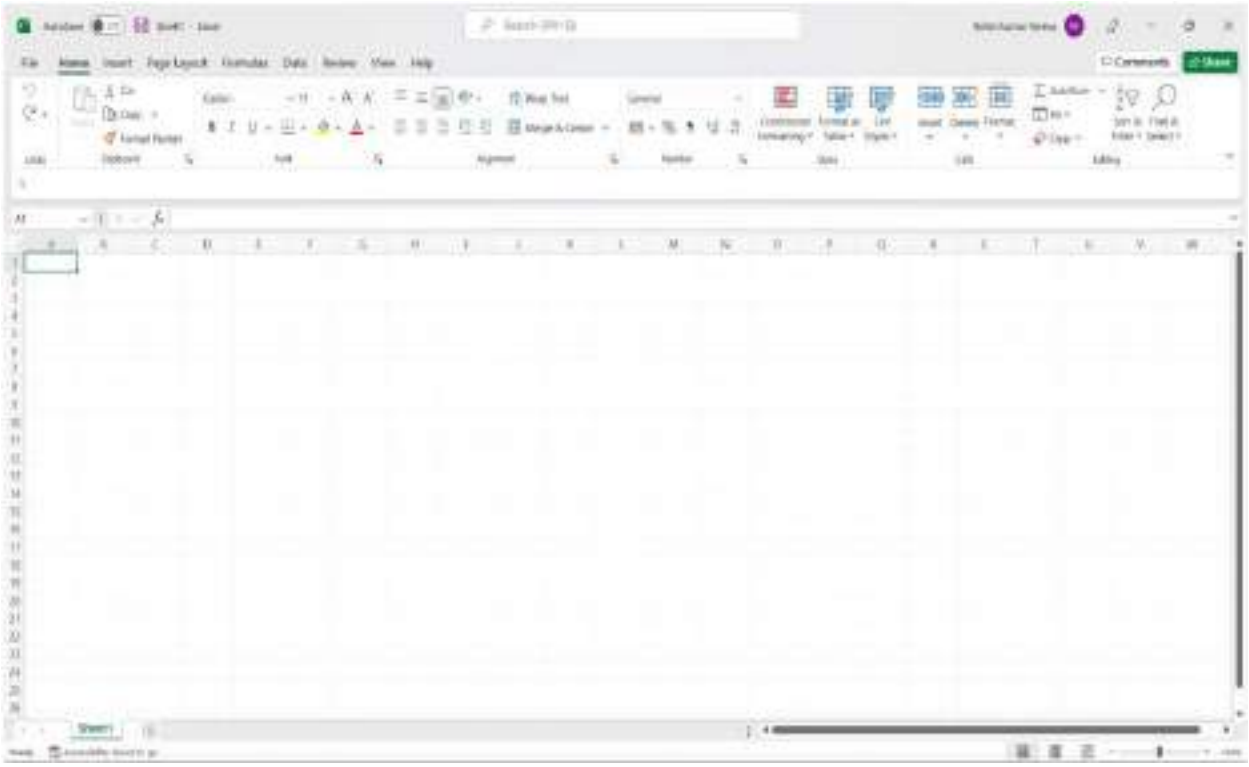
- The “Format Painter” command has now been added to the Quick Access Toolbar, as you can see.



- Simply right-click on the relevant command and choose “Remove from Quick Access Toolbar” from the menu that appears.

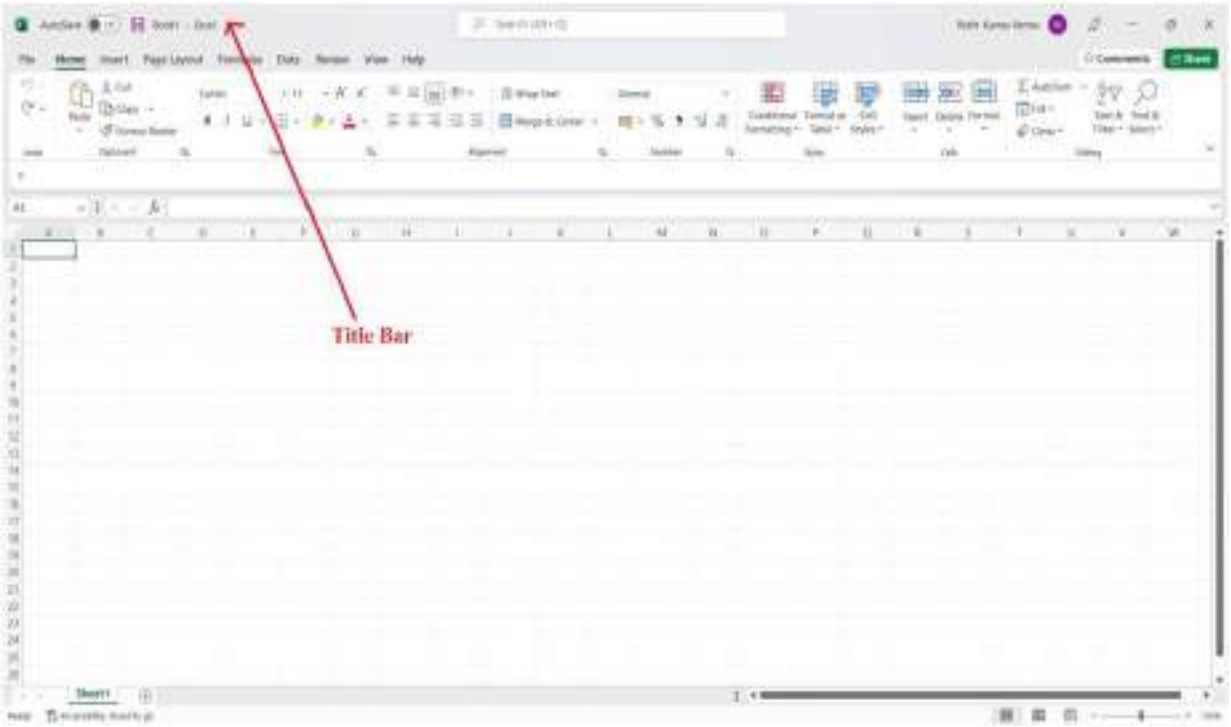


- You will now see that the “Format Painter” command has been deleted from the Quick Access Toolbar.



File Name

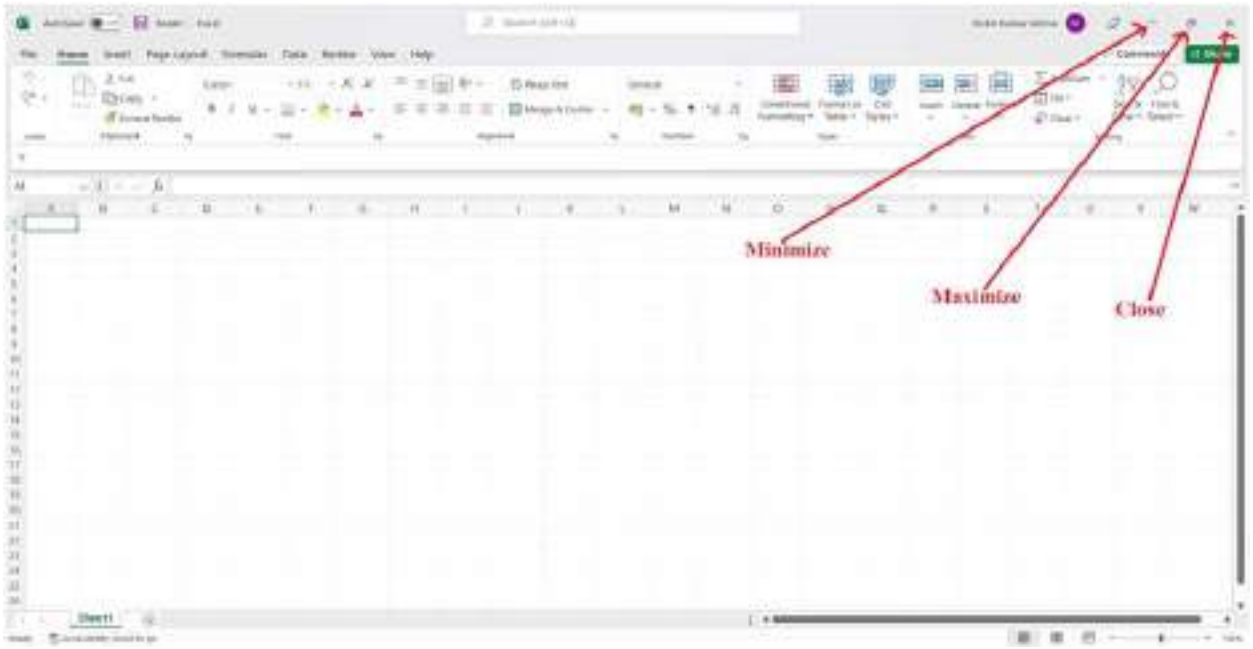
It displays the file name we gave to our excel file. The excel file name is “Book 1” in the screenshot below, and “- Excel” signifies that this is an excel file.



Minimize, Maximize/Restore, Close Buttons

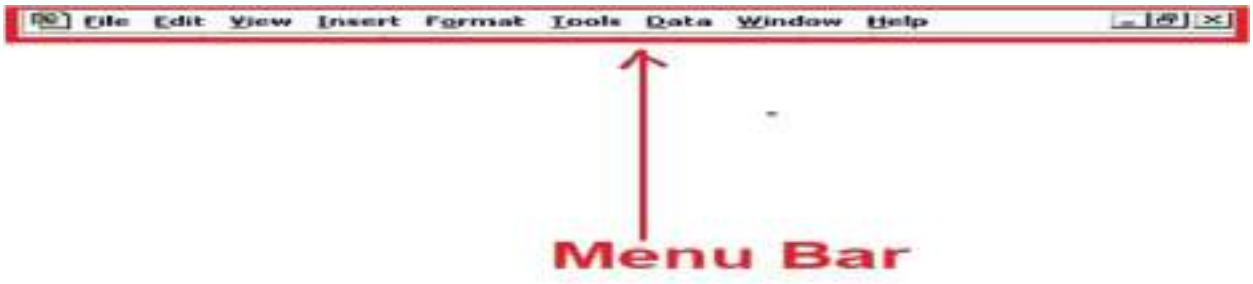
On the right side of the Title Bar are these buttons:

- Minimize: This button has a minus-like appearance. This button will relocate the Excel window to the Taskbar (Taskbar is located at the bottom of the screen).
- Maximize/Restore: When we click on this, the Excel window will fill the entire screen. The Excel window will appear in a lesser size if we click this button after it has already been stretched to fill the entire screen, allowing us to resize the window.
- Close: Select this button to shut off the Excel document.

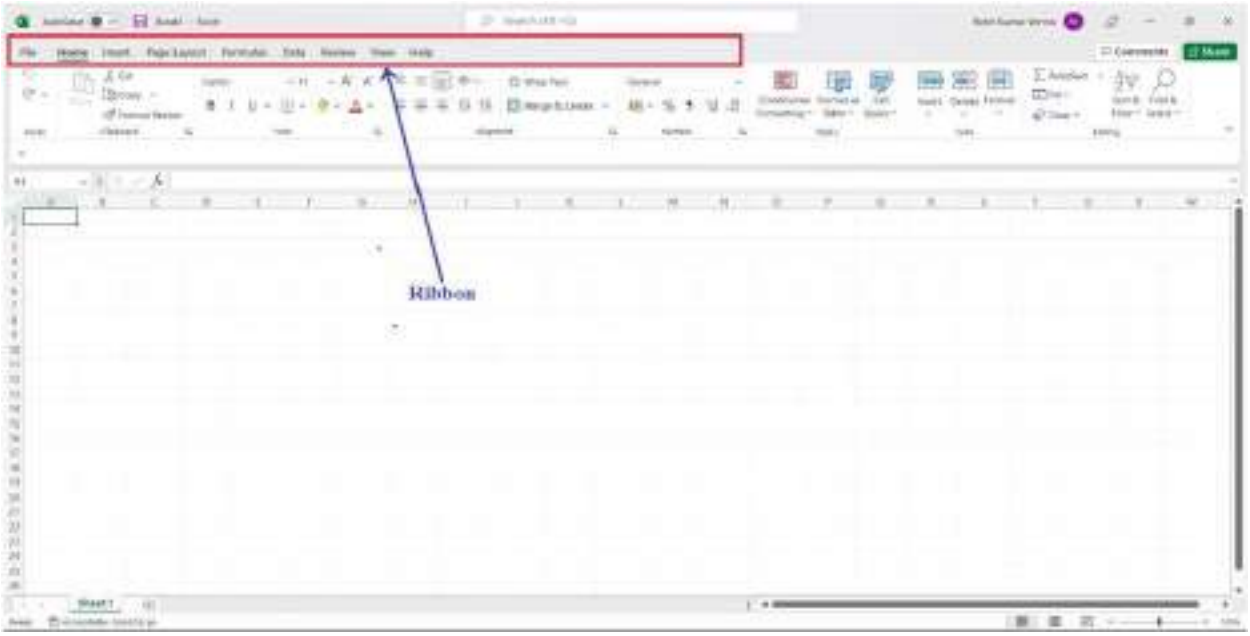


4.2 Introduction of Microsoft Excel Worksheet Menu Bar

You may access several commands required for tasks like opening and closing files, printing documents, formatting data, and other actions using the Menu Bar at the top of the screen. The options in the Menu Bar and how they work are captured on screen in the images below.



Nowadays, the name of Excel's primary menu bar is "Ribbon." The ribbon's items come with collections of icons that serve the same purposes.



These consist of:

File, Home, Insert, Formulas, Page Layout, View, Data

File

The item on the Excel ribbon farthest to the left is the File menu. You may manage your files by using the open, save, close, and print options available on the File ribbon items. Along with tools that let you modify Excel itself; you may import data into Excel from outside sources using the File menu.

Home

The second option in the Excel menu bar is the home menu. Formatting options for font, colour, conditional formatting, filter, number type, and more are available in the home ribbon items. Each of these functions' aids in the execution of several efficient calculations.

Insert

The Insert menu, as its name implies, enables you to add a variety of choices and objects to an Excel spreadsheet. A pivot table, a photo, clip art, shapes, screen captures, charts and graphs, text boxes, header and footers, symbols, equations, and more can all be inserted.

Page Layout

Once more, the name alludes to the group of options available on the Page Layout menu. You'll find a variety of options for setting up pages for reading and printing, including options for page size, margins, colours, and fonts. On the Page Layout menu, you may also change the width and height of individual cells.

Formulas

You can find all the options for number-crunching in the Formulas menu. There are several formulae in Excel, including ones for algebra and trigonometry as well as for financial, logical, text, date and time, lookup and reference.

Data

Numerous crucial Excel features, such as imports and links to databases, are now available under the Data menu. On the Data menu, you can also access the sort, filter, duplicate-removal, data validation, consolidation, group, ungroup, and subtotal options.

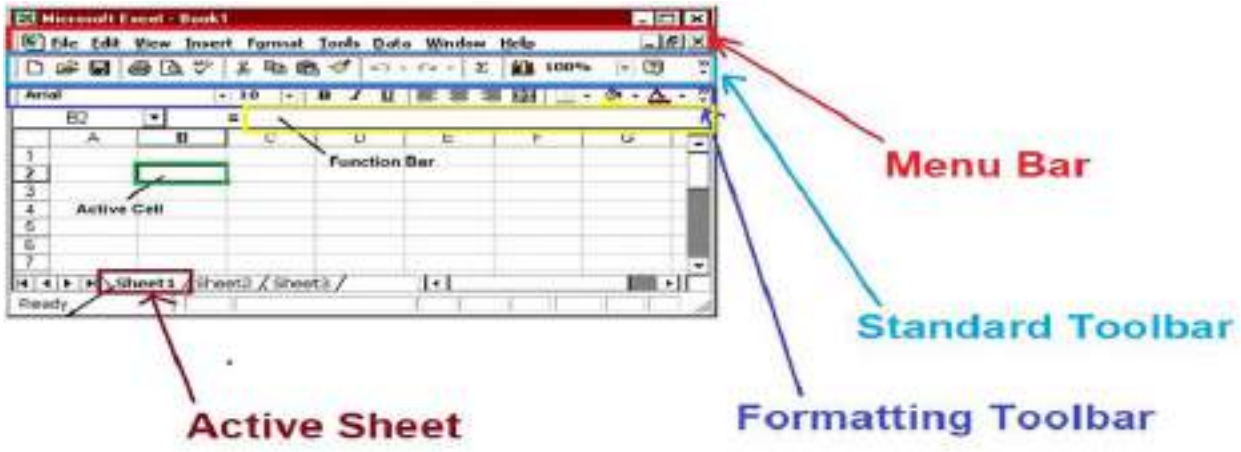
Review

The majority of the tasks can be found in the Review menu. Using features from the Review menu, you may track changes, check spelling, add comments in cells for your colleagues, and even restrict authorization.

View

You can alter how spreadsheets display on your screen by using the View menu. Grid lines between cells can be displayed, the formula bar and headings can be switched, and more options are available. You have the ability to see and record macros from this menu as well, which saves you from having to repeat actions you already know how to accomplish over and over again.

4.3 Introduction of Microsoft Excel Worksheet Toolbar



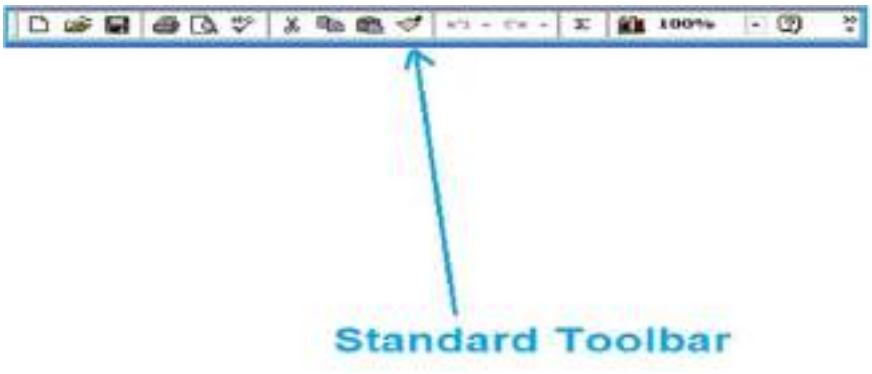
The Excel toolbar is a place where you can put various commands or tools. It can be seen by default in the Excel window's upper right corner, above the ribbon with various tools. Toolbars can now be customized based on how frequently users use particular tools, which improves customer friendliness.

There are two toolbars that offer easy access to many of the Excel features that are utilized the most. The Standard Toolbar is the first bar, followed by the Formatting Toolbar. A yellow box will display next to a toolbar icon when the mouse pointer is placed over it without clicking.

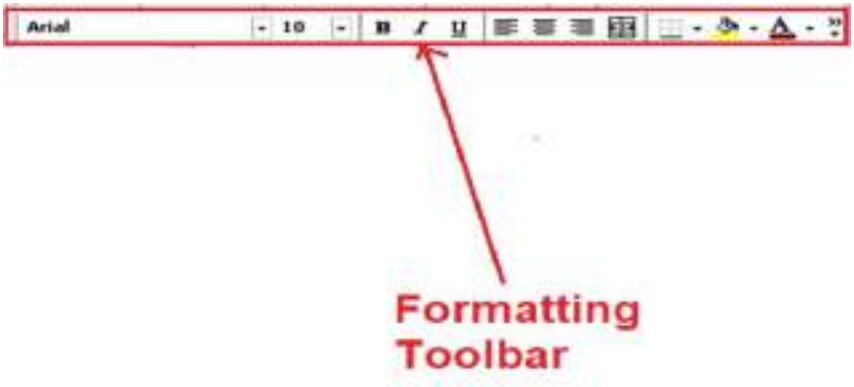
Using the Tools menu, you may modify how the Standard and Formatting toolbars are displayed as seen below:

- Click Tools on the Menu Bar.
- Customize can be selected (clicked) from the drop-down menu.
- To move it to the front, click the Options tab.
- The box next to “Standard and Formatting Toolbar share one row” can be checked or unchecked.
- If the checkbox is unchecked, just one row will be shared by the toolbars.
- The toolbars will be displayed in separate rows if the checkbox is left empty.
- To get back to your workbook window, select Close.

From left to right in the standard toolbar, the buttons are: New Worksheet, Open Worksheet, Save, Print, Print Preview, Spell Check, Cut, Copy, Paste, Format Paint, Undo, Redo, Insert Hyperlink, Web Toolbar, AutoSum, Function Wizard, Sort Ascending, Sort Descending, Chart Wizard, Mapping, Drawing, Zoom, and Help. Additionally, each of these options can be selected from a pull-down menu.



The buttons in the formatting toolbar are, in order, Bold, Italics, Underline, Margins, Font Type, Font Size, and (left, center, right, merge &center,) Borders, fill colour, font colour, increase decimal, decrease decimal, decrease indent, increase indent, currency style, percent style, comma style, and all of the above. Additionally, each of these options can be selected from a pull-down menu.



Toolbars are really helpful. They provide quick access to commands without requiring users to navigate through menu options. Excel comes with a lot of toolbars. Click “Get” on the Menu Bar and choose “Toolbars” to view a list of all the toolbars that are currently accessible. The toolbars are visible in a submenu that emerges. Simply click on a toolbar in the submenu to choose it. Your choice will now be seen from your worksheet due to the check mark that will now appear in front of it.

Function or Formula Bar: The active cell’s or block’s contents are shown in the formula bar. Text, numbers, formulas, and functions are all included.

Active Cell

The chosen cell at the moment is the active cell. The active cell is surrounded by a large border block known as the Cell Pointer. The active cell is filled with data.

Active Sheet

A file frequently contains multiple worksheets. To switch between sheets, click the tab located on each sheet. To make it simpler to recall what each sheet includes, you can rename them. To accomplish this, double-click Sheet1, for example, type a new name, and then press the ENTER key.

Worksheet Window

The Excel worksheet is visible in the worksheet window. There are rows and columns in it. The alphabetic letters, such as A, B, C, etc., are used to identify the columns. On the left side, the rows are numbered. Cells are formed when rows and columns cross. The column name and row number can be used to refer to any cell.

4.4 Introduction of Formula and Function

Formula

Calculating values in a cell or a group of cells is done by a formula, which is an expression.

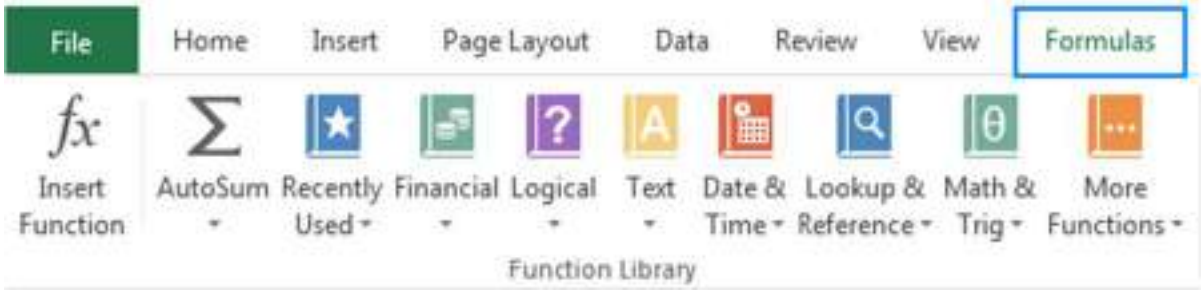
For instance, the values in cells A2 through A4 can be added up using the formula =A2+A2+A3+A4.

Function

Function is a built-in, predefined formula in Excel. Based on the supplied values, referred to as arguments or parameters, functions carry out specific calculations in a precise order.

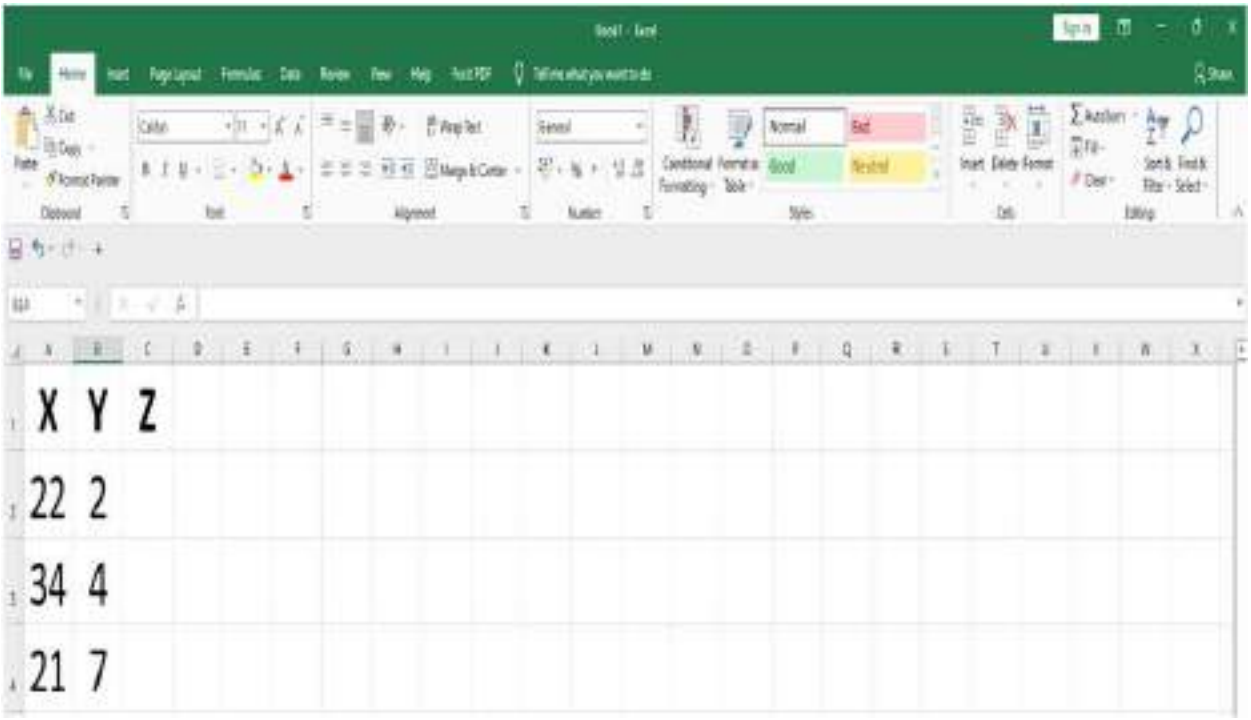
To sum a range of cells, for instance, use the SUM function rather than specifying each value to be added as in the formula above: =SUM(A2:A4)

All of the Excel functions are listed in the Function Library under the Formulas tab:

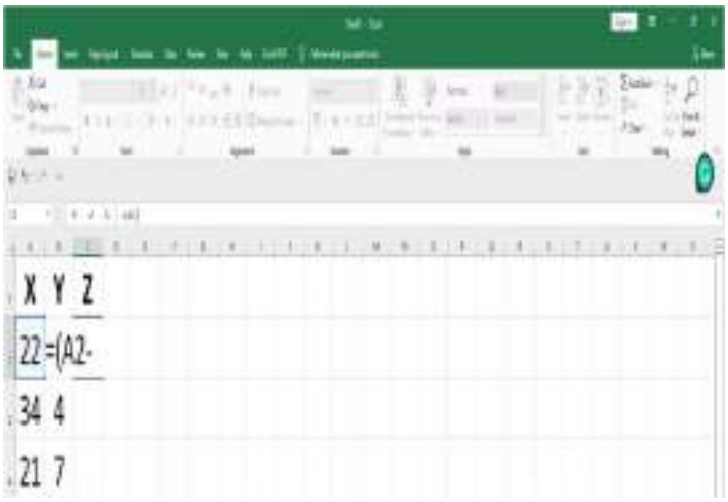


4.4.1 How to enter formula in Excel?

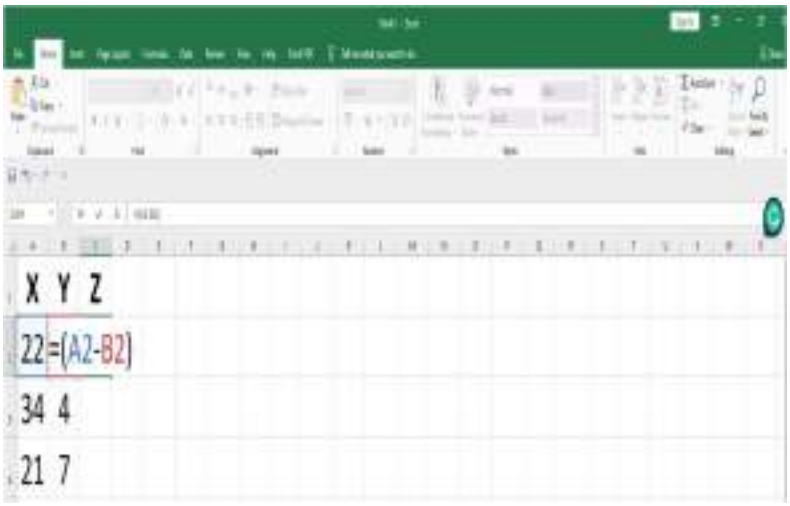
- Click the cell in a spreadsheet with numerical columns where you wish the formula results to show.
- Add the equal sign =.
- To include the first cell in your computation, click it



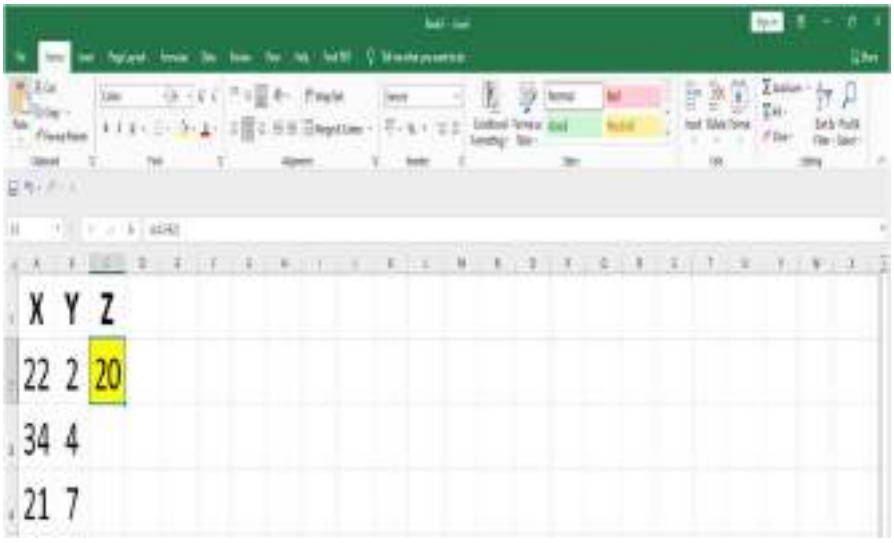
- Type an operator. An operator is a specific type of calculation that the formula carries out. For instance, the * operator multiplies numbers. To subtract in this instance, use the - operator. Your formula should now resemble the following:



- To add the following cell to your computation, click it. Your formula should now seem as follows:



- Press RETURN.



4.5 Summary

In this chapter, we have studied:

- The Excel toolbar is a place where you can put various commands or tools.
- The Insert menu enables you to add a variety of choices and objects to an Excel spreadsheet.
- Calculating values in a cell or a group of cells is done by a formula, which is an expression.

4.6 Answers to self-check exercises

Q.1 What do you mean by Function?

Q.2 Explain Title bar briefly?

Q.3 What are various options available under Menu bar?

Q.4 How to enter formula in Excel?

Q.5 Explain Toolbar briefly?

4.7 Suggested Reading

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365), Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston, Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
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- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-5
CELL FORMATTING, CUT, COPY AND PASTE OPERATION

STRUCTURE

5.0 LEARNING OBJECTIVES

After going through this lesson, you will be able to:

- Understand the basic of Cell Formatting
- Understand the basic of Cut, Copy, Paste Operation
- Understand the basic of Paste Special, Paste Transpose

5.1 Introduction of Microsoft Excel Worksheet Cell

The worksheet's cells are the little, rectangular boxes where we enter data. Row and column intersections form cells. The column header and row number serve as identifiers. Using a set of coordinates or positions, such as A1 (where A stands for a column and 1 for a row), C2, or H15, each cell in Excel is uniquely recognized.

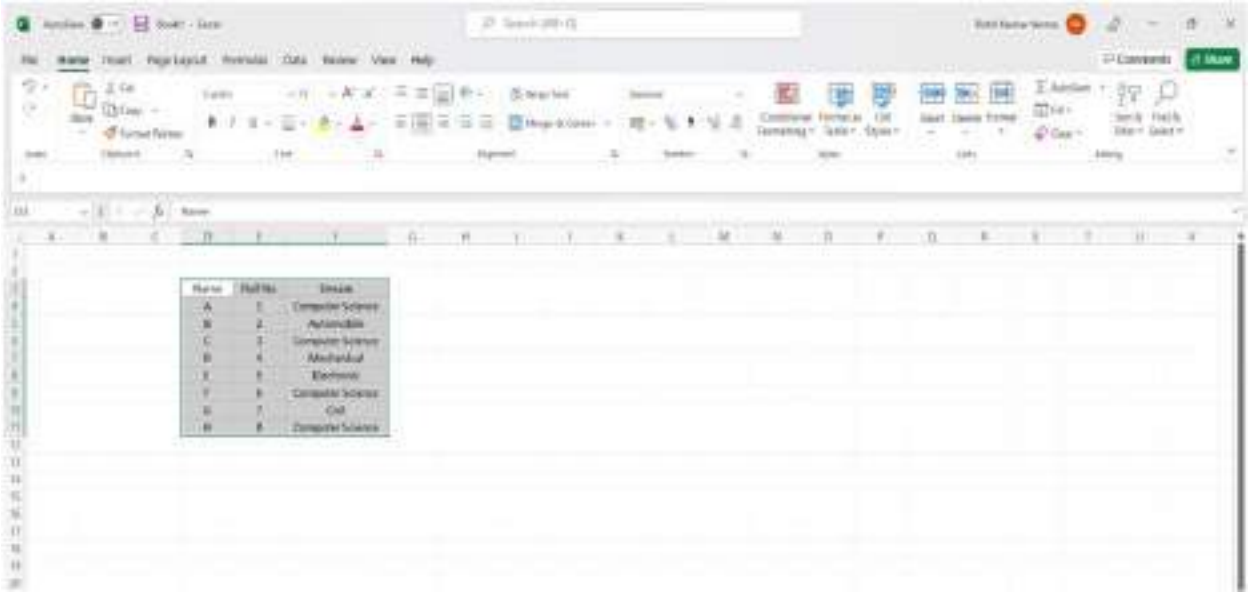
5.1.1 How to change format of a Cell?

A cell's contents, including its data, and a set of related cells can all be formatted. One way to conceptualise this is as if the data were the picture inside the frame and the cells were the picture's frame.

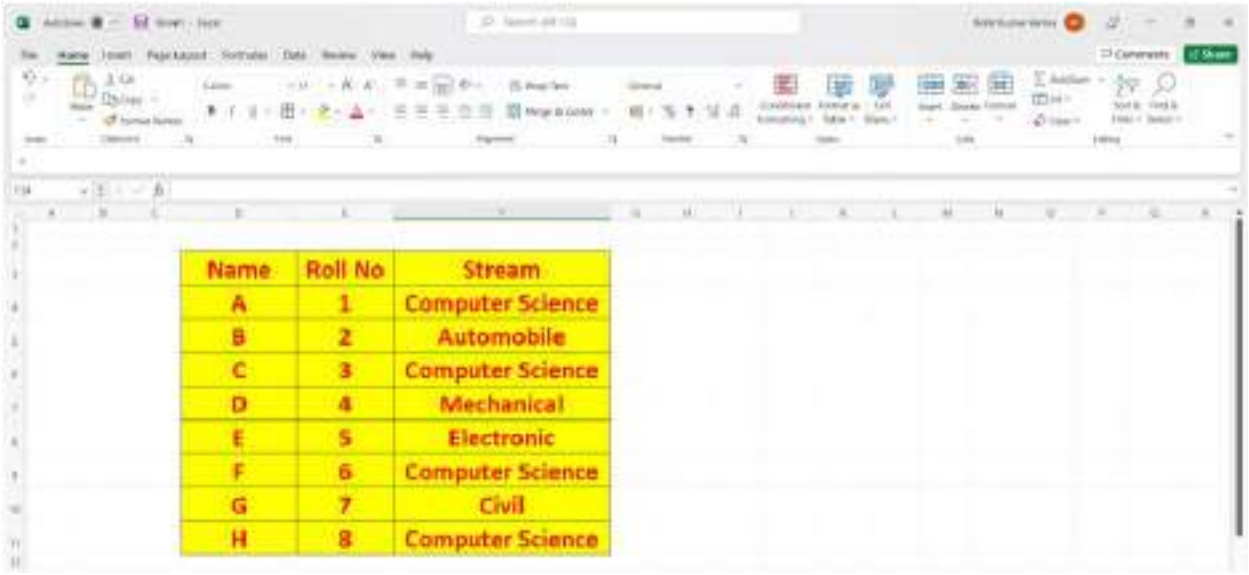
Format Cells

The steps to format cells in Excel are listed below:

- Select the cells.



- To make adjustments such as Bold, Font Color, or Font Size, use the ribbon.

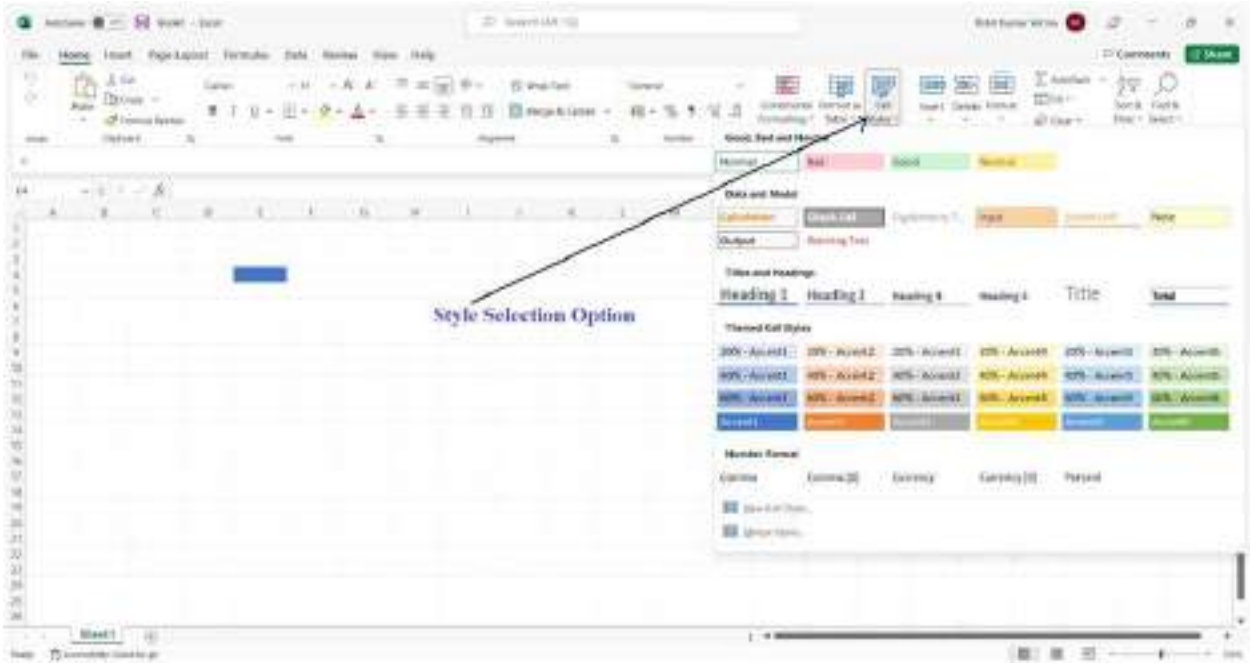


Name	Roll No	Stream
A	1	Computer Science
B	2	Automobile
C	3	Computer Science
D	4	Mechanical
E	5	Electronic
F	6	Computer Science
G	7	Civil
H	8	Computer Science

How to apply style to a Cell in Excel?

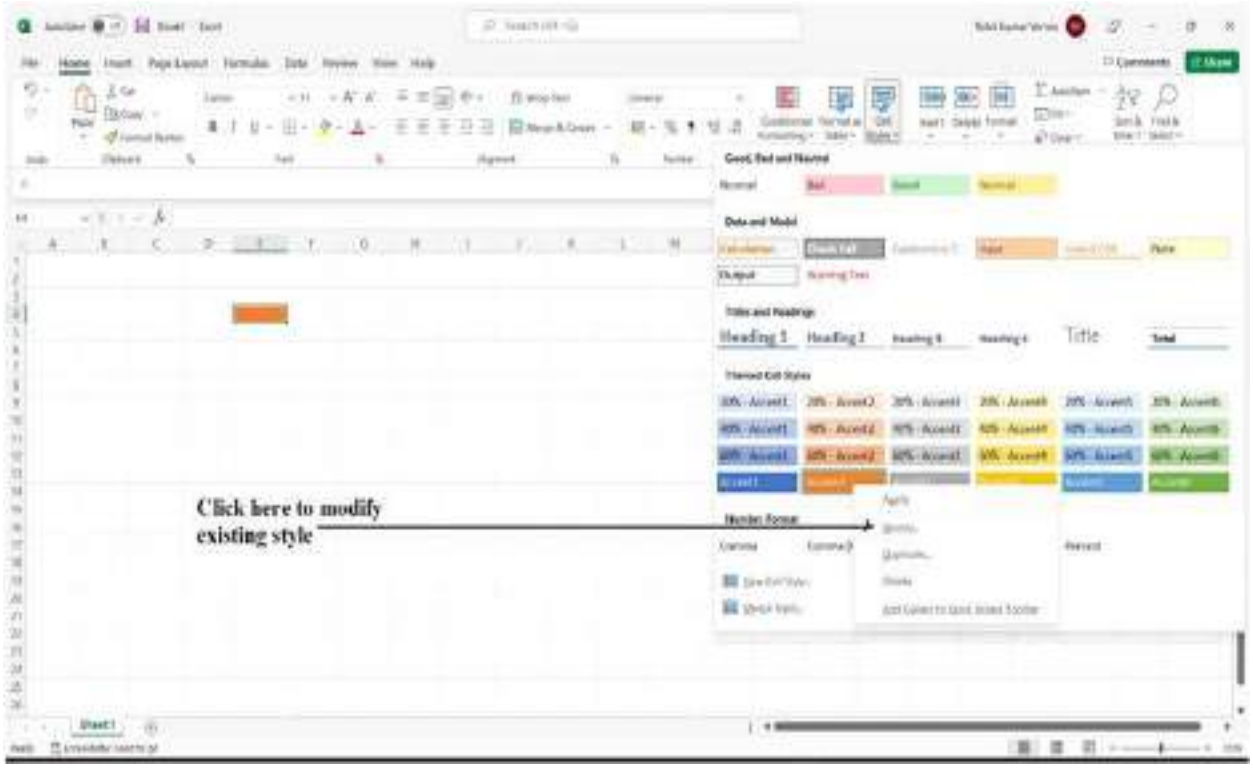
The steps to apply style to a cell in Excel are listed below:

- Choose the cells.
- Pick a style by selecting Home > Cell Style.



How to modify style of a Cell in Excel?

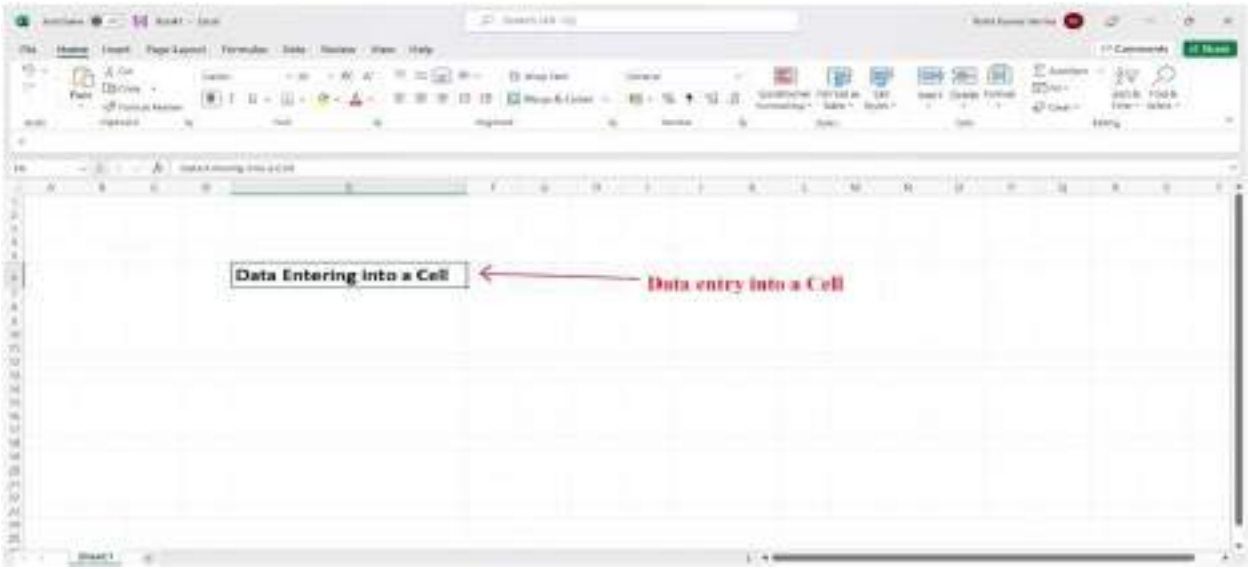
- Choose the cells with the Excel Style.
- Right-click the style that was just applied under Home > Cell Styles.
- To make the changes you wish, choose Modify > Format.



5.1.2 How to enter data into a Cell?

The steps to enter data into a cell in Excel are listed below:

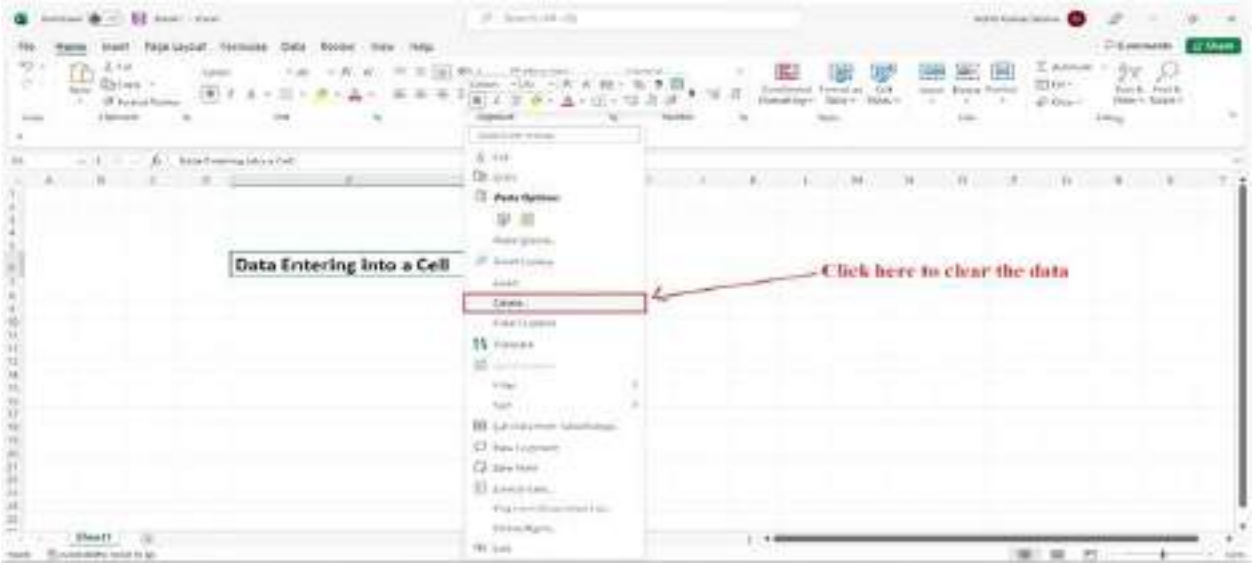
- The cell where you want to enter the data should be clicked and selected.
- Enter the required information into the highlighted cell, then press Enter or shift your pointer to a different cell. Both the formula bar and the cell's content will display the content.



5.1.3 How to clear data from a Cell?

The steps to clear Cell data in Excel are listed below:

- Select the cell by clicking.
- Press the Delete or Backspace key on your keyboard to remove the cell's content.
- Select the cell range, then press the Erase key to delete several cells.



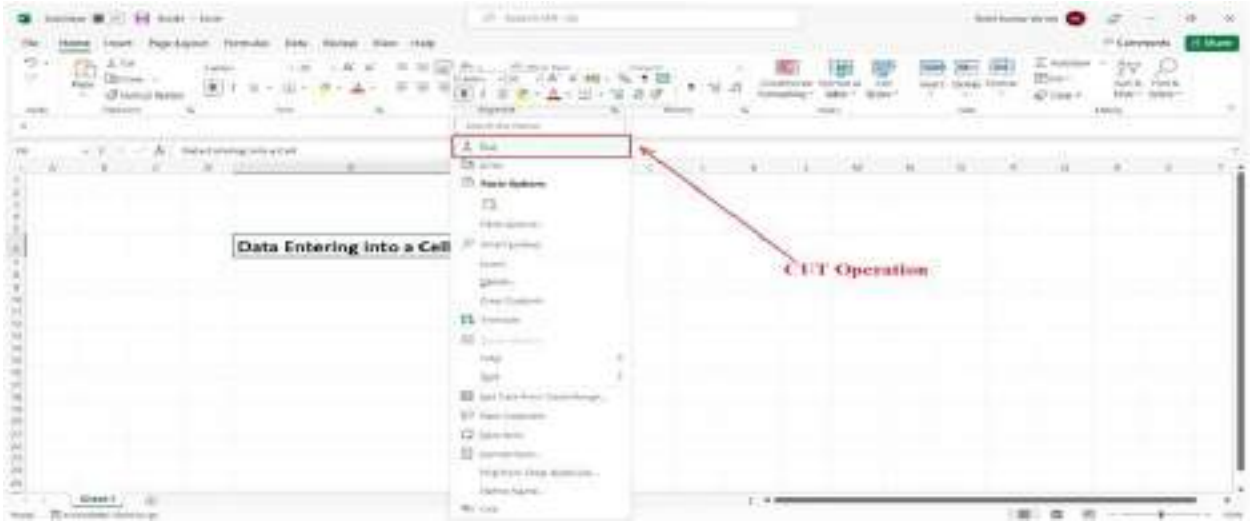
5.2 Introduction of Various types of Operation

5.2.1 CUT Operation

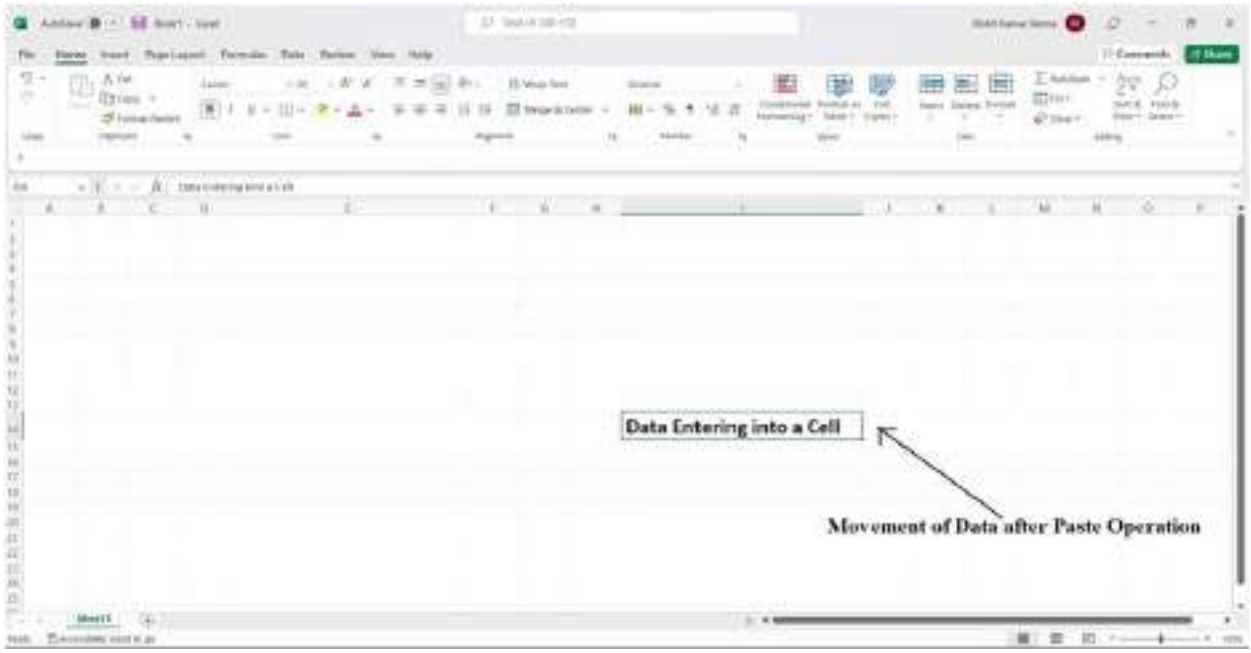
Transferring data from one place to another is known as cutting data in Excel. This can be done by moving the data to a new position in the same worksheet, another worksheet in the same workbook, a different Excel workbook, or even a different application.

Move cells by using Cut and Paste

- Choose a cell or a range of cells.
- Press Ctrl + X, choose Home > Cut, or both.



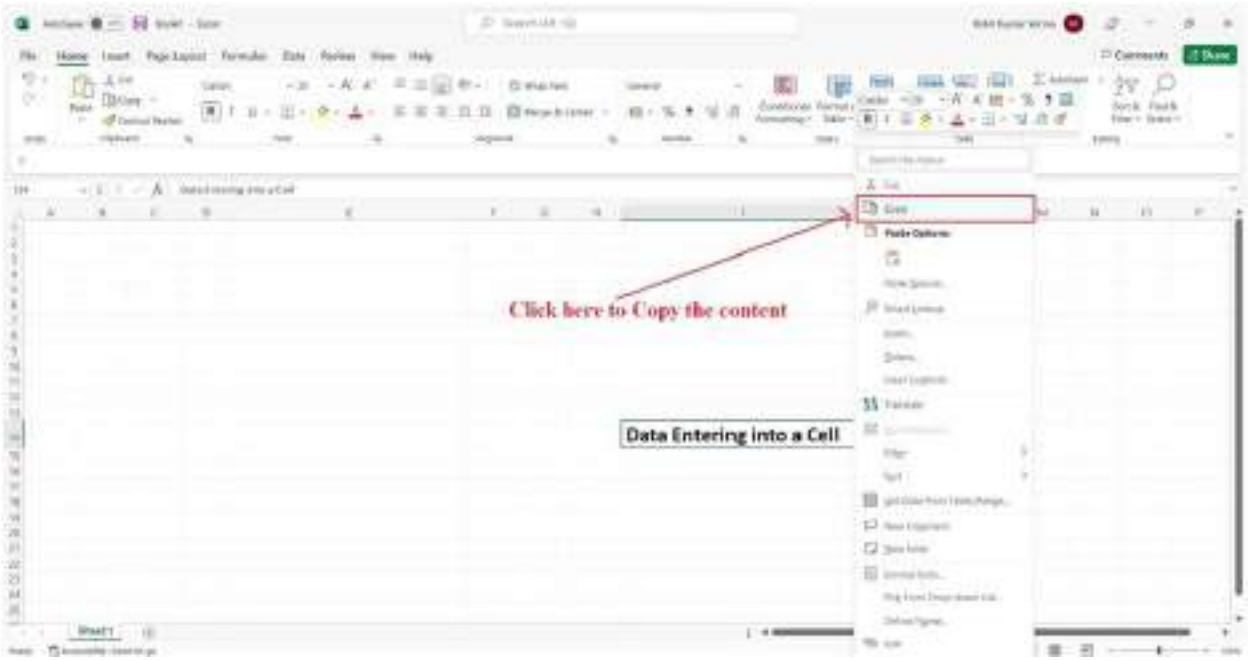
- The cell you want to move the data to is selected.
- Ctrl + V or Home >Paste are two options.



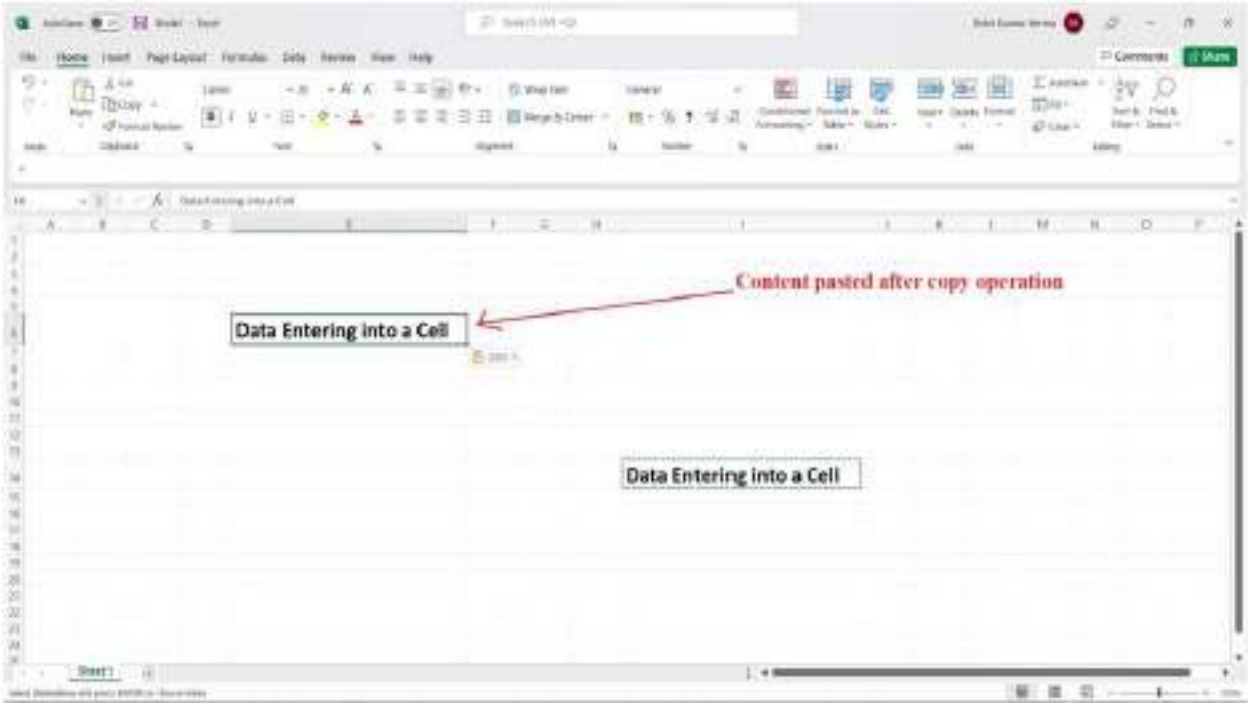
5.2.2 COPY Operation

The steps to copy Cell datafrom one location to another location in Excel are listed below:

- Choose a cell or a range of cells.
- Press Ctrl + C or choose Copy.



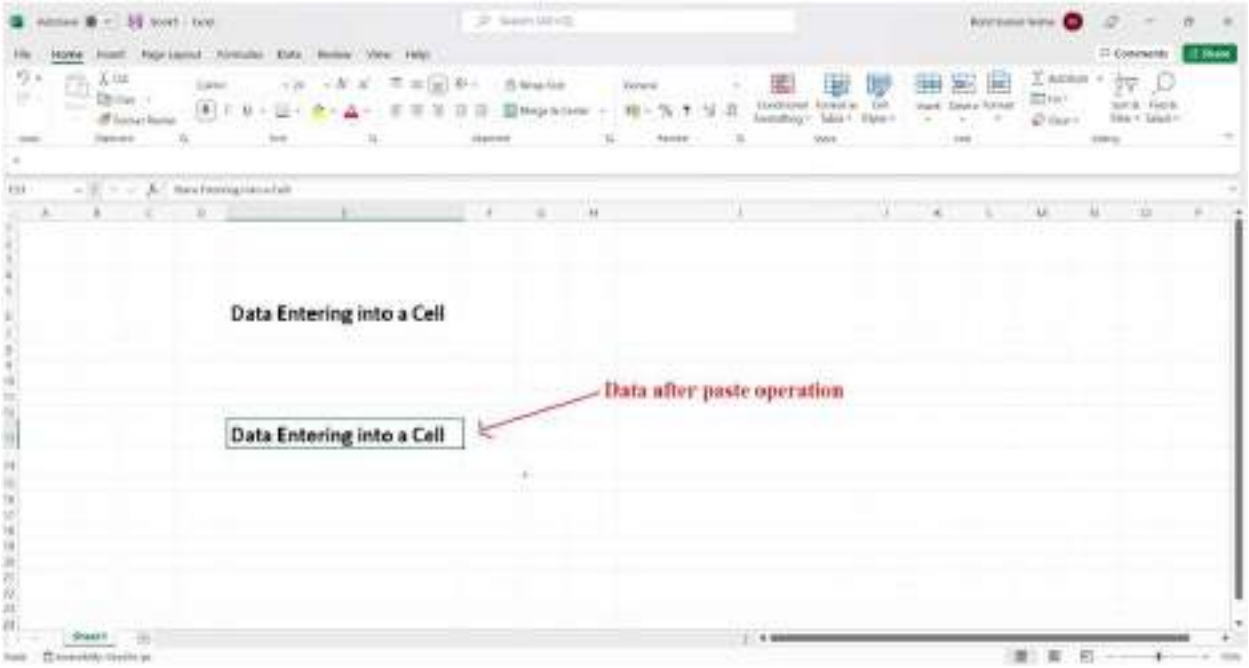
- Choose Paste or click Ctrl + V.



5.2.3Paste Operation

The Paste option pastes everything.

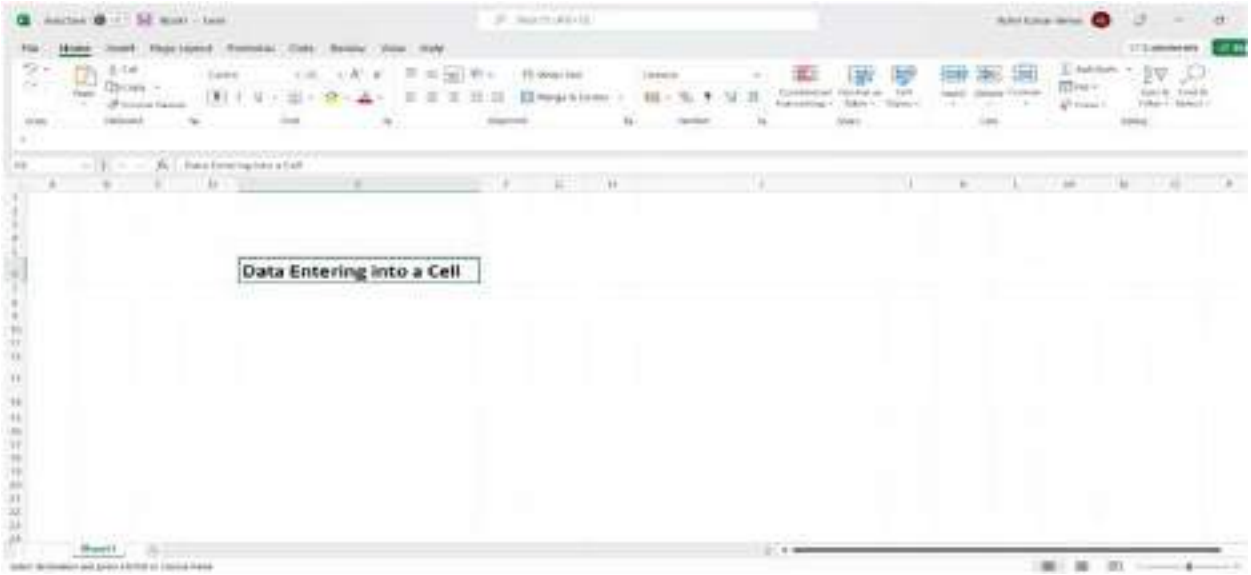
- Select cell E6, right click, and then click Copy (or press CTRL + c).
- Next, select cell E13, right click, and then click Paste under ‘Paste Options:’ (or press CTRL + v).



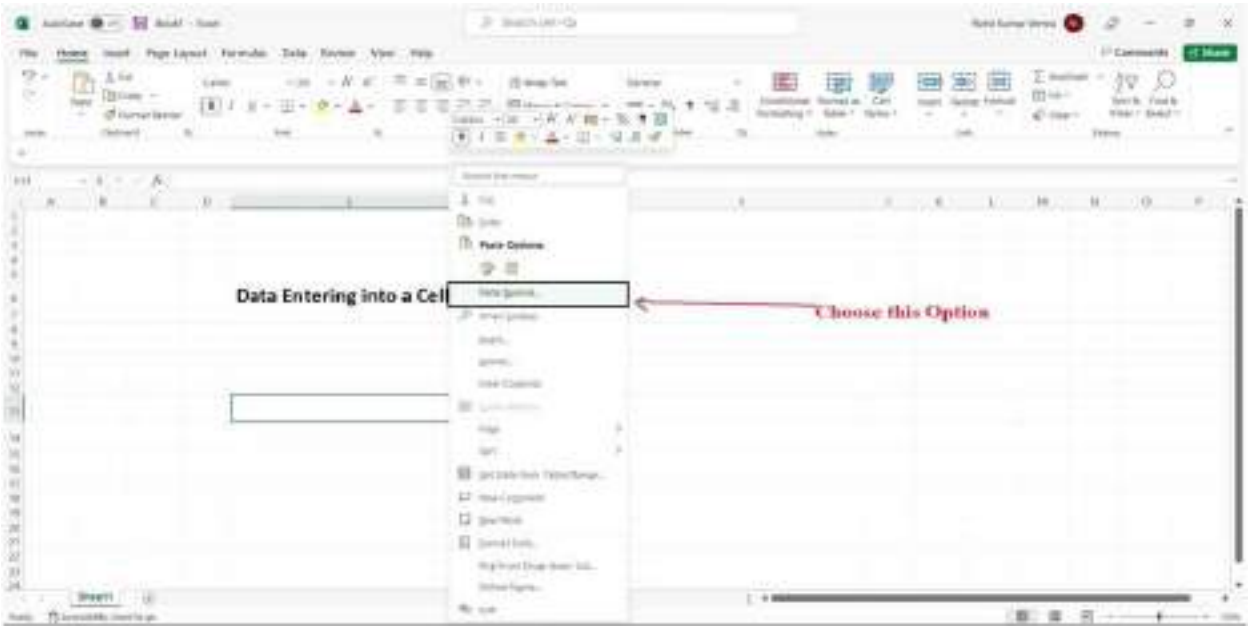
5.2.4 Paste Special

In Excel, we use the Paste Special option when we wish to paste only specific portions of the data rather than the entire set of data.

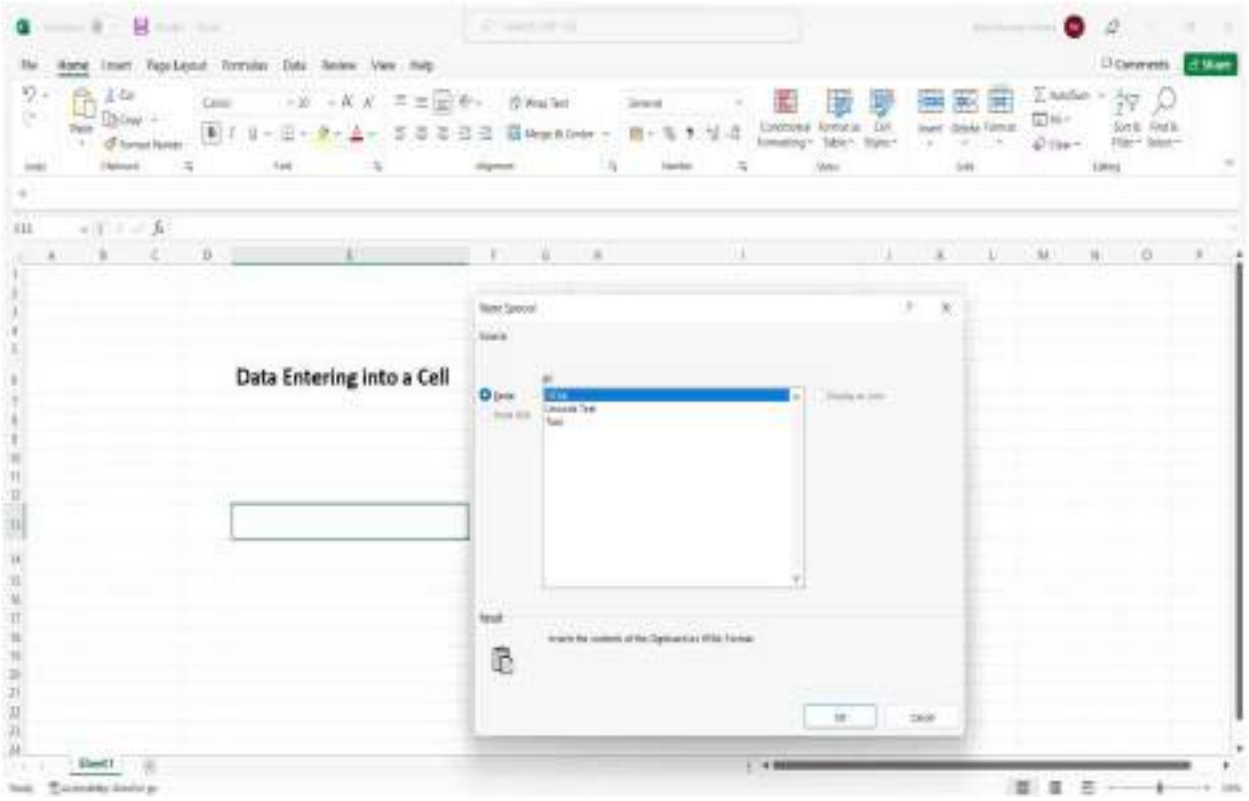
- Select cell E6, right click, and then click Copy (or press CTRL + c).



- Next, select cell E13, right click, and then click Paste Special.



- The Paste Special dialog box appears.

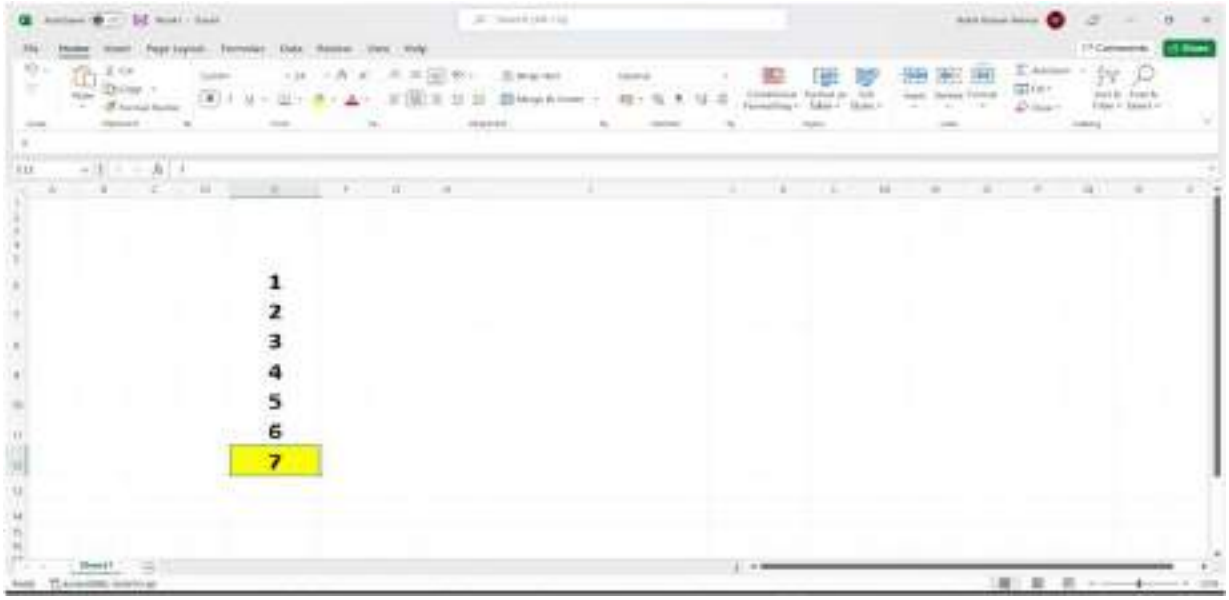


- The above-described pasting choices are also available here. Additionally, you can paste everything except borders, column widths, formulas and number formats, values and number formats, validation criteria only, and comments.

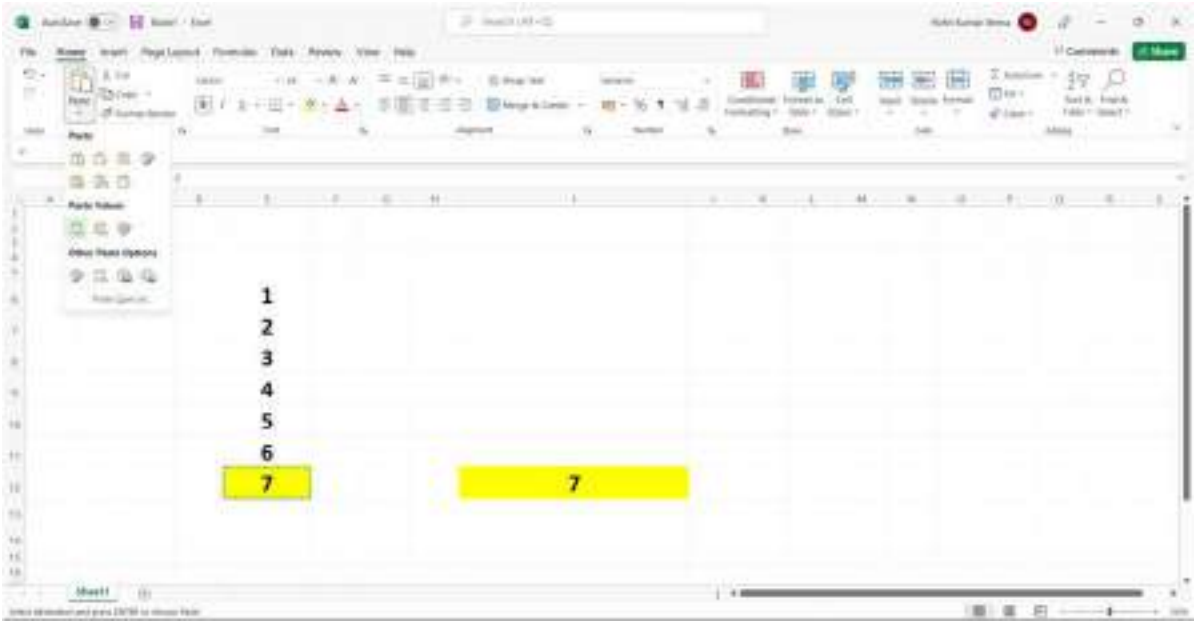
5.2.5 Paste Value

The Values option pastes the result of the formula.

- Select cell E6, right click, and then click Copy (or press CTRL + c).



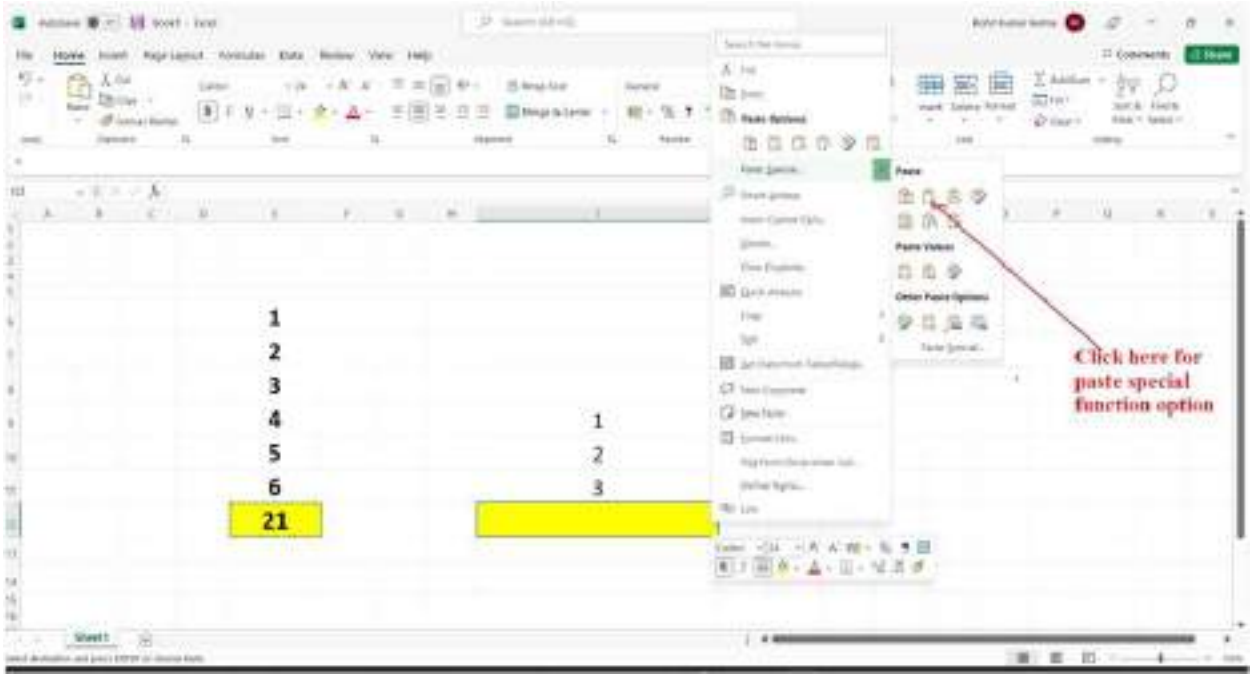
- Next, select cell E12, right click, and then click Values under ‘Paste Options:’



5.2.6 Paste Formula

The Formulas option only pastes the formula.

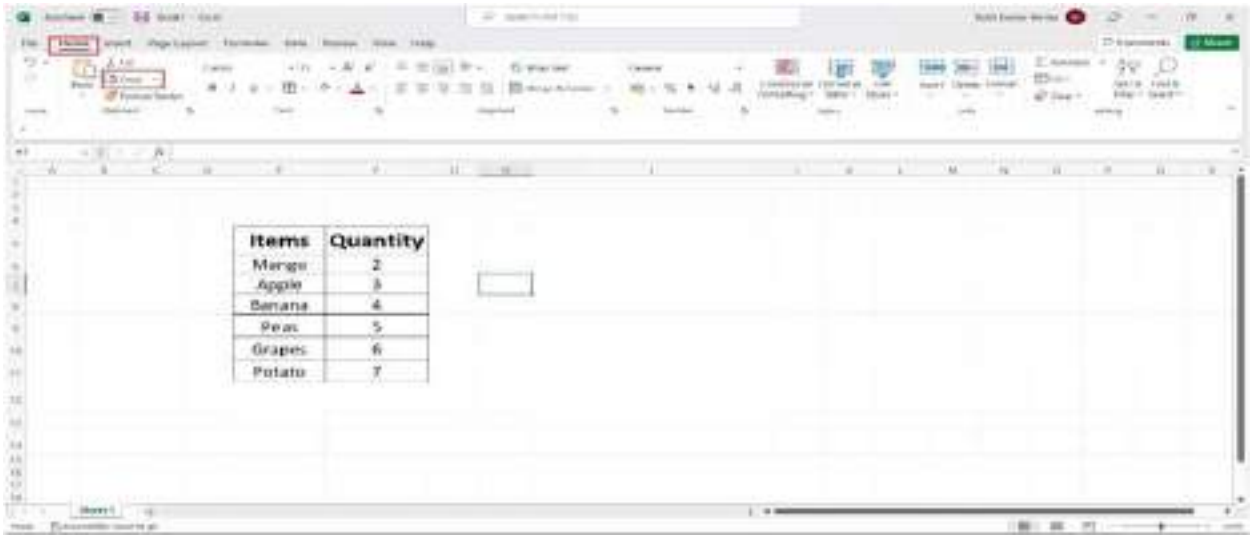
- Select cell E12, right click, and then click Copy (or press CTRL + c).
- Next, select cell F5, right click, and then click Formulas under ‘Paste Options:’



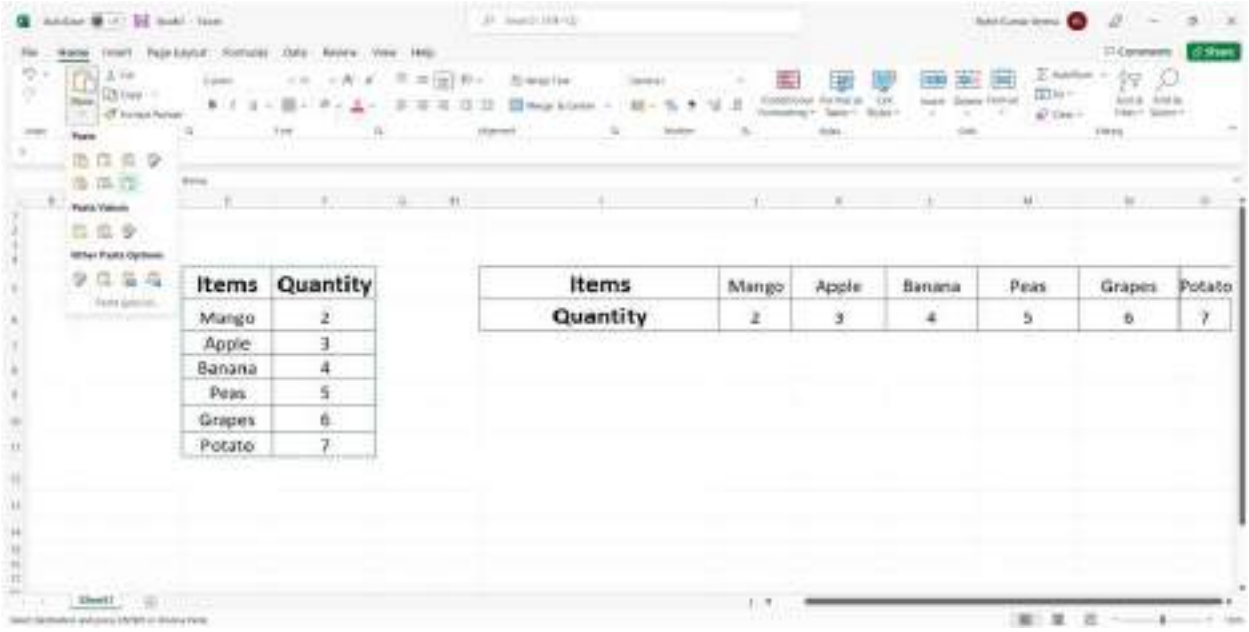
5.2.7 Paste Transpose of Data Set

The steps to paste transpose of data setin Excel are listed below:

- Select the data we have to transpose. Here I've selected range B4:C9.
- Then go to Home.
- Now, select Copy from the Clipboard group of commands.



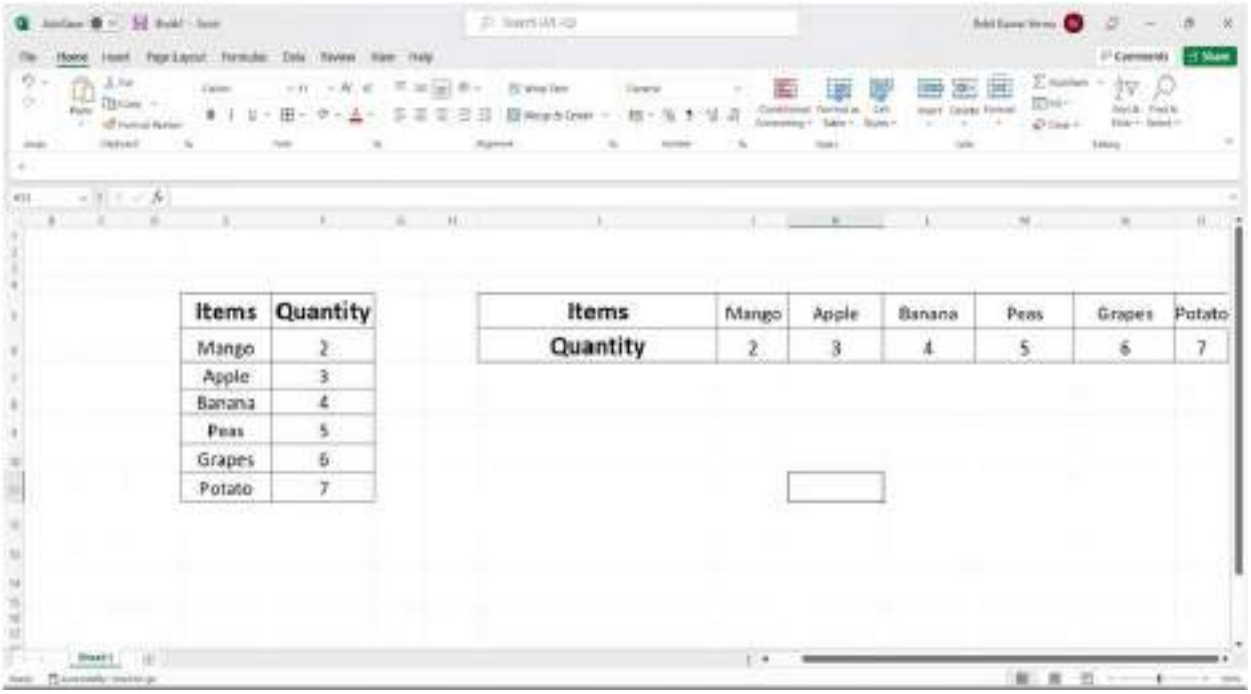
- Now, go to Cell I5 to Paste and Transpose.
- Go to the main Home tab.
- Then select Paste from the commands.
- From the drop-down of Paste option, select Transpose(T).



Items	Quantity
Mango	2
Apple	3
Banana	4
Peas	5
Grapes	6
Potato	7

Items	Mango	Apple	Banana	Peas	Grapes	Potato
Quantity	2	3	4	5	6	7

- After selecting Transpose(T), we will get our transposed data.



Items	Quantity
Mango	2
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Banana	4
Peas	5
Grapes	6
Potato	7

Items	Mango	Apple	Banana	Peas	Grapes	Potato
Quantity	2	3	4	5	6	7

5.3 Summary

In this chapter, we have studied:

- The Excel toolbar is a place where you can put various commands or tools.
- The Insert menu enables you to add a variety of choices and objects to an Excel spreadsheet.
- Calculating values in a cell or a group of cells is done by a formula, which is an expression.

5.4 Answer to Self-Check exercises

Q.1 What do you mean by Cell Formatting?

Q.2 Explain CUT, COPY, Paste Operation briefly?

Q.3 Explain Paste Value, Paste Function briefly?

Q.4 How to Paste Special Operation in Excel?

Q.5 How to enter data into a Cell?

Q.6 How to clear data from a Cell?

5.5 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365), Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston, Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
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- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-6
DATA MANAGEMENT

STRUCTURE

6.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand about the data management
- Understand the process of data transformation
- Understand the various functions and formulas for data transformation

6.1 Introduction

Data management is a systematic way of collecting, organizing, protecting, and storing an Establishment's data so it can be analyzed to make better business decisions. As organizations create and consume data at an unprecedented rate, data management solutions are becoming essential to making sense of the vast amounts of data. Today's leading data management software ensures that reliable and up-to-date data is always used to make decisions. The software helps with everything from data preparation to cataloging, searching, and management, so people can quickly find the data they need for analysis.

Becoming an Excel expert is more than learning functions and combining formulas. An important part of using Excel to its full potential is knowing the art of data management. This covers everything from setting up spreadsheets to data entry and good maintenance practices.

In today's digital world, organizations have access to more data than ever before. This data forms the foundation for making important business decisions. Data management methods improve visibility, reliability, security, and scalability.

6.1.1 Types of Data Management

Data management plays a vital role in making essential functions easier and less time-intensive. Some of the commonly used data management techniques are:

- **Data preparation** is used to clean and transform raw data into the right shape and format for analysis, including making corrections and combining data sets.
- **Data pipelines** enable the automated transfer of data from one system to another.
- **ETLs**are three operations combined namely, Extract, Transform and Load. These are made to take the data from one system, transform it, and load it into the system's data storage.
- **Data catalogs** help deal with the metadata to create a complete picture of the data, providing brief informationabout its changes, locations, and quality while also making the data easy to find.
- **Data warehouses** are places to merge and unite various data sources. It provides a clear route for data analysis.
- **Data governance**sets standards, processes, and policies to preserve data security and integrity.
- **Data architecture**supplies a formal approach for creating and managing data flow.
- **Data security**defends data from unauthorized access and corruption.
- **Data modeling** documents the direction of the transfer of data through an application or organization.

6.1.2 Importance of Data Management

Data management is an important first step to employing effective data analysis at scale. Effective data management helps the person to find and access trusted data for their queries. A few benefits of effective data management include:

Visibility

An increase in the visibility of an organization's data assets makes it easier for people to easily and confidently find the right data for their analysis. Data visibility allows your establishment to be more organized and productive, allowing employees to find the necessary data they need to better do their jobs.

Reliability

Data management helps minimize potential errors by making data more reliable for decision-making. With reliable, up-to-date data, the organization can answer more effectively to market changes and customer needs.

Security

Data management protects the data of your organization and its employees from losses, thefts, and breaches with various authentication and encryption tools. Strong data security ensures that critical information is backed up and retrievable in case the primary source becomes unavailable.

Scalability

Data management allows the effective scalability of data in organizations. When actions are easy to repeat, your establishment can avoid the unnecessary costs of duplication, such as employees conducting the same operation over and over again.

6.2 Data Transformation

Data transformation means changing the data in some way to meet your data analysis needs. For example, you can filter rows, delete columns or change the data type. Each of these actions transforms the data. Data shaping or data processing is a term used to describetransformations (and aggregations) to a set or sets of data.

Transformation of data gives several benefits:

- Transformation of data to make it betterorganized. Transformed data is easier to apply for both humans and computers.
- formatting and validation of data in a proper way improves the data quality and protects applications from possible landmines such as NaN (Not-a-Number), null values, unexpected duplicates, incorrect indexing, and incompatible formats.
- Data transformation eases compatibility between various applications, systems, and types of data. Data used for various purposes may need to be transformed in different ways.

However, there are challenges to transforming data effectively:

- Data transformation can be expensive. Costs depend on the specific infrastructure, software and tool used to process the data. Costs may include costs associated with licensing, computing resources and hiring the necessary personnel.
- Data transformation processes can be resource intensive. Making changes to the local data store after loading or converting data before it is injected into applications can create a computational load that slows down other operations. If you use a cloud-based data warehouse, you can perform transformations after uploading, as the platform can scale to meet demand.
- Lack of expertise and carelessness can cause problems during the changeover. Data analysts without proper knowledge are less likely to notice typos or incorrect data because they do not know the exact and allowed values. For example, a person working with medical information who is unfamiliar with the relevant terms may leave unmarked disease names that should be associated with a single value, or notice typographical errors.

- Businesses can make transformations that do not meet their needs. A company can convert data to a specific format for one application only, to return the data to the previous format for another application.

6.3 Arithmetic Operation

An arithmetic operation is carried out by combining two operands with a single arithmetic operator such as '+', '-', or '*' etc. An arithmetic operator accepts two operands and performs computation on them. Most of the programming languages have a collection of these operators that may be used inside expressions and equations to carry out various kinds of sequential calculations. Everyone utilizesthem in day-to-day math.

6.3.1 Addition

Addition is a mathematical process of adding numbers or integers together. The addition process is denoted by the '+' sign. It combines two or more numbers into a single term. In addition, the order does not matter. It means that the addition process is commutative. It can involve any type of number whether it be a real or complex number, fraction, or decimal.

Example: 5.12 + 3.88 = 9

The process of adding more than two numbers, values, or terms is also known as a summation of terms and can involve *n* number of values.

There are several ways to perform addition operations in Excel. Below is an explanation of a few of these operations:

1. Sum a column in Excel with one click

- Select the column alphabet for which you wish to know the sum by clicking on it.
- You can see the total of the cells in the Excel Status bar (Fig. 6.1).
- To calculate the sum, you can choose a subset of the cells rather than the complete column. The Excel status bar will directly show the sum of the selected cells. In addition to the total Sum of the selected cells, it also shows the number of cells selected with data (not empty cells) and the average of the data in the selected cells.

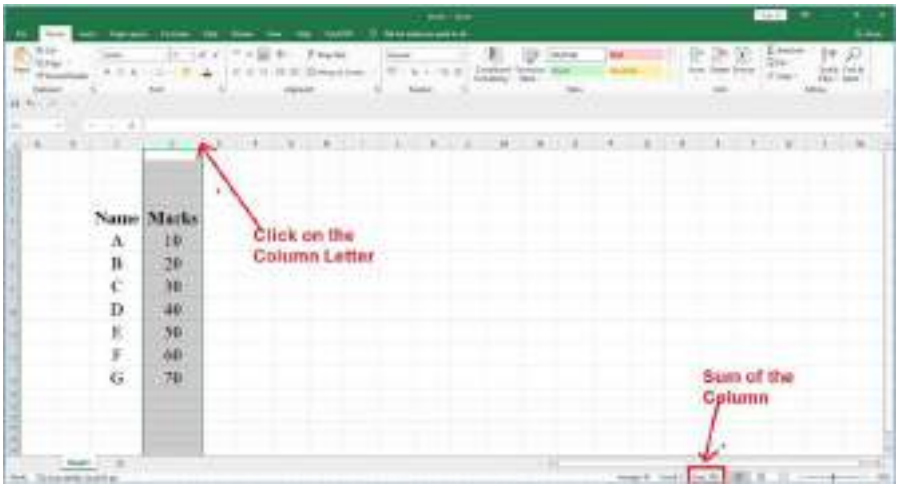


Fig. 6.1

2. Calculate the sum in Excel with AutoSum

- Select the blank cell below the column where you wish to add the numbers by clicking on it (Fig. 6.2).

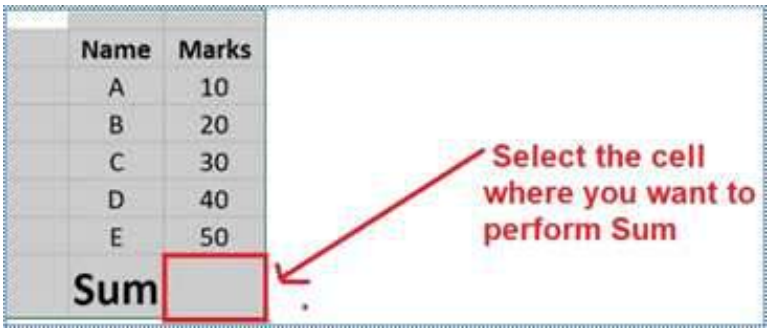


Fig. 6.2

- Select the AutoSum option in the Editing group under the Home menu.

- Excel will choose the range and insert it into the SUM function automatically. However, you can also change the range if necessary (Fig. 6.3).

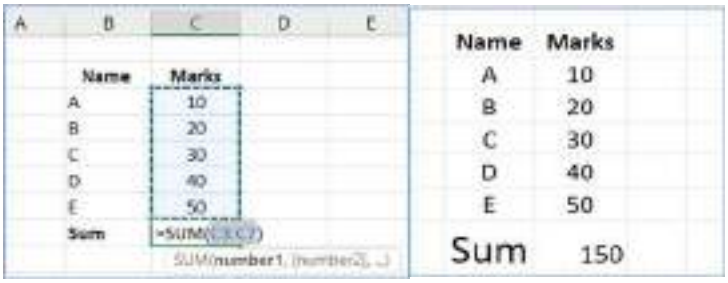


Fig. 6.3

- The moment you press the Enter key on your keyboard, Excel will display the total of the values in the range you have chosen (Fig. 6.3).

3. Addition using the SUM function

- Select the blank cell below the column where you wish to add the numbers by clicking on it(Fig. 6.4).

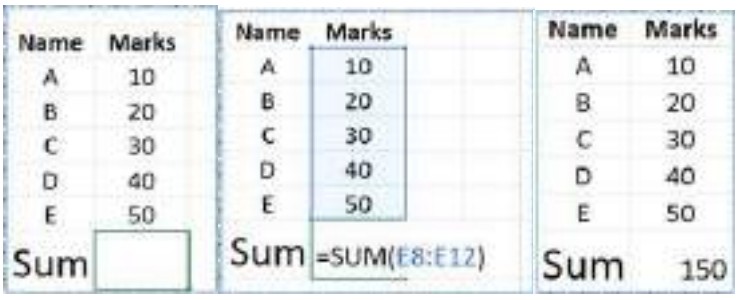


Fig. 6.4

- Begin the formula with an equal to (=), then add SUM (). By placing the cursor on one cell and moving it to the last, you can choose the range of the cells in the arguments. You can choose to provide the number of cell references directly, separated by commas.
- As soon as you press the Enter key, Excel will calculate the sum of the values.

6.3.2Subtraction

Subtraction gives the difference between two numbers. Subtraction is denoted by the '-' sign. It is the inverse process of addition. The addition of the term with the negative term is known as subtraction. This process is mostly used to find how many are left when some things are taken away.

Example: 16 – 7 = 9

There is no predefined function for Subtraction in Excel. But you can still perform the subtraction using a formula. As you are already familiar with the implementation of formulas in Excel, let us take an example to perform subtraction.

- Select the cell that will display the outcome.In this example (Fig 6.5), it's cell C5. Type the "=" sign in the cell. Then choose the first cell, C4 succeeded by the "-" symbol followed by the second number in Cell C3. Once you press the enter key, the two values will be subtracted.

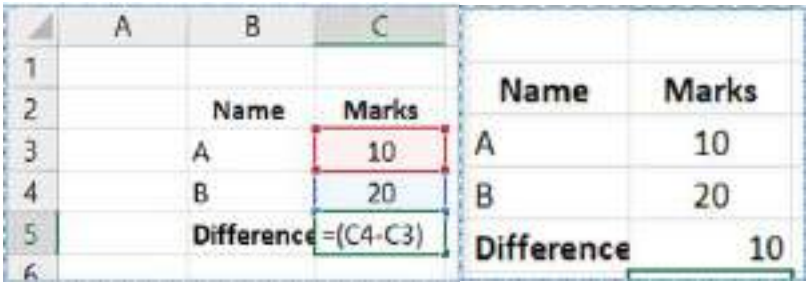


Fig 6.5

In case one needs to apply the subtraction operation on the set of values in a particular column, all you need to do is drag down the formula till the last cell in the result column.

6.3.3 Multiplication

Multiplication is a process of repeated addition. It is denoted by the '×' or '*' symbol. It also combines with two or more values to result in a single value. The multiplication process involves multiplicand and multiplier. The multiplication of the multiplicand and the multiplier gives the product.

Example: 6 × 7 = 42

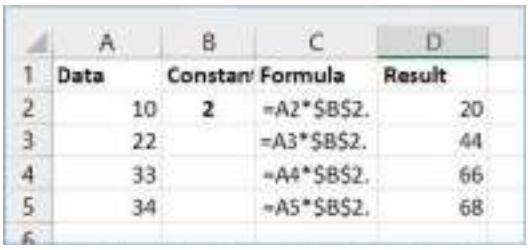
Here, "6" is the multiplier, "7" is the multiplicand, and the result "42" is called the product.

To use the multiplication operation in Excel one can simply use the * (asterisk) arithmetic operator.

For example, if you type =5*20 in a cell, the cell displays the result, 100.

Multiply an entire column of numbers by a constant value

Let us say, oneneeds to multiply each cell in a column of seven numbers by a number that is contained in another cell. In this example (fig. 6.6), the number you want to multiply by is 2, contained in cell B2.



	A	B	C	D
1	Data	Constan	Formula	Result
2	10	2	=A2*B2.	20
3	22		=A3*B2.	44
4	33		=A4*B2.	66
5	34		=A5*B2.	68
6				

Fig. 6.6

- Type =A2*B2 in a new column in your spreadsheet (the above example uses column D for the result). Make sure to include a $ symbol before B and before 2 in the formula, and press ENTER.
- Drag the formula down to the other cells in the column.
- The formula column is showing the formula used for the multiplication

6.3.4 Division

The division is usually denoted by '÷' or '/' and is the inverse of multiplication. It includes two values dividend and divisor, where the dividend is divided by the divisor to give a single-term value. When the dividend is greater than the divisor, the result obtained is greater than 1, or else it would be less than 1.

There is no Divide function in Excel. To perform Division inExcel use the '/' (forward slash) arithmetic operator.

For example, if you type =20/10 in a cell, the cell displays 2.

One thing to make sure of is to type an equal sign (=) in the cell before typing the numbers and the / operator; else, Excel will interpret what one types as a date. Such that, for typing 7/30, Excel may display 30-Jul in the cell. Or, for 12/36, Excel will first convert that value to 12/1/1936 and display 1-Dec in the cell.

6.3.5 Log Transformation

It transforms the value x to Log(x). The log function is mostly used in data analysis to transform the skewed dataset distribution to less skewed. This helps in finding a pattern in the dataset. Finding a pattern in the dataset help in making an effective decision, which is the end task in the data analysis.

There are multiple ways to implement the Log transformation in Excel. Two of those are discussed in this chapter.

1. Use of LOG10 function

This function returns the Logarithm value of a number and the base will be always 10.The function to transform the base to another number is explained later.

- Select the cell for function application, E2 in our example (Fig 6.7).
- Type the formula '=LOG10(D2)' in the cell and hit enter. You can apply the formula for multiple cells in the column by dragging the rectangular symbol in the bottom right corner of the selected cell.

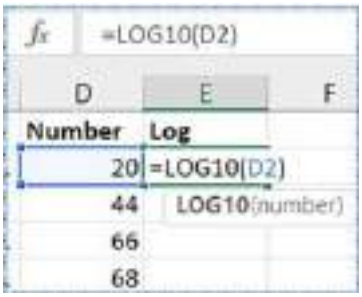


Fig. 6.7

2. Use of LOG function

This function is similar to the LOG10 function explained above. There is an option to add a different base in this function. When we do not enter any value for the base, Excel will assume the base is 10.The value of the base cannot be – negative, 1, or 0.

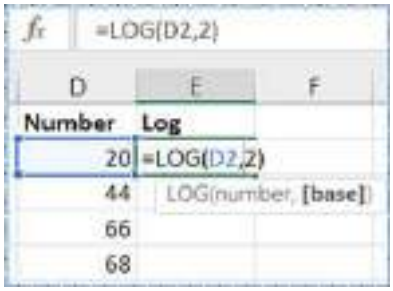


Fig 6.8

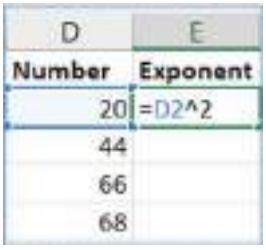
The steps to implement the LOG function are the same as the LOG10 function. Just change the function to 'LOG(number,[base])', where number is the cell number, D2 in this case, and [base] is the base value ofthe Log function. In this example base is 2.

6.3.6 Exponential Transformation

Excel provides users with two methods to calculate exponents.The first option is to use the exponent character, the "^" symbol. The second option is to use a built-in POWER() function. It takes two values, number, and power.

The use of the exponent character '^' is demonstrated in fig 6.9. For multiple-cell implementation of the formula, drag the formula down to the other cells in the column.

Fig 6.9



The use of the POWER function is demonstrated in fig 6.10. The way to use this function is the same as the other functions. Start with the '=' and type POWER followed by number and power. The number value can be replaced by the cell reference.

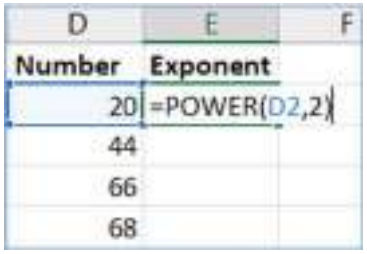


Fig 6.10

For multiple-cell implementation of the function, drag the function down to the other cells in the column.

6.3.7 Square and Square Root

Squaring a number:

Excel provides two ways in which one can square a number:

1. Using a Formula
2. Using a Function

Both ways are very quick and quite easy to implement.

1. Using a Formula

The Square of a number simply means multiplying a number by itself.In other words, raising it to the power of 2.

To square a numberone can write the formula in two different ways:

- Using the multiplication operator to multiply it by itself.
- Using the caret operator to raise the number to the power of 2.

2. Using a Function

As discussed in the previous topic the POWER function is used to find the exponential of a number. So, the POWER function with power value 2 can be used for squaring a number.

Square Root

Excel provides the user with the SQRT function to calculate the square root of any number. The syntax for the function is:

SQRT*(number)*

Here the *number* is the number or cell reference which contains the number for which you want to find the square root. For example, SQRT(400) will give the user value of 20.

6.3.8 INDEX Function

The INDEX function returns a value or the reference to a value from within a table or range. In case one needs to return the value of a specified cell or array of cells then this INDEX function is used. It gives the value of an element in a given location, selected by the row and column number indexes. Syntax is:

INDEX(*array, row_num, [column_num]*)

- array –This value is required. It is a range of cells or an array constant. This gives the range of the cells for indexing.
- row_num– This is the row position in the reference or array.
- col_num - [optional] This is the column position in the reference or array.

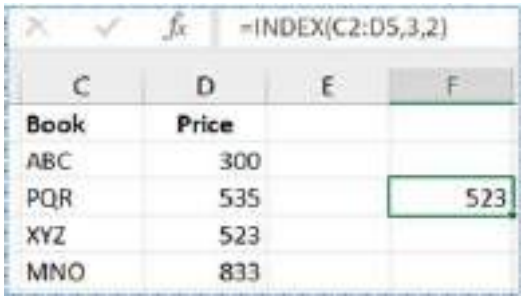


Fig 6.11

Fig 6.11 demonstrates the use of the INDEX function. Here it is used to find the Price of the book named XYZ which is 523. You can check the values of parameters in the formula bar. The range of cells is C2 to D5. Indexing starts at ABC so the index of XYZ is 3. Similarly for the column value. This concept can be implemented in a large dataset.

6.4 Summary

In this chapter, we have studied:

- Data management, its types and benefits of data management.
- Data transformation and different types of transformation.
- Implementation of different Arithmetic operators in Excel.
- Data transformation functions in Excel such as LOG, SQRT, POWER and INDEX, etc.

6.5Answer to Self-Check exercises

Q.1 Define data management and explain its features.

Q.2 What are the various arithmetic operators of Microsoft Excel?

Q.3 Explain the different ways of squaring a number in Excel.

Q.4 What is Log transformation and how we can calculate the Log of a number with different base values?

6.6 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 365),Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling

- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-7
CONDITIONAL STATEMENT

STRUCTURE

Learning Objectives

After going through this lesson, you will be able to:

- Understand the conditional Statements
- Understand the use of IF and its variants
- Understand the use of CONCATENATE, AVERAGEIF

7.1 Introduction

There are many scenarios in real life where you need to work on some conditions. So, while dealing with real-life data in excel one can use the functionality of condition statements or predefined functions to solve problems. Excel provides a wide range of functions for condition checking. In this chapter, the most common Conditional statements and functions are discussed with examples.

7.2 IF Statement

The Excel IF Statement is used to test a given condition and returns one value for a TRUE result and another value for a FALSE result. For example, if marks are more than 40%, then return a “PASS” asthe result – Otherwise, return a “FAIL” for the result. One can implement the IF function in different ways, such as to evaluate a single function, or includes several IF functions in a single formula. The use of Multiple IF statements in Excel is known as nested IF statements.

7.2.1 Use of IF statement

The IF function is commonly implemented to evaluate and analyze data by evaluating specific conditions.

This function can be used to evaluate text, values, and even errors. It's not just about checking if one thing is equal to the other and returning a result. According to our standards, we can also use arithmetic operators and perform additional calculations. One can also combine multiple IF functions together for multiple comparisons.

The syntax for the IF function:

=IF(logical_test, value_if_true, value_if_false)

The function uses the following arguments:

- Logical_test (required argument) – This is the condition that is to be tested and evaluated as either TRUE or FALSE.
- Value_if_true (optional argument) – It isthe value to be returned if the logical_test evaluates to TRUE.
- Value_if_false (optional argument) – It isthe value to be returned if the logical_test evaluates to FALSE.

When using the IF function to construct a test, we can use the following logical operators:

= (equal to)

> (greater than)

>= (greater than or equal to)

< (less than)

<= (less than or equal to)

<> (not equal to)

Example: In Fig 7.1 three columns are present namely, Student, Score, and Result. The Result column provides the values PASS or FAIL after evaluating the value in column D (Score).

The IF function is used here to evaluate the score so that the result will be PASS for a Score greater than or equal to 40 and FAIL otherwise.

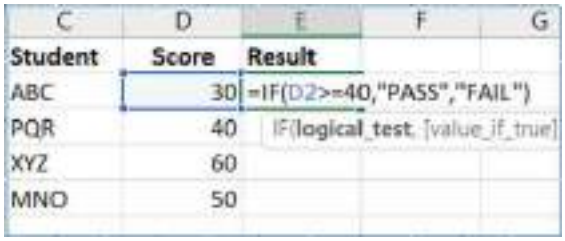

Fig 7.1

To implement the condition to the whole E column just drag the formula downwards. The final result is shown in fig 7.2 after implementation.

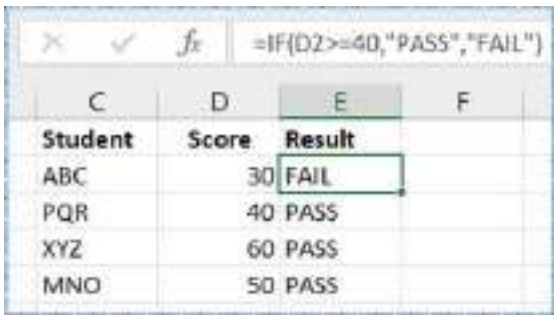

Fig 7.2

Note that The IF function is not case-sensitive.

7.2.2 Nested IF Statement

Excel provides the functionality of Nested IF. A Nested IF is referred to a case in which at least one IF condition is implemented inside another IF for evaluating the condition in more detail and providing a more precise result. It helps narrow down the result and helps in evaluating more conditions within one IF.

Example: Here we are Grading the students based on their scores in the examination. See Fig 7.3.

The Grade (column D) gives the final value by evaluating the Score (Column C). The nested IF is used to evaluate the score and divide the final result into three grades, A, B and C. Fig 7.3 shows the result for student A.

Fig 7.3

After implementing the nested IF to the rest of the cells in the table the final result will look like Fig 7.4.

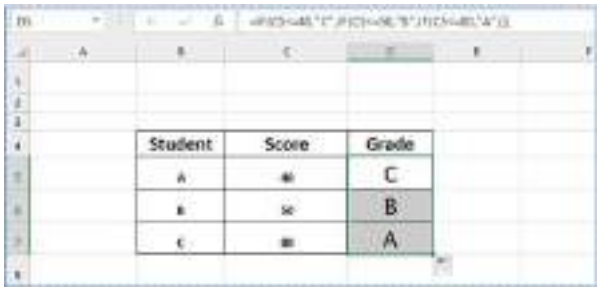

Fig 7.4

While implementing the nested IF, one IF needs to be carefully nested inside the other so that the proper logic gets evaluated.

7.2.3 SUM, SUMIF, SUMIFS Functions

SUM

We can use the SUM function for the addition of a range of cells in MS Excel. SUM function can either be used by directly writing in the cell starting with equal to sign or by clicking on the AutoSum command from the 'Editing' group under the 'HOME' tab on the Ribbon.

The example of the Sum function is already discussed in chapter 6.

SUMIF

SUMIF function is also used to add the range of cells based on one condition or criteria. In the below example (fig 7.5), we are adding the value of the D column only when the cell value is more than 100.

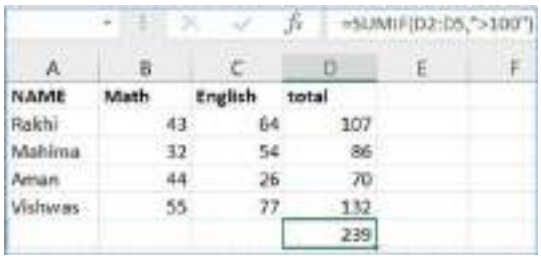

Fig 7.5

The condition/criteriain the formula are written in the double quote as the second parameter. Instead of passing the second parameter as less than or equal to,greater than, one can also put a condition based on other cell range.

For example, if onewants to add the D column value only when it's corresponding A column value is "Aman". To do this, the formula will be written as '=SUMIF(A2:A5, "Aman", D2:D5)'.This means adding the value from D2 to D5 only when A2 to A5 value contains "Aman". In this case, the result will be 70. Here, A2:A5 is the range for criteria and D2:D5 is the range for Sum.

SUMIFS

While using the Sum function on a range of cells, if oneneeds to use multiple criteria, SUMIFS function can be used.

Inthe below example (fig 7.6), we want to sum the value of the D column only if the A column value is "Aman" and the B column value is greater than 40. This criteria will be written as '=SUMIFS(D2:D5, A2:A5, "Aman", B2:B5, ">40")'.

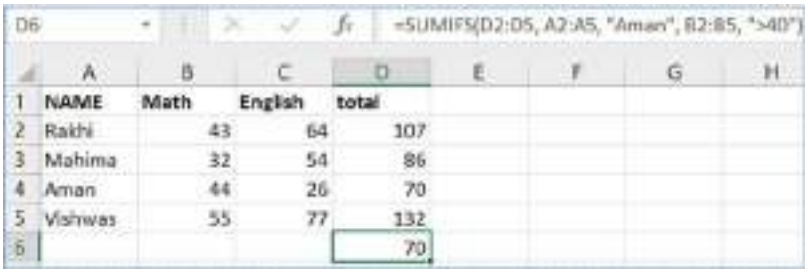

Fig 7.6

Here

- D2 to D5 is the sum range
- A2:A5 is criteria 1 range
- “Aman” is the criteria value of A2:A5
- B2:B5 is the criteria 2 range
- “>40” is the criteria value of B2:B5

7.2.4COUNT, COUNTIF, COUNTIFS Functions

COUNT Function

The count() function is used when one needs to count the number of cells. A range of cells is defined and the count function gives the total number of cells in that range. The result of count() does not include cells containing string data.

Let us take an example, Fig 7.7.

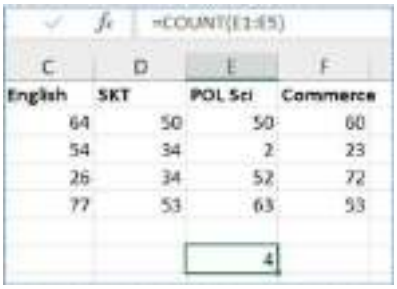

Fig 7.7

Here cell E7 shows the result of Count() function for the range of cells E1 to E5. But here, the cell E5 contains the string value which gives the final result 4. As we have already discussed that this function does not count the cells with string values.

COUNTIF Function

When one needs to count the cells based on one criteria only, then the CountIf function is used. The criteria can be less than, greater than, equal to, etc. The criteria can be used either for numerical or string values.

Fig 7.8

Look at Fig 7.8. Here we are counting the number of cells containing a numerical value greater than 40. Thus, the final result we get is 2. The formula used in the example was =COUNTIF(D1:D5, “>40”).

COUNTIFS Function

This function is used in the case where one needs to count the cells in a range based on more than one criteria. The multiple criteria are separated by a comma.

Fig 7.9

Let us say, in Fig 7.9 one needs to count the number of cells in column A for a value equal to AMAN and column E for values greater than 50. The formula will be, =COUNTIFS(A1:A5, “Aman”,E1:E5, “>50”).

- The count of cells in A1:A5 will give the value 1.
- The count of cells in column E will give a value of 2.

Only those cells are counted for which all criteria are met. In this case, only one value in column E satisfies the first criteria. So, the final result we get is 1.

7.2.5 AVERAGEIF Function

The AVERAGEIF function is a predefined function in Excel, which helps in calculating the average of a range of cells based on criteria. Criteria can be true or false conditions.

It is typed =AVERAGEIF and has three parts:=AVERAGEIF(**range**, **criteria**, **[average_range]**)

The condition in function syntax is referred to as criteria, which can check things like:

- If a number is greater than another number
- If a number is smaller than another number
- If a number or text is equal to something

The [average_range] is the range of cells where the function calculates the average. This value is optional. If not specified, the average will be calculated for the same range as the condition.

AVERAGEIF will automatically ignore the empty cells in the defined range, even when the criteria match. AVERAGEIF returns the value #DIV/0! if no cells in the range meet the criteria. While using the AVERAGEIF function one can only apply a single criteria. To apply multiple criteria, one can use the AVERAGEIFS function.

7.2.6 MAX and MIN Function

The MAX function is a predefined function in Excel, which helps in finding the highest number in a range. It does not take into account text or logical values and only works for the cells with numerical values.

It is typed as '=MAX'.

The MIN function is a predefined function in Excel, which helps in finding the lowest number in a range. It is the opposite of the MAX function. Same tothe MAX function, it also ignores the cells with text values and only works on the cells with numerical values.

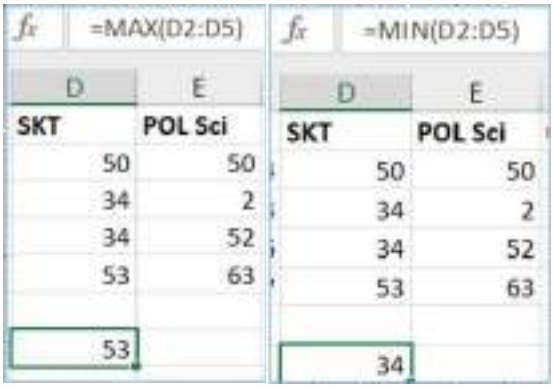

Fig 7.10

Fig 7.10 is showing examples of MAX and MIN functions.

7.2.7 CONCATENATE Function

The meaning of 'Concatenate' is to join or combine. The CONCATENATE function in Excel is used to combine the text values from two or more cells. There is one more way to combine the cells in Excel, i.e., merge cells. The main difference between these two methods is that merge cells combine the two cells 'physically' and shows the result in one larger cell spanning across multiple rows or columns. On the other hand, CONCATENATE function combines the text data value from two or more cell and show the result in another cell.

The Excel CONCATENATE function can be used to join up to 30 text items. It gives theresult as a text.

The syntax of the function is as follows:

Syntax: **=CONCATENATE (text1, text2, [text3], ...)**

For example, the simple formula to CONCATENATE the values of two cells A3 and B3 are as follows:

=CONCATENATE(A3,B3)

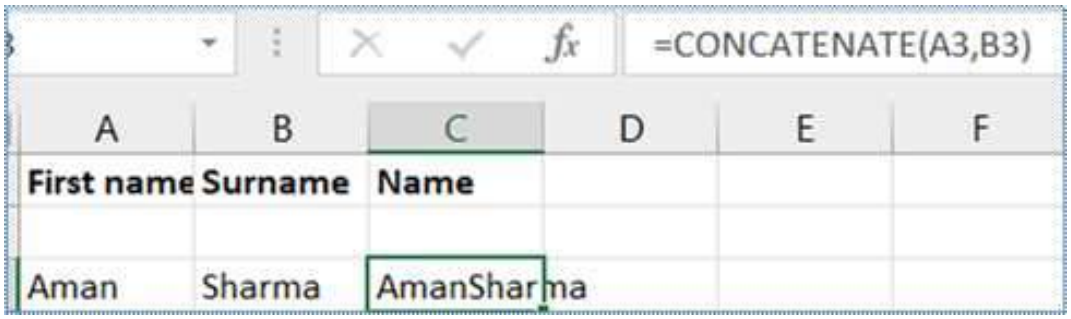

Fig. 7.11

See figure 7.11. Thevalues will be combined without any delimiters. To separate the values with space, one can use " ". In that case, the formula will be like this,

=CONCATENATE(A3, " ", B3)

This will produce the result 'Aman Sharma'.

Concatenating a Text String and a Cell Value

There are more things that the Excel CONCATENATE function can do. One can use the function to join a cell value with a string as well. For example:

=CONCATENATE(A3, " ", B3, " Delhi")

The example is shown in fig 7.12.

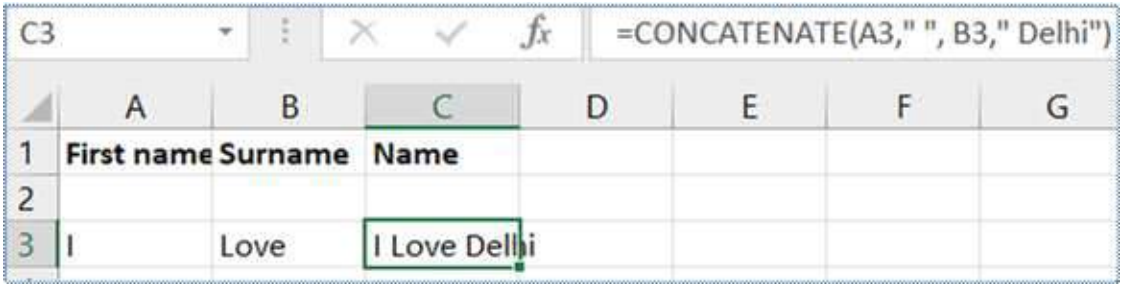

Fig 7.12

When using CONCATENATE function, there should be at least one "text" argument for it to work. In case of invalid arguments, the formula returns a #VALUE! Error.The result of the CONCATENATE function is always a text string.

7.3 Summary

In this chapter, we have studied:

- Conditional statements, IF statements, and their types
- Implementation of conditioning while adding cells.
- Implementation of conditioning while counting the cells.
- Some useful functions like AVERAGEIF and CONCATENATE.

7.4 Answer to Self-Check exercises

Q.1 Define conditional statements and explain them with examples.

Q.2 Discuss SUM, SUMIF and SUMIFS?

Q.3 How to count the cell with specified conditions?

Q.4 Explain the use of CONCATENATE function in Excel and how is it different from the 'merge cell'.

7.5 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95

- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 375), Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 97 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 97.
- Micro Soft Office 97: Unleashed: Techmedia.
- John Walken Bach: Excel 97.

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Chapter-8
SORTING AND FILTERING OF DATA

STRUCTURE

8.0 Learning Objectives

After going through this lesson, you will be able to:

- learnto sort the data in excel
- learn the sorting of data in different ways
- understand the concept of sorting and filtering
- learn the method to filter the text and numerical data
- understand the working of the Lookup function

8.1 Introduction

Excel provides various tools and functions for data analysis and management. Whenever we are dealing with a large volume of data, we need to apply some operations on the data to easily process the information. One of the most commonly applied such operations is Sort. Sort is basically used to arrange the data in a particular order like ascending or descending. Using sort we can arrange the text data values in alphabetical order.Another usually employed function is Filter. The filter is normally used to find the selected information from the heap of the data. To narrow down the search area and get the information more easily different filters are applied to the data. Excel has many predefined filters for the different data types. In addition to these two functions, in this chapter, we have also discussed the Lookup function.

8.2 Sort

There are many cases when you need to organize your data in a certain way which will help in better data analysis. This type of data organizing functionality is provided in the Excel with SORT function. This function allows the user to:

- Sort data A to Z or Z to A
- Sort data in Ascending or Descending order
- Sort data from lowest to highest or highest to lowest

The sort function can be applied either row-wise or column-wise. It allows the applicationof the sorting function to a particular column/row to expand the sorting to the whole data.

The sort function is given in the HOME tab under the Editing group with the label ‘Sort & Filter’. You can see fig 8.1.

Fig 8.1

Ascending and Descending sorting

To sort the data in ascending or descending order, abide by the following steps.

- Select a column with a numerical value on which sorting is to be carried out.
- Then click on the Sort & Filter option in the editing group under the Home tab.
- Here, more options will appear. Click on ‘Sort Smallest to Largest’ for sorting the data in ascending order. In case of descending order sorting, click on ‘Sort Largest to Smallest’.
- Next, a dialogue box will appear with two options;
  - Expand the selection- will apply the sort to other data columns in the sheet concerning the selected column.
  - Continue with the current selection- will apply the sort to the selected column only.
- After selecting the appropriate option, the user can get the sorted data in either ascending or descending order.

Fig 8.2

An example of steps included in sorting is shown in fig 8.2.

A-Z and Z-A Sorting

This type of sorting is used to sort text data alphabetically. For example, in figure 8.2 we have a column NAME with text values. We can sort the data in this column in alphabetic order, either A to Z or Z to A. To carry out this sorting follow the steps:

- Select a column with text value on which sorting is to be carried out. NAME in our example.
- Then click on the Sort & Filter option in the editing group under the Home tab.
- Here, more options will appear. Click on 'Sort A to Z' or 'Sort Z to A'.
- Next, a dialogue box will appear with two options;
  - Expand the selection- will apply the sort to other data columns in the sheet concerning the selected column.
  - Continue with the current selection- will apply the sort to the selected column only.
- After selecting the appropriate option, user can get the alphabetically sorted data.

	A	B	C	D	E
1	**NAME**	**Math**	**English**	**Total**	
2	Aman	44	26	70	
3	Mahima	32	54	86	
4	Rakhi	43	64	107	
5	Vishwas	55	77	132	

Fig 8.3

Fig 8.3 shows the result of the 'A to Z' sort on the NAME column. Refer the fig 8.2 to compare the data before and after sorting.

Users can apply the sorting function in both ways, column-wise or row-wise. Here, column-wise sorting is discussed. To apply the sort row-wise, follow the steps mentioned above after selecting a row you need to sort. The rest of the process is the same.

8.3 Filter

When working with a huge amount of data, one cannot find the specific data easily. To narrow down the search and find the information quickly, filters can be used. It helps to narrow down the data in your worksheet, which allows you to view only the information you need.

To filter data:

In our example, we are going to filter the data in the table shown below (Table 8.1) based on different cases. For correct working filtering, the worksheet should include a header row, which is used to distinguish each column. In our example, our worksheet is organized into four columns identified by the header cells in row 1. The data in the worksheet is shown in table 8.1.

Table 8.1 Example data

NAME	MATH	ENGLISH	TOTAL
Aman	44	26	70
Mahima	32	54	86
Rakhi	43	64	107
Vishwas	55	77	132

To get started with the filtering, follow the steps:

- First, select any cell in the range of data.
- Then go to the 'DATA' tab,and Click Filter in 'Sort & Filter' group.
- In the header cell for each column,a drop-down arrow will appear.

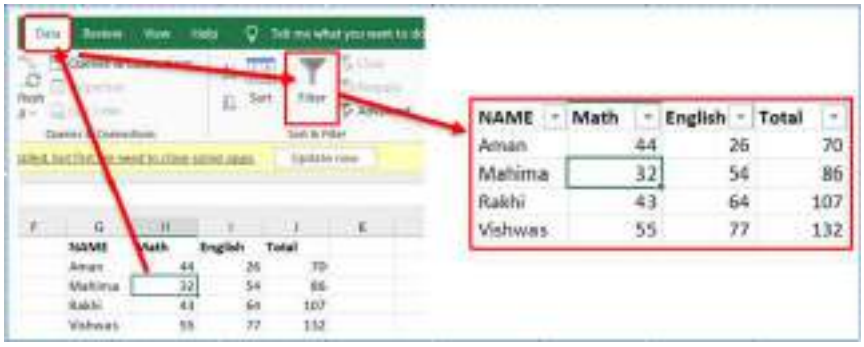


Fig. 8.4

- Click the drop-down arrow for the column you want to filter. See fig 8.5.

Now, there are many options under the filter function. Users can also apply the sort operation on the data of the column. For example, in fig 8.5, one can see the different options available after clicking the down arrow in the 'Math' column.

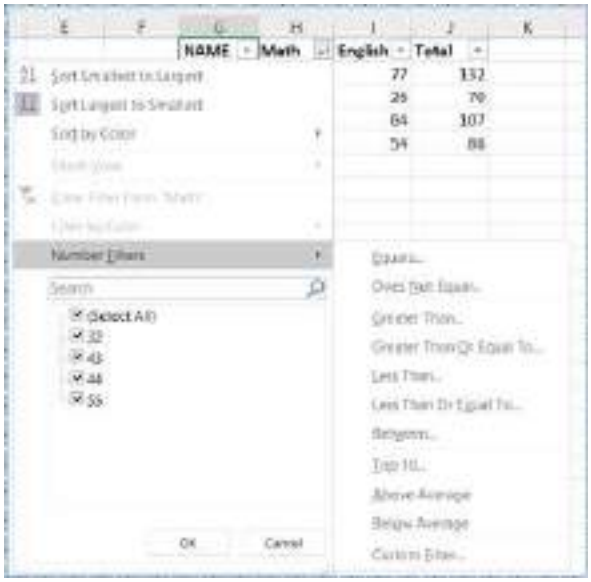


Fig 8.5

Number Filter

Based onthe type of data in the column selected, the user will get the options as ‘Number filters’ or ‘Text Filters’. In our example, we have selected the math column having numerical values. So, here the option available is ‘Number Filters’. Number Filters allow the user to manipulate the numerical data in multiple ways. As you can see in fig 8.5, there are multiple conditions are available under the category of ‘Number filter’.

Let us say, we want to filter the marks in MATHS between 45 and 60.

So, the steps are:

- First, select the ‘Between’ option under Number Filters.
- A dialogue window will appear as shown below.

- Now add the condition for filtering, that the value should be ‘greater than or equal to’ 45 and ‘less than or equal to’ 60. Then press OK.
- The result you will get is shown below.

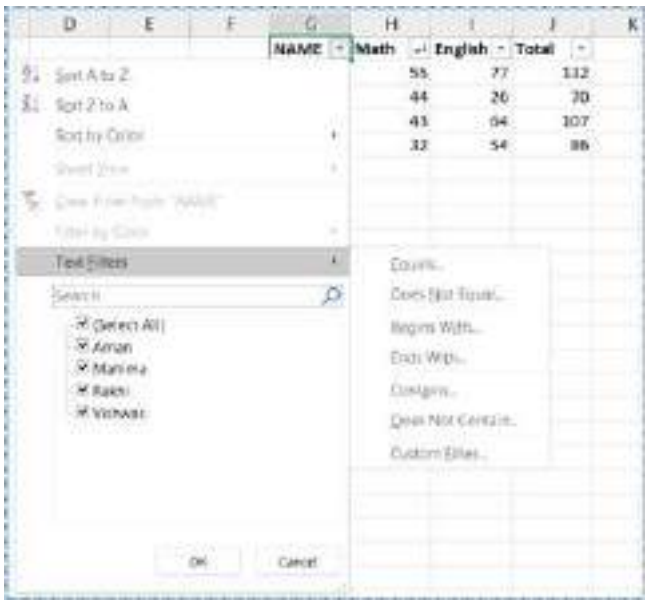
NAME	Math	English	Total
Vishwas	55	77	132

The filtering discussed above is advanced Number Filtering. You can try the different conditions available for ‘Number Filter’ using the same steps mentioned above.

Text Filter

Similarly, for the column with text data, we have Text Filters.Let us take an example to understand its works. If we want to find the entry of a person with a name starting with alphabet A, we will carry out the following steps.

- First, click the down arrow on the Name column. We will get the options shown below.



- After selecting the ‘Text Filters’, you can see the different conditions available.
- We will choose the option, ‘Begins With’. After selecting this, we will get a dialogue box as shown below.

- Enter the Condition, i.e., A and press OK. It will give the following results.

NAME	Math	English	Total
Aman	44	26	70

- This is the final result of Text Filtering.

There are also other types of filtering available, such as Date filtering. This option will appear for the column with the date as data.

Saving the Filtered Data

It may be the case, thatStheuser does not want to modify the original data. In that case, the user can save the result of filtering to another worksheet. There are multiple ways to save the filtered data to a different worksheet. One of the most common ways is to:

- Add a new worksheet by clicking the plus (+) sign near Sheet one above the status bar.
- This will add a new worksheet. You can rename this sheet.
- Now, copy the filtered data by selecting the data and pressing CTRL + C.
- Go to the new sheet, select a cell where you want to paste, and press CTRL + V.
- Save the worksheet.

This is the simplest way to save the filtered data into a different worksheet.

8.4 LOOKUP Function

Most of the time, the user wants to look up for a value in the data and need the results for the matching value to be returned. MS Excel provides the user with a handful of ways to do lookup. The lookup can be done in horizontal or vertical way. The function given in the Excel for this purpose is LOOKUP.

In simple terms, one can say that the LOOKUP function searches a value in one column or row and returns a corresponding value from the same position in another column or row.Lookup functions are generally very assistive with large sets of data to find specific information throughout many rows or columns.

There are two forms of LOOKUP in Excel. Namely, Vector and Array. We have discussed the Vector form in this book.In this context, a vector denotes a one-column or one-row range.The vector form of LOOKUP is used to search one row or one column of data for a specified value, and draw a value from the same position in another row or column. The syntax for vector Lookup is:

LOOKUP(lookup_value, lookup_vector, [result_vector])

Where,

- Lookup_value (required value) – This is the value to search for. It can be a number, text, logical value of TRUE or FALSE, or a reference to a cell containing the lookup value.
- Lookup_vector (required value) – This is the one-row or one-column range of data to be searched. It must be sorted in ascending order.
- Result_vector (optional) –This is the optional one-row or one-column range of data from which you want to return the result - a value in the same position as the lookup value. Result_vector must be the same size as lookup_range. If excluded, the result is delivered from lookup_vector.

The following examples helps in understanding the working of Lookup function.

Vertical Lookup

We took a data of seller and their product, Fig 8.6. Here, we are doing a vertical lookup i.e., searching is done in column range. The list of sellers is in column D (D2:D5) and the products they sold in column E (E2:E5). We are making a dashboard where the user will enter the seller's name in B2 and the formula would pull a corresponding product in B3. The accomplish this task the formula needed will be :

=LOOKUP(B2,D2:D5,E2:E5)

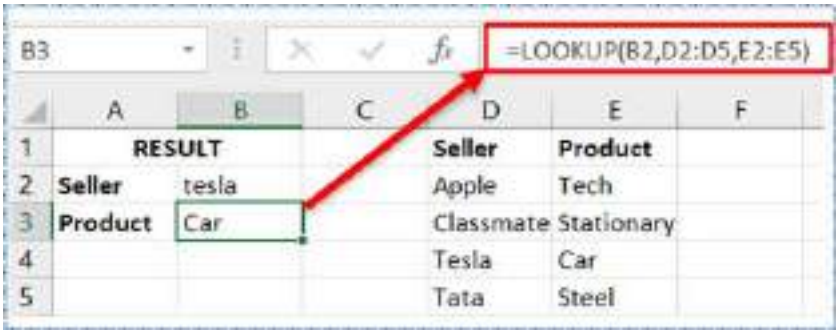


Fig 8.6

Where,

- B2 – is the lookup_value. The user will enter the name of seller here and we need to check the corresponding product.
- D2:D5 – is the lookup_vector. This is the range of lookup_vector from which the user will enter the value.
- E2:E5 – is the result_vector. This is the range of values from which the corresponding value will be searched for.

Horizontal Lookup

There may be the case that the source data has a horizontal layout, i.e., the entries reside in rows rather than columns, fig 8.7. In this case,issue one-row range in the lookup_vector and result_vector arguments. Thus, the formula will be like this:

=LOOKUP(B2,E1:H1,E2:H2)

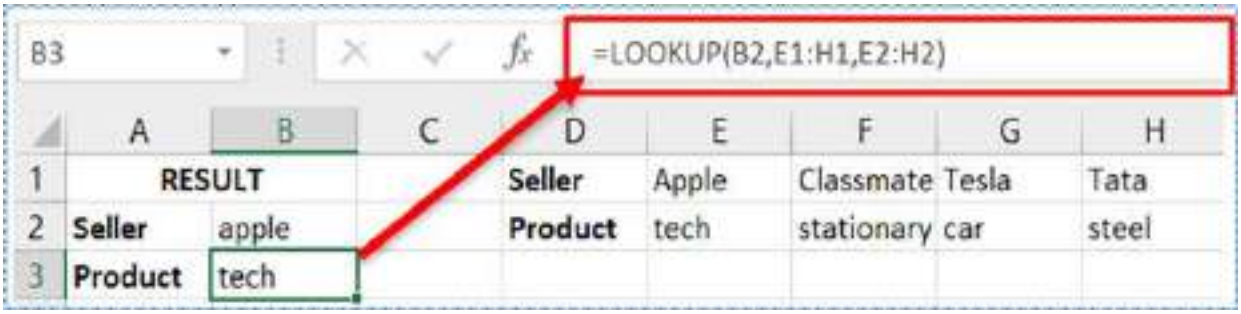


Fig 8.7

Uses of Lookup function

Some common uses of LOOKUP functions are listed below:

- The users can find the exact or suitable match by using the lookup function.
- The users can search for data both vertically (columns) and horizontally (rows) in the worksheet.
- It is easy to use and does not require selecting the complete table.

There are some important points to remember while using the lookup function. They are listed below:

- LOOKUP assumes that lookup_vector is sorted in ascending order which means from A to Z or from smallest to largest.
- When lookup_value cannot be found, LOOKUP will match the next smallest value, i.e. the largest value in lookup_vector that is less than or equal to lookup_value.
- When lookup_value is greater than all values in lookup_vector, LOOKUP matches the last value.
- When lookup_value is smaller than the smallest value in lookup_vector, the Excel LOOKUP returns #N/A.
- Result_vector must be the same size as lookup_vector.
- LOOKUP is not case-sensitive,it does not differentiate uppercase and lowercase text.

8.5 Summary

In this chapter, we have studied:

- Concept of sort and filter
- Different methods in sorting and filtering.
- Lookup function.

8.6Answer to Self-Check exercises

Q.1 Differentiate between sort and filter with examples.

Q.2 How to create a sub sample of dataset using filtering?

Q.3 What is text filter and its different conditions?

Q.4 Explain the concept of horizontal and vertical Lookup.

8.7 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 385),Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel

- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 98 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 98.
- Micro Soft Office 98: Unleashed: Techmedia.
- John Walken Bach: Excel 98.

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Chapter-9
DESCRIPTIVE STATISTICS

STRUCTURE

9.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand the basics of descriptive statistics
- Understand the univariate and multivariate data analysis
- Understand the concept of central tendency and measure of dispersion.
- Implementation of descriptive statistics in MS Excel.

9.1 Introduction

Statistics is the field concerned with collecting, organizing, analyzing, interpreting, and presenting data. Statistical formulas and methods are logical and very interesting to implement. The main reason to use statistical analysis is to make the data more informative and bring clarity to the research questions. The statistical procedures help in finding the hidden patterns in the data that are not directly observable. The discovery of these patterns helps in problem-solving and decision-making.

9.2 Descriptive Statistics

Descriptive statistics include numerical and graphical procedures to help the person to understand the data and discover the hidden patterns. In other words, it is the branch of statistics that focuses on measuring and describing the data in such a way that the person can find the patterns in the data which are usually not apparent. In this chapter, the numerical procedures for data analysis are discussed. Normally, a person gathers data, which is not examined and exists as a series of numerical values with no observable relationship. The use of descriptive analysis techniques helps the person to present the data in such a way that hidden patterns can be assessed numerically and visually.

Before analyzing the data, the motive of analysis is important. Next main point is to identify the type of analysis, i.e., univariate or multivariate analysis. Based on this, the methods are selected for final evaluation.

9.3 Univariate analysis

Univariate analysis is the simplest type of analysis where only a single variable is analyzed. There are many ways to analyze univariate data. The most common manner of analysis is to check the central tendency and measures of dispersion. These two are the popular types of summary statistics.

Central Tendency: the measure of central tendency is used to describe a set of data by identifying the central point of distribution or central position within that set of data. That's why it is often called a measure of central location. The mean, mode, and median are the most familiar measures of central tendency. Other measures are used. Let's discuss them briefly.

- **Mean** – It is the average value in a set of data.
- **Median**- It is the middlemost score in a set of data that has been arranged in the order of magnitude. The value of the median is not much affected by skewed data and outliers.
- **Mode**- The mode is the most commonly occurring value/score in the set of data.
- **Trim mean:** It is a method of statistics that is used to get a more realistic mean of the set of data. To use this method, a percentage of the highest and lowest values are cut and then the mean is calculated. This step of pre-calculation enhances the reliability of the mean.
- **Geometric mean** - A geometric mean is a mean or average which shows the central tendency of a set of numbers by using the product of their values. The geometric mean is mostly used to determine the performance results of an investment or portfolio. For a set of n observations, a geometric mean is the nth root of their product. The calculation of geometric mean does not accept negative or zero values, e.g. only positive values. When working with percentages derived from data values, the geometric mean is recommended to use.
- **Harmonic mean-** The use of harmonic mean is averaging of ratios. The ratios are speed and time, cost, etc. The harmonic mean is the most suitable mean if the data consists of rates. Thus, if the data values are rates, then use the harmonic mean. The very common use of harmonic mean is in averaging things like rates (e.g., the average travel speed given a duration of several travels).

Measures of dispersion – Sometimes, the measures of central tendency are not enough to describe data. Two sets of data may have the same mean but they can be completely different. Thus, there is a need to know about the extent of variability to describe data. And this is given by the measures of dispersion.

- **Range** - The range is the numerical difference between the largest and smallest values in the distribution. It is easy to calculate but susceptible to outliers and thus easily affected.
- **Quartile deviation** – The Quartile Deviation is used to judge the spread of a distribution about a measure of its central tendency (usually the mean). So, it generally provides an estimate of the range within which the central 50% of sample data lies.
- **SD**- The standard deviation is used to represent how spread out the values are. The SD represents a standard amount of distance between the mean and each score in the distribution. It is the square root of the variance (VAR). The variance is the average squared distance of the scores in a distribution from the mean.
- **CV** – CV refers to the coefficient of variation. CV is a standard measure of the dispersion of data points around the mean in a data series. It basically represents the ratio of standard deviation to the mean.
- **Gini coefficient**: it is used to measure the inequality among the values of frequency distribution. Normally, like the levels of the income distribution of a population. Value 0 of the Gini coefficient represents perfect equality and 1 (or 100%) represents maximum inequality among the values.

Moments and order statistics

- **Skewness** - A measurement of a data distribution that determines the extent to which it is ‘‘imbalanced’’ or ‘‘leaning’’ away from a standard bell shape (in the caseof a normal distribution). Skewness is a term that describes whether, or to what extent, a set of values is not perfectly balanced but rather trails off to the left or right of the center.
- **Kurtosis -** Same as skewness the kurtosis is used to represent the distribution. Kurtosis describes the degree to which values cluster in the tails or the peak of a frequency distribution. The peak is the tallest part of the distribution, and the tails are the ends of the distribution.
- **Rank-**Rank is the data transformation in which the numerical values of the distribution are replaced with their ranks.
- **Percentile** – The use of Percentiles is to represent the point in a distributionof values below which a given percentage of values fall.

9.4 Multivariate data

Multivariate data – When data analysis involves three or more variables, it is categorized under multivariate.

- **Covariance**- the covariance value is the measure of the relationship between two random variables. Which to what level, do they change together.
- **Correlation matrix**- It is a tabular representation of correlation coefficients for different variables. The correlation matrix represents the correlation among all possible pairs of values in a table. It is a way to organize a large set of data which further helps to identify and visualize the patterns.

A correlation matrix constitutes the rows and columns that show the variables. Every single cell in the matrix contains the correlation coefficient. It is often implemented in conjunction with other statistical analyses. One of the major use of matrix is to analyze the multiple linear regression models.

- **Partial correlation** – Partial correlation is a method that is used to measure the strength of a relationship between two variables, while controlling for the effect of one or several other variables, on this relationship. For example, it can be used to measure the correlation between the amount of food eaten and blood pressure, while controlling for the variables like weight and frequency of exercise. It is noted that with the increase in the control variables the test becomes less reliable.
- **Rank correlation**- The Rank correlation is generally used in the case when data is not normally distributed or the presence of outliers affects the association between two random variables. Generally, with correlation, we only know about the relationship between two variables and how one affects the other. But we do not know about the quantity, that is how much they are related.

9.5 Implementation with Excel

Now, let us perform the descriptive analysis with MS Excel. First, we need to locate the Data analysis group in the Data tab as shown below (fig 9.1).

Fig 9.1

If you are not able to find this option then follow the steps mentioned below:

1. Click the File tab,click Options in the bottom left, and then click the Add-Ins category.
2. In the Manage box, select Excel Add-ins and then click Go.
3. In the Add-Ins dialogue box, check the 'Analysis ToolPack' check box, and then click OK.

- If Analysis ToolPak is not listed in the Add-Ins available box, you need to click 'Browse' to locate it.
- If you are prompted that the Analysis ToolPak is not currently installed on your computer, click Yes to install it.

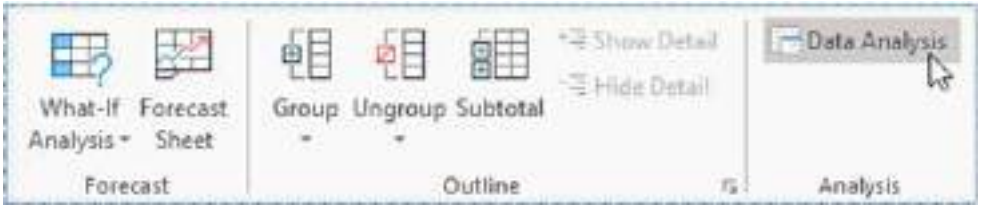
After this step, you will be able to locate the Data Analysis in the Data tab. This Analysis Toolpackis used to generate descriptive statistics. Here is an example.

We took the scores of 10 participants in a test as data, as shown below (fig 9.2). To generate the descriptive analysis for these data values follow the steps given below.

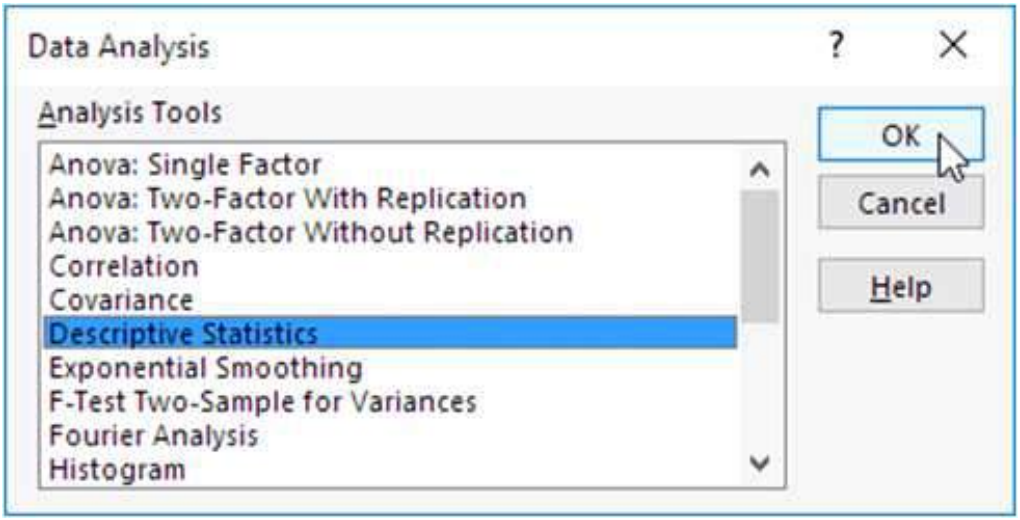
Scores
56
63
77
34
66
98
65
85
71
77

Fig 9.2

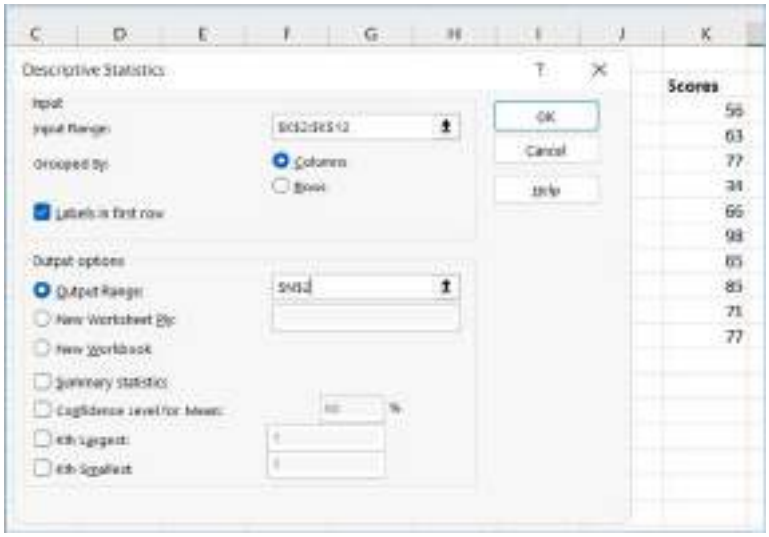
1. Go to the Data tab, in the Analysis group, and click **Data Analysis.**



2. Select Descriptive Statistics from the list and click OK.



3. Select the range K2:K12 (range of input data) as the Input Range.
4. Select cell N2(you can choose any blank cell) as the Output Range.
5. Make sure Summary statistics are checked.



6. Click OK.

Result:

Scores
56
63
77
34
66
98
65
85
71
77

Scores	
Mean	69.2
Standard Error	5.460566
Median	68.5
Mode	77
Standard Deviation	17.26782
Sample Variance	298.1778
Kurtosis	1.368501
Skewness	-0.47131
Range	64
Minimum	34
Maximum	98
Sum	692
Count	10

In the above image, you can check the various statistical information about the data values we have taken (fig 9.2).

In addition to these measures, we can also evaluate other measures in excel.

- **Harmonic mean**: HARMEAN function is available in Excel for harmonic mean.The HARMEAN function takes multiple arguments.The arguments are in the form number 1, number 2, number 3, etc. up to 255. Arguments can be numerical values, cell references, or a range.

Example: =HARMEAN(1,2,6)

It will return 1.8.

- **Geometric mean**: The GEOMEAN function is available in Excel for geometric mean. The GEOMEAN function takes multiple arguments.The arguments are in the form number1, number2, number3, etc. up to 255. Arguments can be numerical values, cell references, or a range.

  Example: =GEOMEAN(4,9)

  It will return 6.
- **Trim Mean**: The Excel TRIMMEAN function is used to calculate the meanwhile excluding outliers. The number of data points that will be excluded by the function is provided in the form of a percentage. This percentage can be either in decimal format or percent format.

  For the data in fig 9.2, the TRIMMEAN will be: =TRIMMEAN (K3:K12,0.2) and it will return the value 70.
- **Quartile Deviation:**The QUARTILE function is used to calculate the quartile deviation.
- First, you need to enter the data set in a single column of the excel sheet. For example, fig 9.2.
- Click on any of the empty cells of the excel sheet for the result display.
- If you want to find the first quartile then, you have to type "=QUARTILE(K3:K12,1)" and hit enter.
- Just like this, you need to type "=QUARTILE(K3:K12,3)" to find the third quartile.
- **Coefficient of Variance**- To calculate the coefficient of variance in Excel, you need to apply the following formula:

  Formula: '=STDEV(K3:K12)/AVERAGE(K3:K12)'

  Where STDEV is the function to calculate Standard Deviation and Average is used to calculate Average or Arithmetic Mean. You can also use the value of Standard Deviation and Mean from the statistical information returned from Data Analysis.
- **Gini Coefficient:** To calculate the Gini coefficient in Excel follow the steps given below:

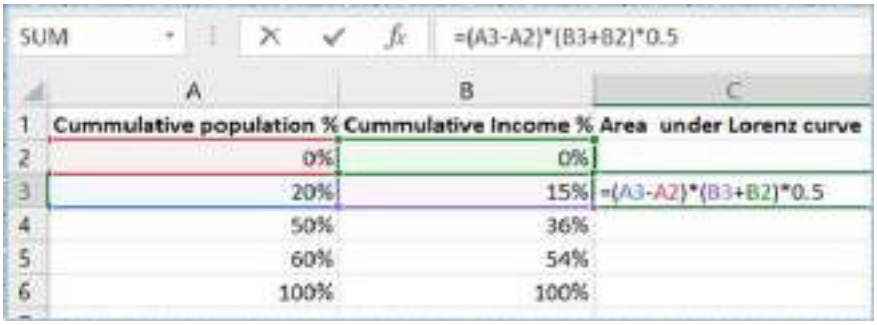
➢ Enter the data. Two columns namely, the cumulative population % and cumulative income % of individuals. Shown in the figure below.

	A	B
1	**Cummulative population %**	**Cummulative Income %**
2	0	0
3	20	15
4	50	36
5	60	54
6	100	100

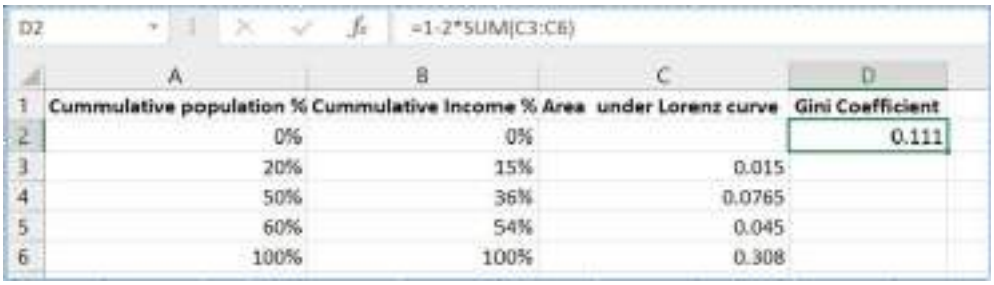
The meaning of these values is,

- The bottom 20 % individuals of in the country account for 15 % of the total income
- The bottom 50 % individuals of in the country account for 36 % of the total income
- The bottom 60 % individuals of in the country account for 54 % of the total income
- 100% of individuals in the country account for 100% of the total income.

➢ The next step is to calculate the Area under Lorenz Curve. This curve is used to visualize the distribution of income in a country. We will use the formula =(A3-A2)*(B3+B2)*0.5 to calculate the area under Lorenz Curve in column C.



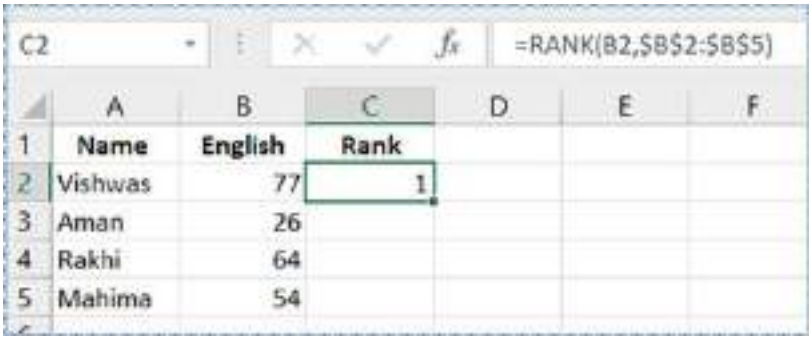
➢ The last step is to calculate the Gini coefficient. For that, we will type the formula '=1-2*SUM(C3:C6)' in D2.



So, the Gini Coefficient for this population turned out to be **0.111**. One can use the same method to calculate the Gini coefficient for a large dataset also.

- **Rank: The** RANK function is available in Excel which returns the statistical rank of a given value within a provided array of values.

  Formula: =RANK(number,ref,[order])



As seen above, the formula is applied in the C2 cell. And same is dragged to the last value in the adjacent column. So the final result will be like this:

	A	B	C
1	**Name**	**English**	**Rank**
2	Vishwas	77	1
3	Aman	26	4
4	Rakhi	64	2
5	Mahima	54	3

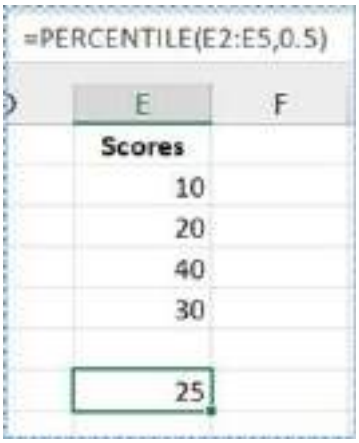
The final result after using the RANK function can be seen above.

- **Percentile**: The PERCENTILE function returns the Kth percentile of the selected values in a range. After MS EXCEL 2010 more functions have been introduced. PERCENTILE.INC() works the same as the PERCENTILE. You can still use the PERCENTILE().

  Formula: PERCENTILE(array,k)

  Where,

1. Array: It is a required argument. The array or range of data that defines relative standing.
2. k: It is required. The percentile value is in the range of 0…1, inclusive. You can either use percentage or decimal values.
3. For example,

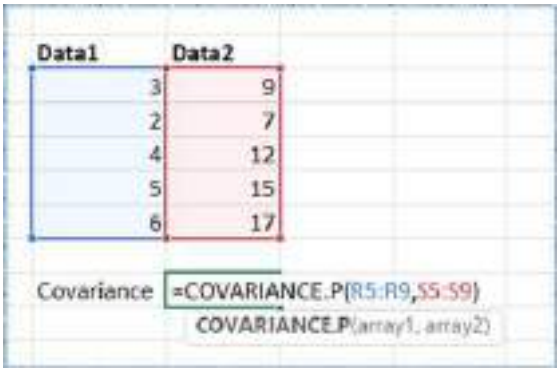


4. As you can see in the above image, we have used the value of k as 0.5 i.e., 50%
5. The value of k cannot be non-numeric otherwise, it will return #VALUE! error value.
6. Fork is < 0 or if k > 1, PERCENTILE returns the #NUM! error value.

- **Covariance**: There are two ways to calculate Covariance in Excel.

1. **COVARIANCE.P():** The first method is to use the Covariance.P() function. It has two arguments, Array1 and array 2. These are range of cells for two variables for which Covariance is to be calculated.

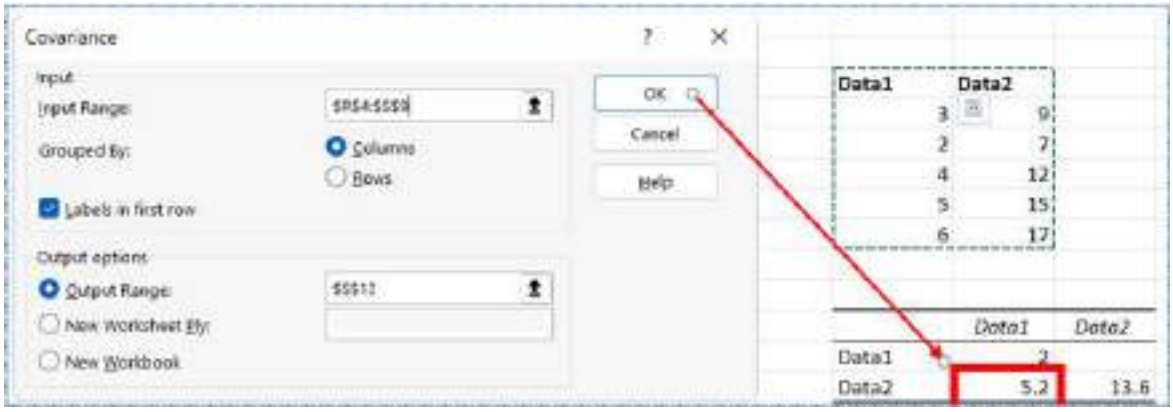
- For example,



Here, you can see two variables Data 1 and Data 2 are selected as the two arguments. The value it will return is **5.2**.

2. **Using Data Analysis tool.**

- Just go to the Analysis group in the Data tab and click Data Analysis.
- Select Covariance from the list.
- Select the input data range.
- Select output range.



- Check the box for Labels in the first row (if any).
- Click OK. The result will beshown in a table form.
- An example is shown above. The result is highlighted in the rectangular box, i.e., 5.2.

- **Correlation Matrix:** There are two ways to calculate Correlation in Excel.

o **CORREL():** This function is used to calculate the correlation. It has two arguments Array 1 and Array 2. These are range of cells for two variables for which Correlation is to be calculated.

o **Using Data Analysis tool.**

- Just go to the Analysis group in the Data tab and click Data Analysis.
- Select Correlation from the list.
- Select the input data range.

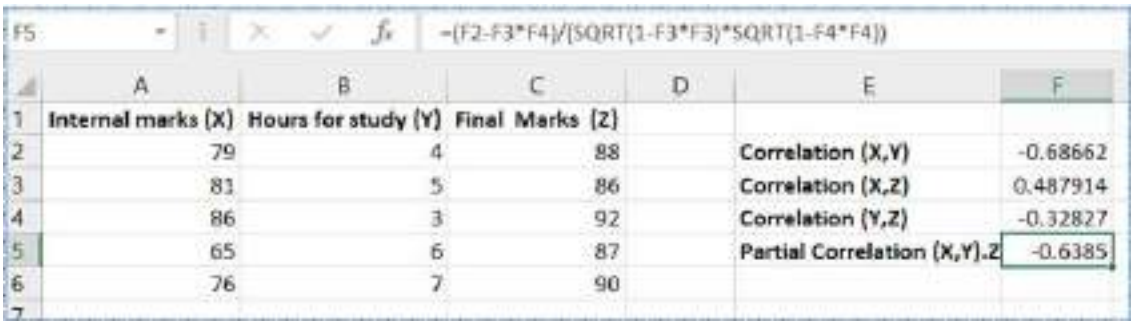
- Select output range.
- Check the box for Labels in the first row (if any).
- Click OK. The result will be shown in a table form.

- **Partial Correlation:** There is no direct function or tool to calculate the partial correlation. See the example below to understand the process of calculation of partial correlation in Excel.

o Consider we have two variables X and Y for which correlation is to be calculated. Z is another variable that is related to both X and Y. So the formula for partial correlation will be:

Partial Corr (X,Y).Z = (Corr (X,Y) - Corr (X,Z)* Corr (Y.Z)) / (√1- (Corr (X,Z)^2 * √1- (Corr (Y,Z)^2)

o Below is an example,



	A	B	C	D	E	F
1	Internal marks (X)	Hours for study (Y)	Final Marks (Z)			
2	79	4	88		Correlation (X,Y)	-0.68662
3	81	5	86		Correlation (X,Z)	0.487914
4	86	3	92		Correlation (Y,Z)	-0.32827
5	65	6	87		Partial Correlation (X,Y).Z	-0.6385
6	76	7	90			

o Here, you can see the formula used in the formula bar applied in cell F5. The partial correlation we have is -0.6385

- **Rank Correlation:** There is no predefined function available in Excel to calculate the rank correlation. The process is similar to the calculation of partial correlation, i.e., apply the traditional formula step-by-step in excel.

9.6 Summary

In this chapter, we have studied:

- About the descriptive statistics.
- Univariate and multivariate data analysis.
- Implementation of various statistical methods in excel to perform descriptive data analysis like the measure of central tendency and measures of dispersion.

9.7 Answer to Self-Check exercises

Q.1 Define descriptive statistics.

Q.2 Discuss the Data Analytical Toolpack in Excel.

Q.3 How to perform the data analysis in Excel?

Q.4 Explain the various measures of descriptive statistics available under data analysis.

9.8 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 95
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 395),Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 99 for windows step by step BPB publication.
- Lonnie. E. Moseley & David M. Boodey: Mastering office 99.
- Micro Soft Office 99: Unleashed: Techmedia.
- John Walken Bach: Excel 99.

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Chapter-10
GRAPHICAL PRESENTATION OF DATA

STRUCTURE

10.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand the importance of the graphical presentation of data
- Understands the different types of charts
- Understand the importance and applications of charts

10.1 Introduction

It is sometimes not easy to interpret Excel data due to the complexity and size of the data. So, charts are a way to represent the data graphically and interpret the data easily. Charts are the visual representation of data.

Excel provides charts to take advantage of graphical representation. The data represented through charts is more understandable than the data stored in an Excel table. This makes the process of analyzing data fast. Excel users can fast analyze the data.

Graphical representation of data using charts makes complex data analysis easier to understand. Excel has a variety of charts, each with its different functionality and representation style.

10.2 Charts

A chart is a graphical representation of your data in a worksheet. Using charts to represent worksheet data often creates a better understanding of your data rather than simply presenting the numbers in a spreadsheet. They are also a great way to add brandingto your presentations.

There is a list of basic and advanced levels of charts used for different scenarios to analyze the data.

Excel offers various charts to represent the data in different manners, such as - Pie charts, Bar charts, Line charts, Stock charts, Surface charts, Radar charts, and many more. You can utilize them as per your data analysis needs.

10.2.1 Types of Charts

I. Clustered column and 3-D clustered column

A clustered column chart shows values in 2-D columns. A 3-D clustered column chart shows columns in 3-D format, but it doesn't use a third value axis (depth axis). Use this chart when you have categories that represent:

- Ranges of values (for example, item counts).
- Specific scale arrangements (for example, a Likert scale with entries like Strongly agree, Agree, Neutral, Disagree, strongly disagree).
- Names that are not in any specific order (for example, item names, geographic names, or the names of people).

- **Stacked column and 3-D stacked column**: A stacked column chart show values in 2-D stacked columns. A 3-D stacked column chart shows the stacked columns in 3-D format, but it doesn't use a depth axis. Use this chart when you have multiple data series and you want to emphasize the total.

- **100% stacked column and 3-D 100% stacked column**: A 100% stacked column chart shows values in 2-D columns that are stacked to represent 100%. A 3-D 100% stacked column chart shows the columns in 3-D format, but it doesn't use a depth axis. Use this chart when you have two or more data series and you want to emphasize the contributions to the whole, especially if the total is the same for each category.

- **3-D column**: 3-D column charts use three axes that you can change (a horizontal axis, a vertical axis, and a depth axis), and they compare data points along the horizontal and the depth axes. Use this chart when you want to compare data across both categories and data series.

II. Line Charts

Data that's arranged in columns or rows on a worksheet can be plotted in a line chart. In a line chart, category data is distributed evenly along the horizontal axis, and all value data is distributed evenly along the vertical axis. Line charts can show continuous data over time on an evenly scaled axis, so they're ideal for showing trends in data at equal intervals, like months, quarters, or fiscal years.

III. Pie Chart

Data that's arranged in one column or row on a worksheet can be plotted in a pie chart. Pie charts show the size of items in one data series, proportional to the sum of the items. The data points in a pie chart are shown as a percentage of the whole pie.

Consider using a pie chart when:

- You have only one data series.
- None of the values in your data are negative.
- Almost none of the values in your data are zero values.
- You have no more than seven categories, all of which represent parts of the whole pie.

Types of pie charts

- **Pie and 3-D pie** Pie charts show the contribution of each value to a total in a 2-D or 3-D format. You can pull out slices of a pie chart manually to emphasize the slices.

- **Pie of pie and bar of pie** Pie of pie or bar of pie charts show pie charts with smaller values pulled out into a secondary pie or stacked bar chart, which makes them easier to distinguish.

IV. Doughnut Chart

Data that's arranged in columns or rows only on a worksheet can be plotted in a doughnut chart. Like a pie chart, a doughnut chart shows the relationship of parts to a whole, but it can contain more than one data series.

V. **Bar Chart:** Data that's arranged in columns or rows on a worksheet can be plotted in a bar chart. Bar charts illustrate comparisons among individual items. In a bar chart, the categories are typically organized along the vertical axis and the values along the horizontal axis.

Consider using a bar chart when:

- The axis labels are long.
- The values that are shown are durations.

Types of bar charts

- **Clustered bar and 3-D clustered bar** A clustered bar chart shows bars in 2-D format. A 3-D clustered bar chart shows bars in 3-D format; it doesn't use a depth axis.

- **Stacked bar and 3-D stacked bar** Stacked bar charts show the relationship of individual items to the whole in 2-D bars. A 3-D stacked bar chart shows bars in 3-D format; it doesn't use a depth axis.

- **100% stacked bar and 3-D 100% stacked bar** A 100% stacked bar shows 2-D bars that compare the percentage that each value contributes to a total across categories. A 3-D 100% stacked bar chart shows bars in 3-D format; it doesn't use a depth axis.

VI. Area Chart

Data that's arranged in columns or rows on a worksheet can be plotted in an area chart. Area charts can be used to plot change over time and draw attention to the total value across a trend. By showing the sum of the plotted values, an area chart also shows the relationship of parts to a whole.

Types of area charts

- **Area and 3-D area** Shown in the 2-D or 3-D format, area charts demonstrate the trend of values over time or other category data. A 3-D area chart uses three axes (horizontal, vertical, and depth) that one can change.

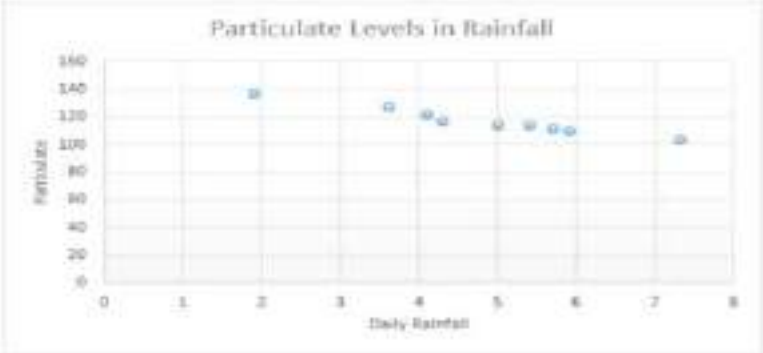
- **Stacked area and 3-D stacked area** Stacked area charts show the trend of the contribution of each value over time or other category data in 2-D format. A 3-D stacked area chart does the same, but it shows areas in the 3-D format without using a depth axis.

- **100% stacked area and 3-D 100% stacked area** 100% stacked area charts demonstrate the trend of the percentage that each value contributes over time or other category data. A 3-D 100% stacked area chart does the same, but it presents areas in the 3-D format without using a depth axis.

VII. Scatter Chart

Data that's arranged in columns and rows on a worksheet can be plotted in anXY (scatter) chart. Place the x values in one row or column, and then enter the corresponding y values in the adjacent rows or columns.

A scatter chart has two value axes: a horizontal (x) and a vertical (y) value axis. It combines x and y values into single data points and shows them in irregular intervals, or clusters. Scatter charts are typically used for showing and comparing numeric values, like scientific, statistical, and engineering data.

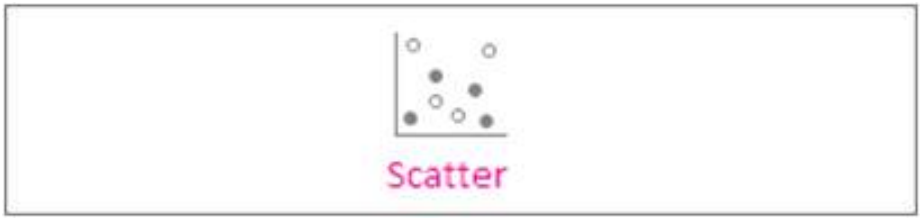


Consider using a scatter chart when:

- You need to change the scale of the horizontal axis.
- You need to make that axis a logarithmic scale.
- Values for the horizontal axis are not evenly spaced.
- There are many data points on the horizontal axis.
- You want to adjust the independent axis scales of a scatter chart to reveal more information about data that includes pairs or grouped sets of values.
- You want to show similarities between large sets of data instead of differences between data points.
- You want to compare many data points without regard to time—the more data that you include in a scatter chart, the better the comparisons you can make.

Types of scatter charts

- **Scatter** This chart shows data points without connecting lines to compare pairs of values.

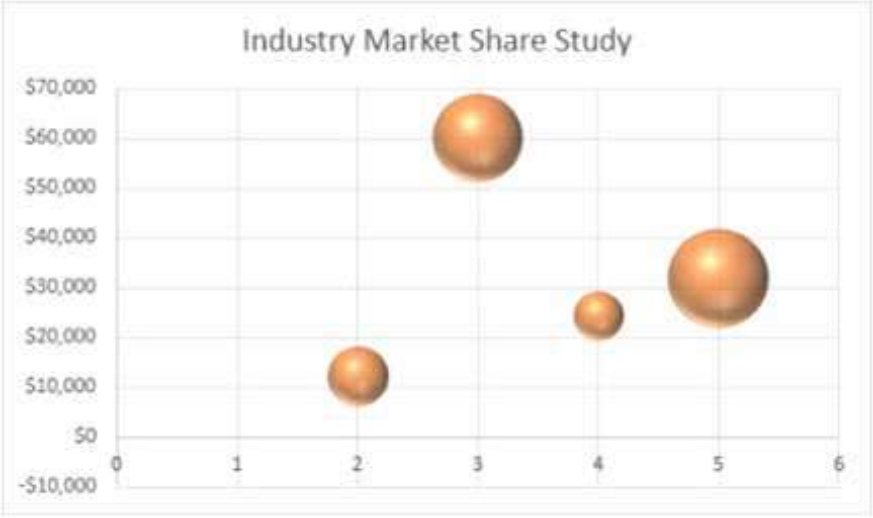


- **Scatter with smooth lines and markers and scatter with smooth lines** This chart shows a smooth curve that connects the data points. Smooth lines can be shown with or without markers. Use a smooth line without markers if there are many data points.

- **Scatter with straight lines and markers and scatter with straight lines** This chart shows straight connecting lines between data points. Straight lines can be shown with or without markers.

VIII. Bubble Chart

Much like a scatter chart, a bubble chart adds a third column to specify the size of the bubbles it shows to represent the data points in the data series.



Type of bubble charts

- **Bubble or bubble with 3-D effect** Both of these bubble charts compare sets of three values instead of two, showing bubbles in 2-D or 3-D format (without using a depth axis). The third value specifies the size of the bubble marker.

IX. Radar

A radar chart compares the aggregate values of many data series.

10.3Create a chart with Insert Charts

Follow the steps:

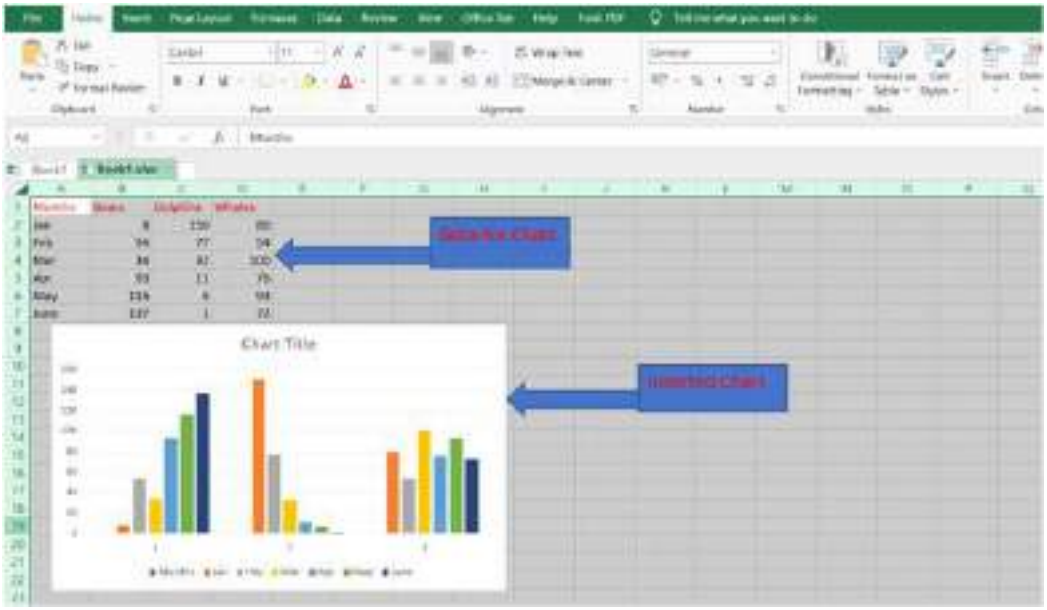
Step 1 ” Select the data for the chart.

Step 2 ” Click the Insert tab on the Ribbon.

Step 3 ” Click the Desired Chart on the Ribbon.

Step 4. Select Ok.

To create a chart with a short method, just select the data you want in the chart and press ALT+F1. It will immediately create a chart. The disadvantage of this method is that the resultant chart may not be the best fit for your data or as per your requirement.



If you’re not sure which type of chart to use, the **Recommended Charts** command will suggest several different charts based on the source data.

Change Chart Type

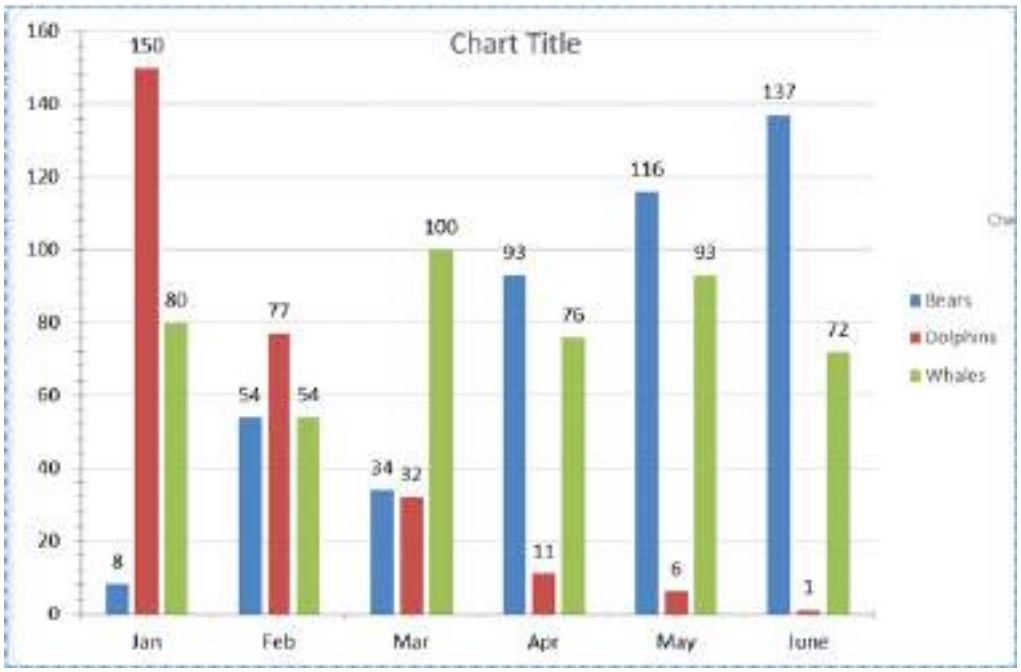
You can easily change to a different type of chart at any time.

1. Select the chart.
2. Right Click on the chart, and click Change Chart Type.

Note: On the Chart Design tab, in the Type group, click Change Chart Type.

3. Select the Chart then click Ok

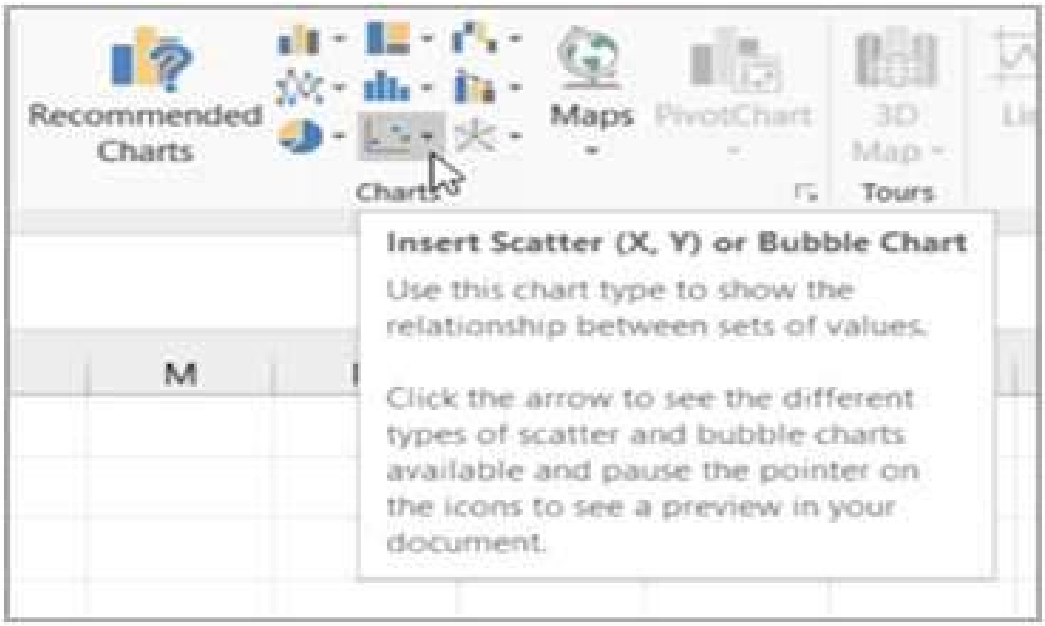
The final result will be like this,

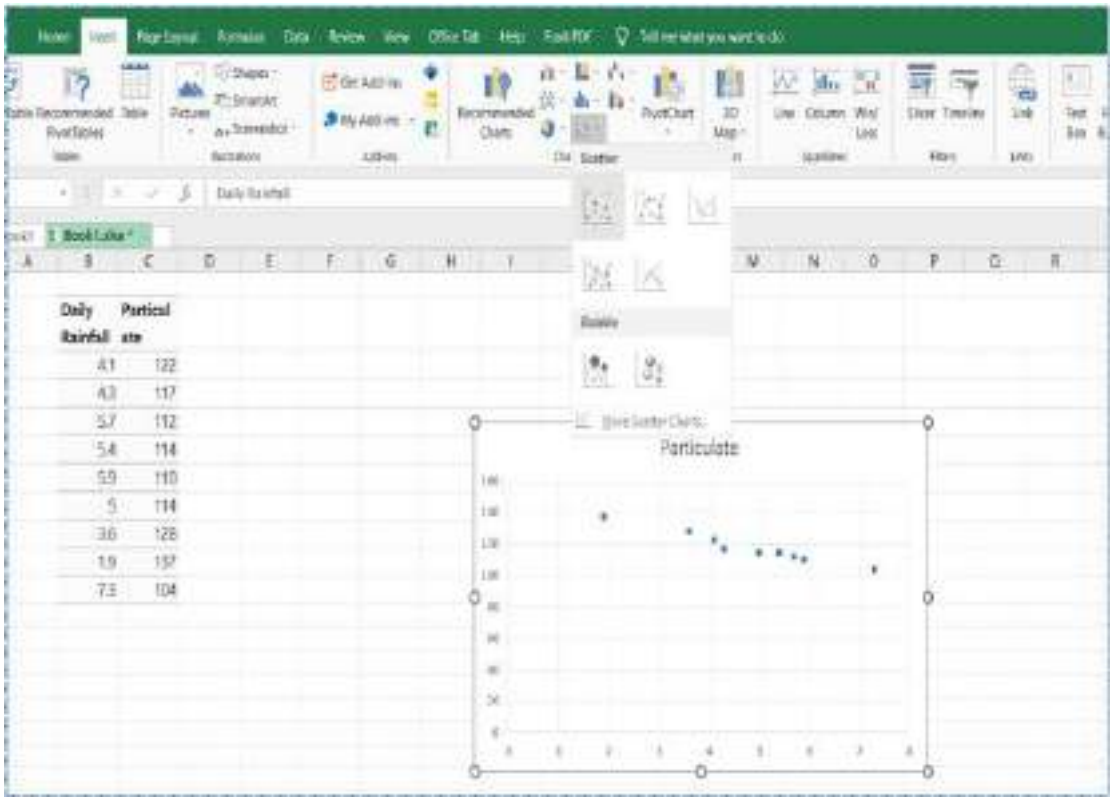


10.4 Scatter Chart

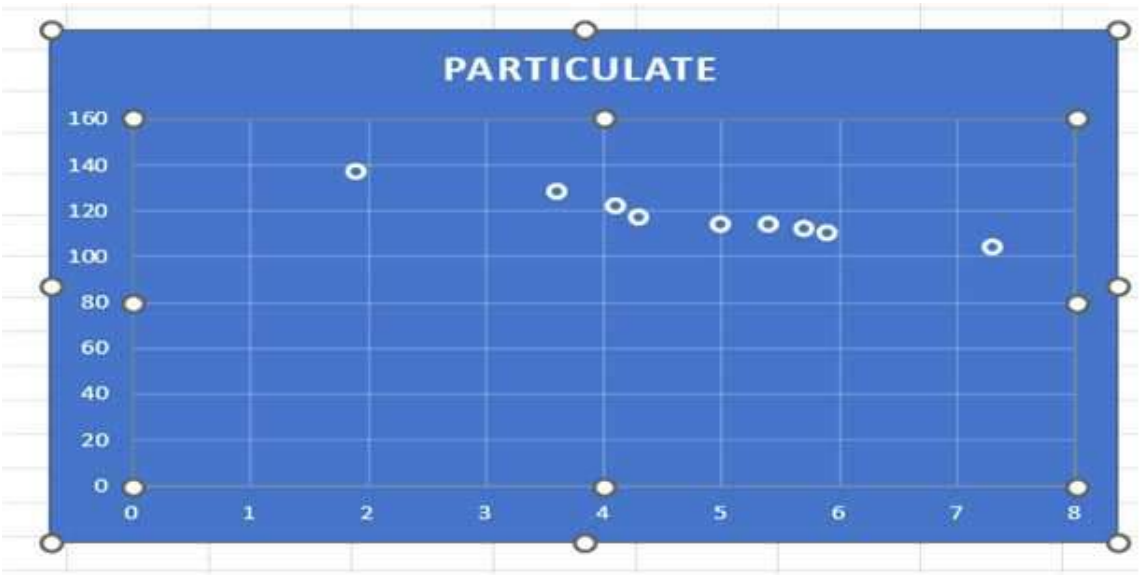
Now, let us see the steps to create a scatter chart. The following procedure will help you create a scatter chart in easy steps. For this chart, we used the example worksheet data.

1. Select the data you want to plot in the scatter chart.
2. Click the **Insert** tab, and then click **Insert Scatter (X, Y) or Bubble Chart**.





The final result will be like this:



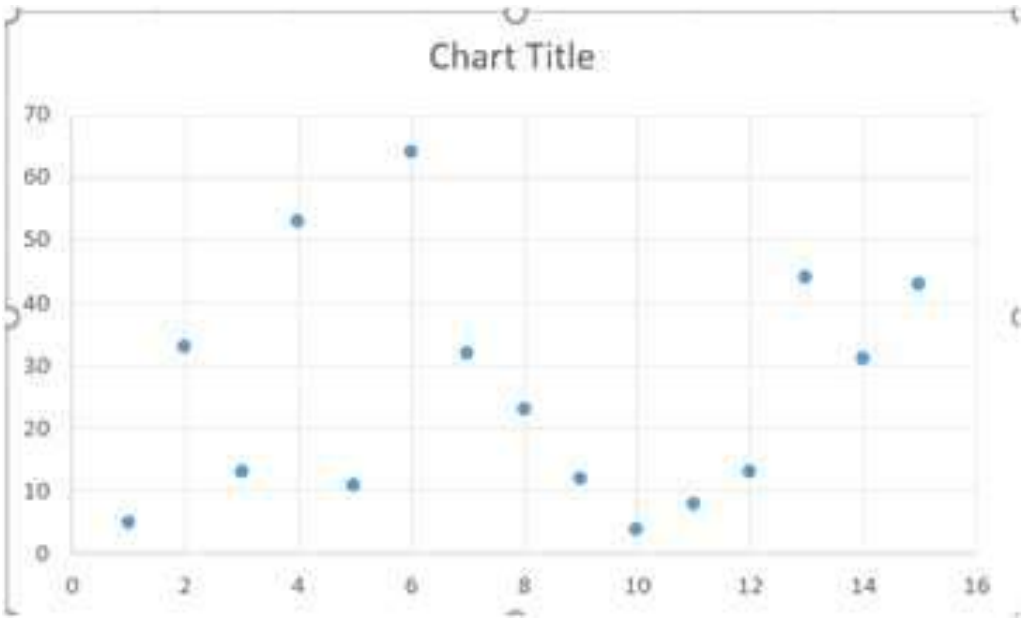
10.5 Curve Fitting

Excel charts provide a very convenient way to fit a curve into the experimental data.

- First, create a data set of two variables

	A	B
1	x	y
2	1	5
3	2	33
4	3	13
5	4	53
6	5	11
7	6	64
8	7	32
9	8	23
10	9	12
11	10	4
12	11	8
13	12	13
14	13	44
15	14	31
16	15	43

- Create a **scatter chart**.

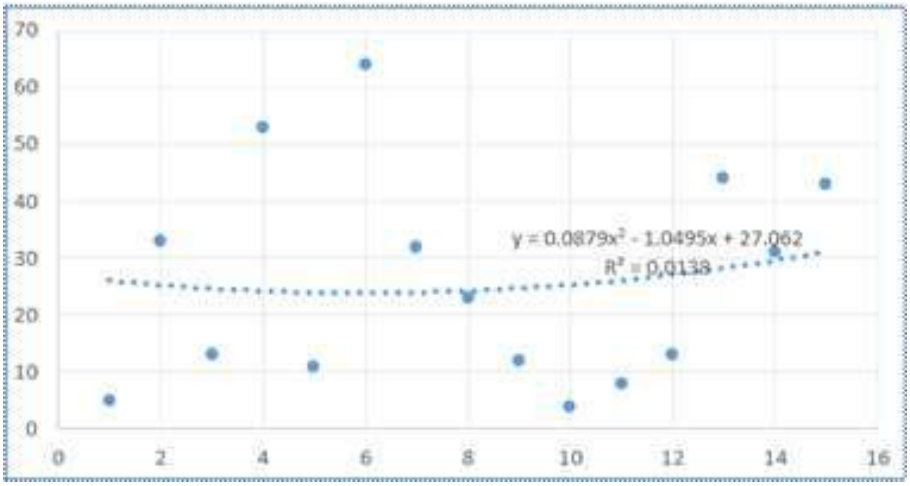


- Then right-click on the data series and select **"Add Trendline."** and then click **More Options**.
- In the window that appears to the right, click the button next to **Polynomial**. Then check the boxes next to **Display Equation on chart** and **Display R-squared value on chart**.

The equation of the curve is as follows:

$y = 0.0879x^2 - 1.0495x + 27.062$

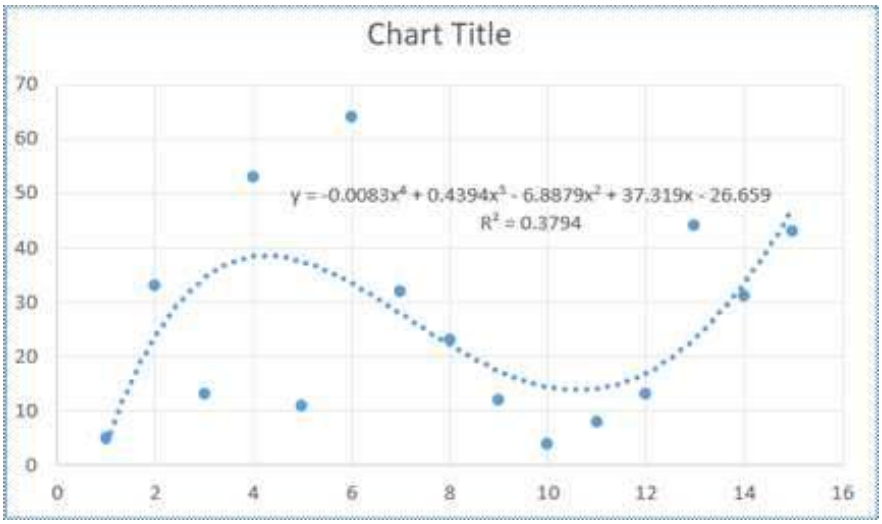
The R-squared value state the percentage of variation in the response variable. The value of R-squared is 0.0138 for this curve.



The curve we get for this value is not flexible. To make it more flexible we can try to increase the polynomial order to 4 from 2. This will give the following equation.

$y = -0.0083x^4 + 0.4394x^3 - 6.8879x^2 + 37.319x - 26.659$

and the resultant curve will be like this,



The R-squared value for this particular curve is0.3794. As you can see that this R-squared value is comparatively higher than that of the previous curve, which shows that it fits the dataset much more closely.

10.6 Summary

In this chapter, we have studied:

- About the concept of graphs presentation in excel
- Different types of charts available in Excel with their creation
- Modification of charts as per user requirement
- Best Curve fitting for the given set of data

10.7 Answer to Self-Check exercises

Q.1 What is graph presentation? Give examples.

Q.2 Discuss 5 types of charts with their applications?

Q.3 How to change a chart type?

Q.4 Explain the role of polynomial order in curve fitting.

10.8 Suggested Readings

- Ron Mansfield, The Compact Guide to Microsoft office; BPB Publication
- Dienes, Sheila s., Microsoft office, Professional for windows 105
- Joan Lambert, Curtis Frye, Microsoft Office Step by Step (Office 2021 and Microsoft 3105),Microsoft Press Publication
- Kenneth N. Berk, Data Analysis with Microsoft Excel
- Wayne L. Winston,Microsoft Excel 2013: Data Analysis and Business Modeling
- Danielle Stein, Using Excel for business analysis: a guide to financial modelling fundamentals
- Olafusi M., Microsoft Excel and Business Data Analysis for The Busy Professional
- Rajiv Mattus: Learning Excel 1010 for windows step-by-step BPB publication
- Lonnie.E. Moseley & David M. Boodey: Mastering office 1010
- Micro Soft Office 1010: Unleashed: Techmedia.
- John Walken Bach: Excel 1010.

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Chapter-11
REPORT WRITING

STRUCTURE

11.0 Learning Objectives

After going through this lesson you will be able to:

- Define a Report,
- Explain the significance of report writing
- Discuss the different steps in writing the reports
- Identify the Mechanics in writing a research report
- Explain the ethics in research

11.1 Introduction

The last and final chapter of the voyage in research is writing of the report. After the collected data has been analyzed and interpreted and generalizations have been drawn the report has to be prepared. The task of research is incomplete till the report is presented. Writing of a report is the last step in a research study and requires a set of skills somewhat different from those called for in respect of the earlier stages of research. This task should be accomplished by the researcher with utmost care.

11.2 Report Writing

A research report is a publication that reports on the findings of a research project or alternatively scientific observations on or about a subject. Normally the research assignments like projects, investigations, explorations, theses, dissertations fall in this category. A research report is a well-crafted document that outlines the processes, data, and findings of a systematic investigation. It is an important document that serves as a first-hand account of the research process, and it is typically considered as an objective and accurate source of information.

11.3 Features of a Research Report

A good research report is marked by certain features:

(1) A good research report should be written lucidly, precisely in simple language and should provide a detailed presentation of the whole of research processes. It should present the data in tables and figures with suitable objective explanations. The end part should include the concluding remarks, the prime findings and recommendations, if any.

(2) The language and style should be academic, formal, less flaunting and simple.

(3) The report is normally based on the first hand information collected by the researcher. However, the reports written on the basis of secondary data are also presented in a systematic and lucid manners.

(4) A research report should normally be written in the third and avoid use of pronouns like, 'I', 'Me', 'My' etc.

(5) The report should facilitate the reader with systematic presentation like proper headings, titles, sub-tiles, tables, graphs, parts and even bullet points where required.

(6) The reports normally forward recommendations too as the solutions to the problems and policy making by the concerned authorities, corporate organizations, institutions and governments.

11.4 Significance of Report Writing

The significance of report writing can be understood from following points.

(1) Report gives merged information- Report presents large information in compressed form.

(2) Present complicated matters easily- Report writing is best way to represent any complicated matter easily and attractively.

(3) Facilitates Decision making and planning- Decisions can be easily made based on the recommendations given in report.

(4) Builds relationship- report build relationship between author and reader. It creates impression on author's knowledge and philosophy between author and reader. It creates impression on author's knowledge and philosophy and also provides insight regarding his analytical and critical understanding.

(5) **Unveil Unknown Information-** Report gives its readers hitherto to unknown information about the problem or issue.

(6) **Provides foundation for future research-** Report provides information in terms of tables, graphs, charts and illustration and therefore we can be aware of facts and figures as an update. One can re-use this information for future reference.

(7) **Augment writing skills in presenting practical work-** Writing report is not a layman's task. The rewriting and editing again and again enhances the writing skills of researcher.

(8) **Highlights important details about the research process-** Report highlights important details about the research process. By simply going through the report one can know the objectives, methodology and results of research.

(9) **Permanent record and is easy to verify-** The written report is as a permanent record. When it is needed, important information can be easily collected from the preserved report. The information and messages that are preserved can be verified easily. If there arises any misunderstanding any party can easily verify the information.

11.5 Different Steps in Writing the Report

Research reports are the product of slow, painstaking, accurate inductive work. The usual steps involved in writing report are(a) logical analysis of the subject-matter;(b) preparation of the final outline;(c) preparation of rough draft;(d) rewriting and polishing; (e) preparation of the final bibliography; and (f) writing the final draft. Though all these steps are self-explanatory, yet a brief mention of each one of these will be appropriate for better understanding. We discuss each of them in detail in the following paragraphs.

(i) **Logical, analysis of the subject matter-** It is the first step which is primarily concerned with the development of a subject. There are two ways in which to develop a subject- (a) logically and (b) chronologically. The logical development is made on the basis of mental connections and associations between the one thing and another by means of analysis. Logical treatment often consists in developing the material from the simple possible to the most complex structures. Chronological development is based on a connection or sequence in time or occurrence. The directions for doing or making something usually follow the chronological order.

(ii) **Preparation of the final outline-** It is the next step in writing the research report. "Outlines are the framework upon which long written works are constructed. They are an aid to the logical organization of the material and a reminder of the points to be stressed in the report'.

(iii) **Preparation of the rough draft-** This follows the logical analysis of the subject and the preparation of the final outline. Such a step is of utmost importance for the researcher who sits to write down what he has done in the context of his research study. He will write down the procedure adopted by him in collecting the material for his study along with various limitations faced by him, the technique of analysis adopted by him, the broad findings and generalizations and the various suggestions he wants to offer regarding the problem concerned.

(iv) Rewriting and polishing the rough draft- This step happens to be the most difficult part of all formal writing. Usually this step requires more time than the writing of the rough draft. The careful revision makes the difference between a mediocre and a good piece of writing. While rewriting and polishing, one should check the report for weakness in logical development or presentation. The researcher should also "see whether or not the material, as it is presented, has unity and cohesion; does the report stand upright and firm and exhibit a definite pattern, like a marble arch? Or does it resemble an old wall of moldering cement bricks and loose bricks". In addition the researcher should give due attention to the fact that in his rough draft he has been consistent or not. He should check the mechanics of writing-grammar, spelling and usage.

(v) Preparation of the final bibliography – Next in order comes, the task of the preparation of the final bibliography. The bibliography, which is generally appended to the research report, is a list of books in some way pertinent to the research which has been done. It should contain all those woks which the researcher has consulted. The bibliography should be arranged alphabetically and may be divided into two parts; the first part may contain the names of books and pamphlets, and the second part may contain the names of magazine and newspaper articles. Generally, this pattern of bibliography is considered convenient and satisfactory from the point of view of reader, though it is not the only way of presenting bibliography. The entries on bibliography should be made adopting the following order:

For books and pamphlets the order may be as under:

1. Name of author, last name first.
2. Title, underlined to indicate italics.
3. Place, publisher, and date of publication
4. Number of volumes.

(vi) Writing the final draft – This constitutes the last step. The final draft should be written in a concise and objective style and in simple language, avoiding vague expressions such as "it seems", there may be" and the like ones. While writing the final draft, the researcher must avoid abstract terminology and technical illustration and examples based on common experiences must be incorporated in the final draft as they happen to be most effective in communicating the research findings to others. A research report should not be dull, but must enthuse people and maintain interest and must show originality, It must be remembered that every report should be an attempt to solve some intellectual problem and must contribute to the solution of a problem and must add to the knowledge of both the researcher and the reader.

11.6 Guidelines for Writing a Report

Researcher who are affective in report writing agree that there are a series of guidelines which should be followed. Such guidelines can be enumerated as under:

- **Consider the Audience:** Make the report clear, use only words familiar to the readers and defined all technical terms. To make the comparison of figures easier, usepercentages, rounded off figures, ranks or ratios; put the exact data in a table within the text or in the appendix**.**
- **Address the information Needs:** Remember the research report is designed to communicate information to decision makers. Make sure that it clearly relates the research findings to the objectives of the management.
- **Be Concise, Yet Complete:** Most managers will not want to read about the details of a research report. Knowing what to include and what to leave out is a difficult task. It is up to you, the researcher, to take into account the information needs of the decision maker when writing your report.
- **Be Objective:** You will probably face at least one situation in which you know that the client will not easily accept the results. The findings may be conflict with the decision makers experience and judgment or they may reflect unfavorable on the wisdom of previous decisions. In these circumstances, there is a strong temptation to start the report by making the result more acceptable to the management. A professional researcher, however, will present the research findings in an objective manner and will present the research findings in an objective manner and will defend their validity if they are challenged by the client.
- **Style:** The style of writing a research report is important because it shows a way of presentation. Here are a few a tips to help you write a report that is easy to read.
    - Use short words and sentences.
    - Be concise.
    - Use the active voice
    - Consider appearance-space makes a long report easier to read.
    - Avoid clichés.
    - Write in present tense.

11.7 Layout of the Research Report

Major Parts	Sections
a) Preliminary Part	1. Title 2. Certificate/Authorisation document 3. Contents 4. Preface & Acknowledgements 5. List of Tables/Figure 6. Acronyms (If applicable)

b) Main Body	1. Introduction 2. Review of Literature 3. Research Objectives/Questions/Hypotheses 4. Research Methodology 5. Data Analysis/Results/Discussion 6. Conclusions and Findings 7. Recommendations
c) End Part	1. Endnotes/References 2. Appendices 3. Bibliography 4. Index

11.7.4 Preliminary Part

Preliminary part of a research report includes the title page of the report, certificate of authentication by the research supervisor or letter of accreditation/authorisation by research sponsoring agency, the contents of the report based on the chapter scheme, foreword, preface and acknowledgements, and the list of tables or figures, if any. Usually, foreword is written by an expert of the area. Preface is the face of report i.e. a brief discussion about the research problem, objectives and researcher's approach about dealing with it. Tables or figures are normally numbered on the basis of Chapter No. and tables in continuity e.g Table No.1.1; 1.2; 1.3; 1.4; 1.5 or Table 2.1; 2.2; 2.3; 2.4 etc.

11.7.5 Main Body

1. Introduction

Introduction is the most important part of the report since it introduces the topic, the objectives, the methodology and the context or background in which the problem is discussed. Background information may include a brief review of the literature already available on the topic so that you are able to 'place' your research in the field. Some brief details of your methods and an outline of the structure of the report and the purpose, significance and implications of the study should be discussed too.

2. Review of Literature

'Literature Survey' is the first major task to be performed by a researcher before and after the selection of problem. It could be done even before selection of problem to determine the research problem to be selected. The reason of carrying out a Literature Survey is to exhibit and develop one's familiarity with other people's works related with the research problem chosen. It normally involves the survey or search of written works in the shape of books and papers in academic journals, and also speeches, letters, documents, films or other outputs. There are many types of Literature Survey, andit depends on one's needs like

looking through citations, quotations, bibliographies, indexes etc. In literature review the major works related with research problems are reviewed in brief. The review could be done on the basis of classification of works thematically or could be done in chronological order. The researcher should be able to underline the major argument, content or finding of the work reviewed and present that analytically in reference to the research problem showing the existing gap, difference or lag in the study.

3. Research Methodology

Research Methodology means the adoption of the special procedures, tools and techniques in order to find, categorise, select, process, and analyze information about a particular research problem. In a research document, be it a paper, dissertation, thesis or project the methodology section allows the reader to critically evaluate a study's overall validity and reliability. Jansen and Warren (2020) observe that the research methodology simply refers to the practical "how" of any given piece of research. More specifically, it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives. It includes research approach, sample plan, data sources, questionnaire type etc.

In methodology section the researcher discusses in details the research methodology he has followed i.e. what he did and how he did it. Methodology should be clearly written so that other researcher could also understand it and follow it in similar kind of research endeavours. Methodology is normally written in a passive voice e.g. 'the population was selected on the basis of stratified sampling' or 'the respondents were asked to answer the questions' instead of writing in active voice e.g. I asked the respondents to fill the questionnaire'.

4. Data Analysis

'Data Analysis' is the step to be followed once the first-hand information has been collected. It refers to the process to examine, elicit, elucidate and explain the data, in the course of which concepts or theories are likely to be considered, advanced and developed. The application of tools or techniques depends upon the nature of the data and suitability of the tools for analysing it. It is also classified into preliminary analysis or hypotheses testing. While the former involves the presentation of data in graphs or tables the latter refers to testing of the inferences (hypotheses) made in the beginning. The data can be small, medium or large in quantum and quantitative (numeric) or qualitative (textual) in nature.

5. Results

The results represent the findings of the study based upon the methodology or methodologies applied in collection of data and the tools and techniques applied in data analysis. The results should statethe findings of the research in a systematic manner and in logical sequence without bias or interpretation. It is here where the researcher indicates what he has found. In simple words it is the data collected and arranged systematically ready for interpretation.

6. Discussion

Discussion mostly forms part of the natural science or quantitative studies. However, they can be used in social sciences too wherever the data is presented cartographically in quantitative manner or patterns or figures drawn even in qualitative research. The purpose of the discussion is to interpret and describe the significance of your findings in light of what was already known about the research problem being investigated, and to explain any new understanding or fresh insights about the problem after you've taken the findings into consideration. The discussion will always connect to the introduction by way of the research questions or hypotheses you posed and the literature you reviewed, but it does not simply repeat or rearrange the introduction; the discussion should always explain how your study has moved the reader's understanding of the research problem forward from where you left them at the end of the introduction' (Paul 2008). In this section one discusses the relevance of results and how the findings fit with other research in the area. It will relate back to your literature review and your introductory thesis statement.

7. Conclusion

Conclusion refers to the broad drawing of the study done and the major findings and suggestions made. It can also be called the summary of the major findings of the study. In conclusions the researchers are advised not to include any new information or idea not discussed in the previous chapters. However, one can specify the limitations of the study and the zones of its utility and applications.

8. Recommendations

Normally recommendations are included in the concluding part or in conclusions. However, they can be presented separately too. Recommendations include suggestions for what needs to be done as a result of your findings. Recommendations are usually listed in order of priority.

11.7.6 End Part

The End Part' of the report comprises of endnotes, references, appendices, bibliography and indexes. It also includes endnotes if foot notes are not used in the report. Endnotes are like footnotes but are located at the back rather than the bottom of each page. These would include all of the references for all works cited in the review of related literature or any other sections of the report as well as the references for quotations, either direct or indirect, taken from other sources, or any footnote comments that might have been included. These are listed in numeric order as presented in the text (Hill, 1970).

1. Bibliography

Bibliography includes all the references used in the report or referred to for background information. Bibliography preparation is based on specific patterns. Kindly check the stylesheets for learning how to prepare a bibliography.

2. Appendices

Any information in the forms of tables/figures, acts, documents, letters, speeches or other materials which is not totally central to the analysis but needs to be mentioned is placed in appendices. They should add extra information to the report. If you include appendices they must be referred to in the body of the report and must have a clear purpose for being included. Each appendix must be named and numbered.

3. Abstract/Synopsis

Many universities have the tradition of asking for the abstracts of the thesis or dissertations. The purpose is to supply in brief the essence of the work done. Abstracts give a very brief overview of the report in a condensed form ranging from introduction to the conclusions.

11.8 Mechanics of Writing a Research Report

There are very definite and set rules which should be followed in the actual preparation of the research report or paper. Once the techniques are finally decided, they should be scrupulously adhered to, and no deviation permitted. . The criteria of format should be decided as soon as the materials for the research paper have been assembled. The following points deserve mention so far as the mechanics of writing a report are concerned:

(i) **Size and Physical Design-** The manuscript should be written on unruled paper 8 ”×11’ in size. If it is to be written by hand, then black or blue-black ink should be used. A margin of at least half an inch at the right hand of the paper. There should also be one –inch margins, top and bottom. The paper should be neat and legible /if the manuscript is to be typed, then all typing should be double-spaced on one side of the page only except for the insertion of the long quotations.

(ii) **Procedure –** various steps in writing the report should be strictly adhered

(iii) **Layout-** Keeping in view the objective and nature of the problem, the layout of the report should be thought of and decided and accordingly adopted.

(iv) **Treatment of Quotations-** Quotations should be placed in quotation marks and double spaced, forming an immediate pat of the text. But if a quotation is of considerable length (more than four or five type written lines) then it should be single-spaced and indented at least half an inch to the right of the normal text margin.

(v) **The footnotes –** Regarding footnotes one should keep in view of the followings:

(a) The footnotes serve two purposes viz., the identification of materials used in quotations in the report and the notice of materials not immediately necessary to the body of the research text but still of supplemental value. In other words, footnotes are meant for cross references, citation of authorities and sources, acknowledgement and elucidation or explanation of a point of view. It should always be kept in view that footnote is neither an end nor a means of the display of scholarship. The modern tendency is to make the minimum use of footnotes for scholarship does not need to be displayed.

(b) Footnotes are placed at the bottom of the page on which the reference quotation which they identify or supplement ends. Footnotes are customarily separated from the textual material by a space of half an inch and a line about one and a half inch long.

(c) Footnotes should be numbered consecutively, usually beginning with 1 in each chapter separately. The number should be put slightly above the line, say at end of a quotation. At the foot of the page, again, the footnote number should be indented and typed a little above the line. Thus, consecutive numbers must be used to correlate the reference in the text with its corresponding note at the bottom of the page, except in the case of statistical tables and other numerical material, where symbols such as the asterisk(*) or the like one may be used to prevent confusion.

(d) Footnotes are always typed in single space though they are divided from one another by double space.

(6) Documentation style– regarding documentation, the first footnote reference to any given work should be complete in its documentation, giving all the essential facts about the edition used. Such documentary footnotes follow a general sequence. The common order may be described as under:

(i) Regarding the single-volume reference

1. Author's name in normal order(and not beginning with the last name as in a bibliography) followed by a comma;
2. Title of work, underlined to indicate italics;
3. Place and date of publication;
4. Pagination references(The page number)

(ii) Regarding multi-volumed reference

1. Author's name in normal order(and not beginning with the last name as in a bibliography) followed by a comma;
2. Title of work, underlined to indicate italics;
3. Place and date of publication;
4. Pagination references(The page number)

(iii) Regarding woks arranged alphabetically

For works arranged alphabetically such as encyclopedia and dictionaries, no pagination reference is usually needed. In such cases the order is illustrated as under:

Example 1

"Salamanca." Encyclopaedia Bitannica,14th Edition.

(iv) *Regarding periodicals reference*

1. Name of the author in n
2. Title of article, in quotation marks;
3. Name of periodical, underlined to indicate italics'
4. Volume Number
5. Date of issuance
6. Pagination

(iv) Regarding anthologies and collections reference

Quotations from anthologies or collection of literary works must be acknowledged not only by author, but also by the name of the collector.

(v) Regarding second-hand quotations reference

In such cases the documentation should be handled as follows:

1. Original autor an title'
2. 'quoted or cited in";
3. Second author and work.

Example

J.f.Jones, *Life in Ployensia,p.16, quoted in History of the Pacific Ocean area,* R.B, Abel,p.191.

(vii) *Case of multiple authorship*

If there are more than two authors or editors, then in the documentation the name of only the first is given and the multiple authorship is indicated by "et al." or "and others'.

Subsequent references to the same work need not be detailed as stated above. If the work is citied again without any other work intervening, it may be indicated as ibid, followed by a comma and the page number. A single page should be referred to as p., but more than one page be referred to as pp. If there are several pages referred to at a stretch, the practice is to use often the page number, for example, pp. 190ff, which means page number 190 and the following pages; but only for page 190 and the following page '190f'. Roman numerical is generally used to indicate the number of the volume of a book. Op. cit, (opera citato, in the work cited) or Loc. Cit. (loco citatao, in the place cited) are two of the very convenient abbreviations used in the footnotes. Op. cit, or Loc. Cit, after the writer's name would suggest that the references is to work by the writer which has been cited in detail in an earlier footnotes but intervened by some other references.

7. **Punctuation and abbreviations in footnotes-** the first item the number in the footnote is the author's name, given in the normal signature order. This is followed by a comma. After the comma, the title of the book is given: the article (such as "A", "An", "The" etc.) is omitted and only the first word and proper nouns and adjectives are capitalized. The title is followed by a comma. Information concerning the edition

is given next. This entry is followed by a comma. The place of publication is then stated; it may be mentioned in an abbreviated form, N.Y. for New York, N.D. for New Delhi and so on. This entry is followed by a comma. Then the name of the publisher is mentioned and this entry is closed by a comma. It is followed by the date of publication and this entry is closed by a comma. It is followed by the date of publication if the date is given on the title page. If the date appears in the copyright notice on the reverse side of the title page or elsewhere in the volume, the comma should be omitted and the date enclosed in square brackets[c 1978], [1978]. The entry is followed by a comma. Then follow the volume and page references and are separated by comma if both are given. A period closes the complete documentary reference. But one should remember that the documentation regarding acknowledgements from magazine articles and periodical literature follow a different form as stated earlier while explaining the entries in the bibliography.

8. **Use of statistics, charts and graphs –** A judicious use of statistics in research reports is often considered a virtue for it contributes a great deal towards the clarification and simplification of the material and research results. One may well remember that a good picture is often worth more than a thousand words. Statistics are usually presented in the form of tables, charts, bars and line-graphs and pictograms. Such presentation should be self explanatory and complete in itself. It should be suitable and appropriate looking to the problem at hand. Finally, statistical presentation should be neat and attractive.
9. **The final draft –** Revising and rewriting the rough draft of the report should be done with great care before writing the final draft. For the purpose, the researcher should put to himself questions like: Are the sentences written in the report clear? Are they grammatically correct? Do they say what is meant? Do the various points incorporated in the report fit together logically? “Having at least one colleague read the report just before the final revision is extremely helpful. Sentences that seem crystal clear to the writer may prove quite confusing to other people; a connection that had seemed self evident may strike others as a non-sequitur. A friendly critic, by pointing out passages that seem unclear or illogical, and perhaps suggesting ways of remedying the difficulties can be an invaluable aid in achieving the goal of adequate communication.”
10. **Bibliography-** Bibliography should be prepared and appended to the research report.
11. **Preparation of the index-** At the end of the report, an index should invariably be given, the value of which lies in the fact that it acts as a good guide to the reader. Index may be prepared both as subject index and as author index. The former gives the names of the subject-topics or concepts along with the number of pages on which they have appeared or discussed in the report, whereas the latter gives the similar information regarding the names of authors. The index should always be arranged alphabetically. Some people prefer to prepare only one index common for names of authors, subject-topics, concepts and the like ones.

11.9 Ethics in research

Ethics are nothing but the accepted codes of conduct. The term is derived from a Greek word ethos which means custom, habit, character or disposition. In research, ethics are a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues. Ethics are applied on all stages of research, such as planning, conducting and evaluation. Webster dictionary defines ethical (behavior) as conforming to the standards of conduct of a given profession or group."

a) Ethical Principles in Research

In research it is impossible to construct general ethical principles. But in social science research there are some ethical principles which are very important.

(i) Principle of Autonomy- The principle of autonomy requires that protection be given to potentially vulnerable populations such as children, the elderly, the mentally ill, or prisoners. Individuals in these groups may be incapable of understanding information that would enable them to make an informed decision about study participation. They are considered potentially "vulnerable." Consequently, careful consideration of their situation and needs is required and extra care must be taken to protect them.

(ii) Principle of non-maleficence – The principle of "Non-Maleficence" requires an intention to avoid needless harm or injury that can arise through acts of commission or omission. Non-Maleficence asserts that the primary concern when carrying out a research is to do no harm.

(iii) Principle of Beneficence – Beneficence obligates the researcher to secure the well-being of all study participants. It is the responsibility of researcher to protect participants from harm, as well as ensure that they experience the possible benefits of involvement.

(iv) Principle of Justice – This principle of justice raises the question of who ought to receive the benefits of research and bear its burdens. An injustice occurs when some benefit to which a person is entitled is denied without good reason or when some burden is imposed unduly. It requires that the benefits and risks of research should be fairly distributed among people.

b) Important Ethical Guideline for Social Science Research

(i) Integrity and Quality- Integrity and Quality relate to the honesty of a research how honesty he or she undertakes a research. In research confidential communication, such as papers or grants submitted to publication, personal records, trade or military secrets, and patient records should be protected. The integrity of investigator is must because any breach of integrity and quality weakens or even invalidated the research.

(ii) **Objectivity –** A researcher should avoid personal bias and should try to bring objectivity in research. He should minimize bias or self-deception in experimental design, data analysis, data interpretation, peer review, grant writing and other aspects of research where objectivity is expected or required.

(iii) **Essentiality-** For undertaking research, a researcher should give adequate consideration to existing literature/ knowledge and its relevance. This will justify the need for the study. It may be possible that there are alternatives available on the subject/issue under the study and study is not required.

(iv) **Confidentiality-** The confidentiality of respondents should be maintained. They should be assured that identifying information will not be made available to anyone who is not directly involved in the study.

(v) **Anonymity-** Anonymity means that the participant will remain anonymous throughout the study-even to the researchers themselves. Clearly, it is standard of privacy, but it is some time difficult to accomplish, especially in situations where participants have to be measured at multiple time points like pre test and post test measurements, in different situations, etc.

(vi) **Free from coercion voluntary participants-** It requires that people should not be compelled or forced to participate in research. This is especially relevant where researchers has to rely on 'captive audiences' for their participants-prisons, universities, and places like that.

(vii) **Informed Consent-** The prospective research participants must be fully informed about the procedures and risks involved in research and should be taken in research only after they give their consent to participate.

(viii) **Legality-** A researcher should be aware of all the legal aspects of the research problem. He should know and obey relevant laws and institutional and governmental policies and follow them

(ix) **Maximization of public interest and of social justice-** In social sciences research is usually carried out for the benefit of society. A researcher should strive to promote social good and prevent or mitigate social harms through research. The research should be undertaken with the motive of maximization of public interest and social justice.

(x) **Accountability and transparency-** The research should be conducted in a fair and transparent way. The researcher should always be willing for social and financial review of his or her research. Researcher should also make appropriate arrangements for the preservation of research records for a reasonable period of time so that it can be verified.

(xi) **Independence and impartiality of researcher-** A researcher should work independently and impartially. He should not get influenced and pressurized by the funding agencies and authorities and should report and forecast factual results. He should also not indulge in pseudo-pilot studies.

11.10 Summary

A report is prepared after interpretation of data. It is defined as a document in which a given problem is examined for the purpose of conveying information, report findings, putting forward ideas and sometimes making recommendations. A research report can be classified into decision oriented report and popular report. In the popular report, the main emphasis is on the methods employed, assumptions made in the course of study and the detailed presentation of the findings including their limitations and supporting data. The popular report is intended detail of research methods and terminology.

The contests of the research report must include preliminary pages, main text and the end matter. Different steps involved in report writing are: logical analysis of the subject matter, preparation of the final outline, preparation of the rough draft, rewriting and polishing, preparation of the final bibliography, and writing the final draft.

11.11 Glossary

- **Ethics-** Ethics are nothing but the accepted codes of conduct. The term is deived from a Greek word ethos which means custom, habit, character or disposition. In research, ethics are a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues.
- **Plagiarism-**Plagiarism is using other people's work without acknowledging their contribution it can be of passing off somebody else's ideas, thoughts, theories, words or stories as own. It is a kind of stealing from the original author.
- **Fabrication-** Fabrication is the international act of making up data or results and recording or reporting them. For example suppose a researcher/interviewer completes a questionnaire for a fictitious subject that he never interviewed.
- **Falsification-** Falsification is manipulating research materials, equipments, or processes, of changing or omitting/ suppressing data or results without scientific or statistical justification, such that the research is not accurately represented.
- **Post factum –** means occurring after the fact, or ex-post facto design is a quasi-experimental study examining how an independent variable, present prior to the study in the participants, affects a dependent variable.
- **Quotation-** quoting means repeating the author's exact words. In some disciplines, such as literary studies and history, quoting is used frequently to support the argument.
- **Generalisation –** which is an act of reasoning that involves drawing broad inferences from particular observations, is widely-acknowledged as a quality standard in quantitative research but more controversial in qualitative research.

11.12 Answers to Self-Check Exercises

1. Explain report writing?
2. What do you understand by ethics in research?
3. Explain Mechanics of report writing?

11.13 Suggested Readings

- Bhandarkar, P.L. and Wilkinson, T.S. (2016). Methodology and Techniques of Social Research. Himalaya Publishing House: New Delhi.
- Donald R. Cooper and Pamela S. Schindler. (2006). Business Research Methods. 9th Edition, Tata McGraw Hill.
- Ghosh, B.N. (2015). Scientific Method and Social Research. Himalayan Publishing House, New Delhi.
- Goode, William J., and Hatt, Paul K. (1952). Methods in Social Research, New York: McGraw-Hill.
- Gopal, M.H. (1970). An introduction to *research* procedures in *social sciences.* Asia Publishing House, New Delhi.
- Gupta, S.P. (2021). Statistical Method (46th edition), Sultan Chand and Sons, New Delhi.
- Kothari, C.R. (2004). Research Methodology Methods and Techniques, New Age International (P) Limited: New Delhi.
- Panneerselvam, R. (2013). Research Methodology. Prentice-Hall of India Pvt. Ltd., New Delhi.
- Rao K.V. (1993). Research Methodology in Commerce and Management, Sterling Publishers Private Limited: New Delhi.
- Sadhu A.N. and A. Singh. (2017). Research Methodology in Social Sciences, Himalaya Publishing House, New Delhi.
- Saravanavel, P. (2019). Research Methodology. KitabMahal. Allahabad.
- Sekaran, U. (2006). Research methods for Business, Wiley India, New Delhi.
- Thakur, H.K. (2021). Research Methodology in Social Sciences. Corvette Press, New Delhi.

11.14 Terminal Questions

1. What is report writing? Discuss the different types of reports.
2. Discuss the guidelines to be taken in to account for writing a report.
3. Explain the layout of the research report.

*****

Chapter-12
REFERENCES STYLE IN RESEARCH REPORT

Structure

12.0 LearningObjectives

After reading this chapter, you will be able to:

- explain how to write references in a scientific research report as per APA;
- describe the art of referencing; and
- write a research report references in APA format.

12.1 Introduction

The reference section is a very important component of the report. It contains all the necessary literature that have been referred to before, during and after the study and contains books, journal articles and documents from where the materials have been referred to. References differ from bibliography in that references are those literature which have been cited in the main text of the report in different places. Bibliography includes many referred as well as many unreferred literature in the text of the report. Sometimes a book would have been consulted but not necessarily referred to in the text. Thus the bibliography will be inclusive of many materials which have not been referred in the text. Of course it may

contain the referred materials also. On the other hand the references will contain basically the referred materials. In this unit we are going to focus on references, how to write the same and the importance of reference etc. Basically we will be depending on the APA source for this purpose.

12.2 Reference List (The Format)

As per Publication Manual of American Psychological Association (Sixth Edition, 2009) just as data in the paper support interpretations and conclusions, so Reference citations support document statements made about the literature.

All citations in the manuscript must appear in the Reference list, and all References must be cited in the text.

The Reference list should be succinct, not exhaustive; simply provide sufficient references to support your Research. Choose References judiciously and cite them accurately. For example, if you retrieve an abstract but do not also retrieve and read the full article, your Reference should be identified as an abstract.

The standard procedures for citation ensure that References are accurate, complete, and useful to investigators and readers.

Whenever possible, support your statements by citing empirical work, such as method and results of an empirical study or a review of empirical studies (Lalumiere, 1993). When you cite nonempirical work, make this clear in your narrative as given in the examples below (see the box).

Tripathi (1991) theorized that Pandey (inpress) argued that Parmeshwar(1993).

Similarly, when you want to direct the reader to background information, signal the reader with phrases such as “for a review, see” and “(e.g., see [author, year]).

“References” section begins at a new page with the label “References” at the centre. References comprise all documents including journals, books, technical Reports, computer programmers and unpublished works mentioned in the text of the Report.

References are arranged in alphabetical order by the last name of the author(s) and the year of publication in parenthesis or in case of unpublished citations, only the Reference is cited.

Sometimes no author is listed and then, in that condition the first word of the title or sponsoring organisation is used to begin the entry. When more than one name is cited within parenthesis, the References are separated by semicolons.

In parenthesis page number is given only for direct quotations. The Researcher should check carefully that all References cited in the text appear in.

12.3 References (Process of Writing)

References should not be confused with Bibliography. A bibliography contains everything that is included in the Reference section plus other publications which are useful but were not cited in text or manuscript. Bibliography is not generally included in Research Reports. Only References are usually included.

References in APA Format

The APA style guide prescribes that the Reference section, Bibliographies and other lists of names should be accumulated by surname first, and mandatory inclusion of surname prefixes. For example, “Martin de Rijke” should be sorted as “De Rijke, M” and “Saif Al Falssi” should be sorted as “Al-Falasi, S.” (The preference forArabic names now is to hyphenate the prefix so that it remains with the surname.).

Reference citations in text are done using parenthetical referencing. Most usually, this involves putting the author’s surname and the date of publication within parentheses, separated by a comma, generally placed immediately after the Reference or at the end of the sentence in which the Reference is made.

However, it is also common for the authors to be the subject or object of a sentence. In such a case only the year is in parentheses. In all cases of citation, author name(s) are always followed immediately by the year in which the article was published. In the case of a quotation, the page number is also included in the citation.

Full bibliographic information is then provided in a Reference section at the end of the article. APA style defines that the Reference section may only include articles that are cited within the body of an article. This is the distinction between a document having a Reference section and a Bibliography, which may incorporate sources read by the authors as background but not referred to or included in the body of a document.

Let us now see how to write references if it is single author, multiple author etc.

- ***Single author***

Format should be Author’s last name followed directly by a comma, then the year of publication. When one makes the Reference to the author(s) directly as a part of the narrative, then only the year (and page number if needed) would remain enclosed within parentheses. The same holds for multiple authors.

Examples are given below:

“A recent study found a possible genetic cause of alcoholism (Pauling, 2005).” “Pauling (2005) discovered a possible genetic cause of alcoholism.”

- ***Two authors***

Authors should be presented in order that they appear in the published article. If they are cited within closed parentheses, use the ampersand (&) between them. If not enclosed in parentheses then use expanded “and”.

Examples are given below:

"A recent study found a possible genetic cause of alcoholism (Pauling & Liu, 2005)."
"Pauling and Liu (2005) discovered a possible genetic cause of alcoholism."

- ***Three to five authors***

With three to five authors, the first Reference to an article includes all authors. Subsequent citations in the same document may refer to the article by the principal author only plus "et al."

All authors must be present in the References section.

A recent study found a possible genetic cause of alcoholism (Pauling, Liu, &Guo, 2005).

Examples are given below:

"Pauling, Liu, and Guo (2005) conducted a study that discovered a possible genetic cause of alcoholism."

"Pauling et al. (2005) discovered a possible genetic cause of alcoholism."

"A recent study found a possible genetic cause of alcoholism (Pauling et al., 2005)."

- ***Six or seven authors***

The correct format in the text is (First Author et al., Year) or First Author et al. (Year).

Examples given below:

"Brown et al. (2005) discovered a possible genetic cause of alcoholism."

In the Reference section, all authors' names should be included if there are six or seven authors.

- ***Eight or more authors***

In the text, the first and all subsequent References should be to First Author et al. (Year) or (First Author et al., Year).

In the Reference list, list the first six authors, and then put an ellipsis (three periods), and then list the last author.

Example given below:

"Brown, A.B., Johnson, C., Laird, K., Howard, O. P., Evans, S., . . . Pritchard, J. (2004) (study has eight or more authors)"

- ***Multiple publications, same author***

If an author has multiple publications that you wish to cite, you use a comma to separate the years of publication in chronological order (oldest to most recent). If the publications occur in the same year, the *Publication Manual* recommends using suffixes a, b, c, etc. (note that corresponding letters should be used in the Reference list, and these References should be ordered alphabetically by title).

Example given below:

"Recent studies have found a possible genetic cause of alcoholism (Pauling, 2004, 2005a, 2005b)."

"Pauling (2004, 2005a, 2005b) has conducted studies that have discovered a possible genetic cause of alcoholism"

- ***Multiple publications, different authors***

Follow the rules for one author above, and use a semicolon to separate articles. Citation should first be in alphabetical order of the author, thenchronological.

Example given below:

"Recent studies found a possible genetic cause of alcoholism (Alford, 1995; Pauling, 2004, 2005; Sirkis, 2003)"

- ***Direct quotes***

The same rules as above apply here, the format being (Author, Year, Page Number). Example given below:

"When asked why his behaviour had changed so dramatically, Max simply said, "I think it's the reinforcement" (Pauling, 2004, p. 69)."

12.4 Reference Listand Print Sources

The APA style guide prescribes that the *Reference* section, Bibliographies and other lists of names should be accumulated by surname first, and mandates inclusion of surname prefixes. For example, "Martin de Rijke" should be sorted as "de Rijke, M." and "Saif Al-Falasi" should be sorted as "Al-Falasi, S."

For names in non-English languages, follow thecapitalisation standards of that language. For each of the source types below a hanging indent should be used where the first line is flush to the left margin and all other lines are indented.

Book by one author

Sheril, R. D. (1956). *The terrifying future: Contemplating color television*. San Diego, CA: Halstead.

Book by two authors

Kurosawa, J., & Armistead, Q. (1972).*Hairball: An intensive peek behind the surface of an enigma*. Hamilton, Ontario, Canada: McMaster University Press.

Chapter in an edited book

Mcdonalds, A. (1993). Practical methods for the apprehension and sustained containment of supernatural entities. In G. L. Yeager (Ed.),*Paranormal and occult studies: Case studies in application* (pp. 42–64). London, England: OtherWorld Books.

Dissertation (Ph.D. or masters)

Mcdonalds, A. (1991). *Practical dissertation title* (Unpublished doctoral dissertation).University of Florida, Gainesville, FL.

Article in a journal with continuous pagination (nearly all journals use continuous pagination)

Rottweiler, F. T., &Beauchemin, J. L. (1987). Detroit and Narnia: Two foes on the brink of destruction. *Canadian/American Studies Journal, 54,* 66–146.

Kling, K. C., Hyde, J. S., Showers, C. J., &Buswell, B. N. (1999). Gender differences in self-esteem: A meta-analysis. *Psychological Bulletin, 125,* 470–500.

Article in a journal paginated separately Journal_pagination

Crackton, P. (1987). The Loonie: God's long-awaited gift to colourful pocket change? *Canadian Change, 64*(7), 34–37.

Article in a weekly magazine

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time, 135,* 28-31.

Article in a weekly magazine with DOI

Hoff, K. (2010, March 19). Fairness in modern society.*Science, 327,* 1467-1468. doi:10.1126/science.1188537

Article in a print newspaper

Wrong, M. (2005, August 17). "Never Gonna Give You Up" says Mayor. *Toronto Sol,* p. 4.

12.5 Electronic Sources

For electronic References, websites, and online articles, APA Style asserts some basic rules, including to direct readers specifically to the source material using URLs which work include retrieval date ONLY when content is likely to change (e.g., wikis) include all other relevant APA Style details for the source.

Online article based on a print source, with DOI (e.g., a PDF of a print source from a database)

Example is given below:

Krueger, R. F., Markon, K. E., Patrick, C. J., &Iacono, W. G. (2005).Externalizing psychopathology in adulthood: a dimensional-spectrum conceptualisation and its implications for DSM-V. Journal of Abnormal Psychology, 114, 537-550. doi:10.1037/ 0021-843X.114.4.537

Online article based on a print source, without DOI (e.g., a PDF of a print source from a database)

Marlowe, P., Spade, S., & Chan, C. (2001).Detective work and the benefits of color versus black and white.*Journal of Pointless Research, 11,* 123–127.

Online article from a database, no DOI, available ONLY in that database (proprietary content—not things like Ovid, EBSCO, and PsycINFO)

Liquor advertising on TV. (2002, January 18). Retrieved from http://factsonfile.infobasepublishing.com/

or

Liquor advertising on TV. (2002, January 18). Retrieved from *Issues and Controversies* database.

Article in an Internet-only journal

McDonald, C., & Chenoweth, L. (2009). Leadership: A crucial ingredient in unstable times. *Social Work & Society, 7.* Retrieved fromhttp://www.socwork.net/2009/1/articles/mcdonaldchenoweth

Article in an Internet-only newsletter (eight or more authors)

Paradise, S., Moriarty, D., Marx, C., Lee, O. B., Hassel, E., . . . Bradford, J. (1957, July). Portrayals of fictional characters in reality-based popular writing: Project update. *Off the Beaten Path, 7*. Retrieved from http://www.newsletter.offthebeatenpath.news/otr/complaints.html

Article with no author identified

Britain launches new space agency. (2010, March 24). Retrieved fromhttp://news.ninemsn.com.au/technology/1031221/britain-launches-new-space-agency

Article with no author and no date identified (e.g., Wiki article)

Harry Potter. (n.d.).In *Wikipedia.*Retrieved March 12, 2010, from http://en.wikipedia.org/wiki/Harry_Potter

Entry in an online dictionary or Reference work, no date and no author identified Verisimilitude.(n.d.).In *Merriam-Webster's online dictionary* (11th ed.). Retrieved from http://www.merriam-webster.com/dictionary/verisimilitude

E-mail or other personal communication (cite in text only) Monterey, personal communication, September 28, 2001)

12.6 Book on CD, Tape and Movie

Nix, G. (2002).*Lirael, Daughter of the Clayr*[CD]. New York, NY: Random House/Listening Library.

Book on tape

Nix, G. (2002).*Lirael, Daughter of the Clayr*[Cassette Recording No. 1999- 1999-1999]. New York, NY: Random House/Listening Library.

Movie

Gilby, A. (Producer), & Schlesinger, J. (Director).(1995). *Cold comfort farm* [Motion picture]. Universal City, CA: MCA Universal.

12.7 Reference Specifications

Text citations: Source material must be documented in the body of the paper by citing the author(s) and date(s) of the sources. The underlying principle is that ideas and words of others must be formally acknowledged. The reader can obtain the full source citation from the list of References that follows the body of the paper.

When the names of the authors of a source are part of the formal structure of the sentence, the year of publication appears in parentheses following the identification of the authors. Consider the following example:

Wirth and Mitchell (1994) found that although there was a reduction in insulin dosage over a period of two weeks in the treatment condition compared to the control condition, the difference was not statistically significant. [Note: *and* is used when multiple authors are identified as part of the formal structure of the sentence. Compare this to the example in the following section.]

When the authors of a source are *not* part of the formal structure of the sentence, both the authors and year of publication appear in parentheses. Consider the following example:

Reviews of Research on religion and health have concluded that at least some types of religious behaviours are related to higher levels of physical and mental health (Gartner, Larson, & Allen, 1991; Koenig, 1990; Levin &Vanderpool, 1991; Maton&Pargament, 1987; Paloma& Pendleton, 1991; Payne, Bergin, Bielema, & Jenkins, 1991). [Note: *&*is used when multiple authors are identified in parenthetical material. Note also that when several sources are cited parenthetically, they are ordered alphabetically by first authors' surnames and separated by semicolons.]

When a source that has two authors is cited, both authors are included every time the source is cited.

When a source that has three, four, or five authors is cited, all authors are included the first time the source is cited. When that source is cited again, the first author's surname and "et al." are used. Consider the following example:

Reviews of Research on religion and health have concluded that at least some types of religious behaviours are related to higher levels of physical and mental health (Payne, Bergin, Bielema, & Jenkins, 1991).

Payne et al. (1991) showed that ...

When a source that has six or more authors is cited, the first author's surname and "et al." are used every time the source is cited (including the first time).

Every effort should be made to cite only sources that you have actually read. When it is necessary to cite a source that you have not read ("Grayson" in the following example) that is cited in a source that you have read ("Murzynski&Degelman" in the following example), use the following format for the text citation and list only the source you have read in the References list:

Grayson (as cited in Murzynski&Degelman, 1996) identified four components of body language that were related to judgments of vulnerability.

To cite a personal communication (including letters, emails, and telephone interviews), include initials, surname, and as exact a date as possible. Because a personal communication is not "recoverable" information, it is not included in the References section. For the text citation, use the following format:

B. F. Skinner (personal communication, February 12, 1978) claimed ...

To cite a Web document, use the author-date format. If no author is identified, use the first few words of the title in place of the author. If no date is provided, use “n.d.” in place of the date. Consider the following examples:

Degelman (2009) summarises guidelines for the use of APA writing style.

Changes in Americans’ views of gender status differences have been documented (*Gender and Society*, n.d.).

To cite the Bible, provide the book, chapter, and verse. The first time the Bible is cited in the text, identify the version used. Consider the following example:

“You are forgiving and good, O Lord, abounding in love to all who call to you” (Psalm 86:5, New International Version). [Note: No entry in the References list is needed for the Bible.]

Quotations: When a direct quotation is used, always include the author, year, and page number as part of the citation.

A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence. Consider the following example:

Patients receiving prayer had “less congestive heart failure, required less diuretic and antibiotic therapy, had fewer episodes of pneumonia, had fewer cardiac arrests, and were less frequently intubated and ventilated” (Byrd, 1988, p. 829).

A lengthier quotation of 40 or more words should appear (without quotation marks) apart from the surrounding text, in block format, with each line indented five spaces from the left margin.

References: All sources included in the References section must be cited in the body of the paper (and all sources cited in the paper must be included in the References section).

Pagination: The References section begins on a new page.

Heading: “References” (centered on the first line below the running head)

Format: The References (with hanging indent) begin on the line following the References heading. Entries are organised alphabetically by surnames of first authors. Most Reference entries have the following components:

Authors: Authors are listed in the same order as specified in the source, using surnames and initials. Commas separate all authors. When there are eight or more authors, list the first six authors followed by three ellipses (...) and then the final author. If no author is identified, the title of the document begins the Reference.

Year of Publication: In parentheses following authors, with a period following the closing parenthesis. If no publication date is identified, use “n.d.” in parentheses following the authors.

Source Reference: Includes title, journal, volume, pages (for journal article) or title, city of publication, publisher (for book). Italicize titles of books, titles of periodicals, and periodical volume numbers.

Electronic Retrieval Information: Electronic retrieval information may include digital object identifiers (DOIs) or uniform resource locators (URLs). DOIs are unique alphanumeric identifiers that lead users to digital source material. To learn whether an article has been assigned a DOI, go to http://www.crossref.org/guestquery/.

Example of APA-formatted Internet References: Go to http://www.vanguard.edu/uploadedFiles/Psychology/References.pdf*Examples of sources*

Journal article with DOI

Murzynski, J., &Degelman, D. (1996).Body language of women and judgments of vulnerability to sexual assault.*Journal of Applied Social Psychology, 26,* 1617- 1626. doi:10.1111/j.1559-1816.1996.tb00088.x

Journal article without DOI, print version

Koenig, H. G. (1990). Research on religion and mental health in later life: A review and commentary. *Journal of Geriatric Psychiatry, 23,* 23-53.

Journal article without DOI, retrieved online

For articles retrieved from databases, include the URL of the journal home page. Database information is not needed. Do not include the date of retrieval.]

Aldridge, D. (1991). Spirituality, healing and medicine.*British Journal of General Practice, 41,* 425-427. Retrieved from http://www.rcgp.org.uk/publications/bjgp.aspx

Book

Paloutzian, R. F. (1996). *Invitation to the psychology of religion* (2nd ed.). Boston, MA: Allyn and Bacon.

Informally published Web document

Degelman, D. (2009). *APA style essentials.*Retrieved from http://www.vanguard.edu/faculty/ ddegelman/detail.aspx?doc_id=796

Informally published Web document (no date)

Nielsen, M. E. (n.d.). *Notable people in psychology of religion.*Retrieved from http://www.psywww.com/psyrelig/psyrelpr.htm

Informally published Web document (no author, no date)

Gender and society.(n.d.). Retrieved from http://www.trinity.edu/~mkearl/gender.html

12.8 Abstract from Secondary Database

Garrity, K., &Degelman, D. (1990).Effect of server introduction on restaurant tipping.*Journal of Applied Social Psychology, 20,* 168-172. Abstract retrieved from PsycINFO database.

Article or chapter in an edited book Shea, J. D. (1992).Religion and sexual adjustment. In J. F. Schumaker (Ed.),*Religion and mental health* (pp. 70-84). New York, NY: Oxford University Press.

Diagnostic and Statistical Manual of Mental Disorders

American Psychiatric Association.(2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

12.9 Footnotes

Footnotes: Content footnotes are occasionally used to support substantive information in the text. A content footnote may be placed at the bottom of the page on which it is discussed or on a separate page following the References.

Pagination: Footnotes begin on a separate page.

Heading: "Footnotes" is centered on the first line below the running head.

Format: Indent the first line of each footnote 5-7 spaces and number the footnotes (slightly above the line) as they are identified in the text.

Example of APA-formatted

Footnotes: http://www.vanguard.edu/uploadedFiles/Psychology/Footnote.pdf

Tables: A common use of tables is to present quantitative data or the results of statistical analyses (such as ANOVA). See the *Publication Manual* (2010, pp. 128- 150) for detailed examples. Tables must be mentioned in the text.

Pagination: Each Table begins on a separate page.

*Heading: "*Table 1" (or 2 or 3, etc.) is typed flush left on the first line below the running head. Double-space and type the table title flush left (italicized in uppercase and lowercase letters).

Example of APA-formatted Tables.

http://www.vanguard.edu/uploadedFiles/Psychology/table.pdf

Figures: A common use of Figures is to present graphs, photographs, or other illustrations (other than tables). See the *Publication Manual* (2010, pp. 150-167) for detailed examples.

Pagination: Figures begin on a separate page.

Figure Caption: "*Figure 1.*" (or 2 or 3, etc.) is typed flush left and italicized on the first line below the figure, immediately followed on the same line by the caption (which should be a brief descriptive phrase).

Example of APA-formatted

Figure: http://www.vanguard.edu/uploadedFiles/Psychology/figure.pdf

Appendixes: A common use of appendixes is to present unpublished tests or to describe complex equipment or stimulus materials.

Pagination: Each Appendix begins on a separate page.

*Heading :*If there is only one appendix, "Appendix" is centered on the first line below the manuscript page header. If there is more than one appendix, use Appendix A (or B or C, etc.). Double-space and type the appendix title (centered in uppercase and lowercase letters).

Format: Indent the first line 5-7 spaces.

Example of APA-formatted Appendix

http://www.vanguard.edu/uploadedFiles/Psychology/Appendix.pdf

12.10 General Guidelines to Write References

Start on a new page. Center the word References at the top. As usual, double space.

Any citations made in the manuscript must be presented in this section and vice versa. That is, if something is not cited in the text, then it should not appear in this section. In still other words, this is not a bibliography.

In any of the previous sections, whenever you say something like studies have shown you must provide a citation. This section tells the reader where they can find these citations.

This section is alphabetized by last name (of the first author involved in the study).

A hanging indent is employed for each Reference, that is, the first line is not indented and the rest are five-space indented.

For each author, give the last name followed by a comma and the first (and middle) initials followed by periods.

Separate multiple authors with commas and the last author with the ampersand ('&') rather than the word "and".

After the author(s) comes the year (in parentheses and followed by a period).

For a journal Reference, italicize the title of the journal and the volume number. Note that issue numbers are typically not included. Also, capitalize the important words of the journal title.

For a book Reference, just italicize the title. Only capitalise the first word of the title. Do include the city, state (as a two-letter abbreviation without periods), and the publisher's name.

See the example Reference section. It provides several types of References, including: Single and multiple author, journal articles, book, and book chapter, web page, as well as a government document.

12.11 Summary

In this unit we have tried to present how the references shouldbe written. We have tried to differentiate between references and bibliography. We pointed out that a list of Reference is an integral part of the Research Report. It may be headed as 'References' or 'Bibliography'. While Bibliography is a comprehensive term which includes, in addition to referred literature, other related and very useful literature which readers may like to read which the Researcher has himself read but not referred to it in the text of the thesis. All literature referred to in the text must appear in the Reference list. We learnt all about the guidelines to follow while writing references, in the style of American Psychological Association (APA) format.

We also discussed how to write the reference when it is a single author, more than one author and multiple authors. When there is more than one author, the initial of the first author must be followed by ‘a comma’. The wording of the title should appear exactly as it does on the title page of the book or first page of the article. The name of the journal should either appear as it is or be abbreviated according to accepted abbreviations.

We also learned about how to write the reference for the same author who has published in different years and also in the same year. How to write a journal reference and a book reference were also presented.

12.12 Glossary

- **References:** comprise all documents including journals, books, technical Reports, computer programmers and unpublished works mentioned in the text of the Report.
- **Bibliography**: contains everything that is included in the Reference section plus other publications which are useful but were not cited in text or manuscript.
- **APA style**: uses the author/date method of citation in which the author’s last name and the year of the publication are inserted in the actual text of the paper. It is the style recommended by the American Psychological Association and used in many of the social sciences.

12.13 Answers to Self-check Exercise

1. What is the significance of References in a Research Report?
2. How will you differentiate between references and bibliography
3. If the same author has multiple books how would you write the reference for them?

12.14 Suggested Readings

- Bhandarkar, P.L. and Wilkinson, T.S. (2016). Methodology and Techniques of Social Research. Himalaya Publishing House: New Delhi.
- Donald R. Cooper and Pamela S. Schindler. (2006). Business Research Methods. 9th Edition, Tata McGraw Hill.
- Ghosh, B.N. (2015). Scientific Method and Social Research. Himalayan PublishingHouse, New Delhi.
- Goode, William J., and Hatt, Paul K. (1952). Methods in Social Research, New York: McGraw-Hill.
- Gopal, M.H. (1970). An introduction to research procedures in social sciences. AsiaPublishing House, New Delhi.
- Gupta, S.P. (2021). Statistical Method (46th edition), Sultan Chand and Sons, New Delhi.
- Kothari, C.R. (2004). Research Methodology Methods and Techniques, New AgeInternational (P) Limited: New Delhi.

- Panneerselvam, R. (2013). Research Methodology. Prentice-Hall of India Pvt. Ltd., New Delhi.
- Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.
- Rao K.V. (1993). Research Methodology in Commerce and Management, Sterling Publishers Private Limited: New Delhi.
- Sadhu A.N. and A. Singh. (2017). Research Methodology in Social Sciences, Himalaya Publishing House, New Delhi.
- Saravanavel, P. (2019). Research Methodology. KitabMahal. Allahabad.
- Sekaran, U. (2006). Research methods for Business, Wiley India, New Delhi.
- Singh, AK. (2009). Test Measurements and Research Methods in Behavioural Sciences (Fifth Edition). BhartiBhawan Publishers & Distributors.
- Thakur, H.K. (2021). Research Methodology in Social Sciences. Corvette Press, NewDelhi.

12.15 Terminal Questions

1. Elaborate upon the central guidelines for writing references from diverse sources. Give suitable examples.
2. How will you write references for the internet resources?
3. Elucidate the style of referencing according to the APA format, especially single author and multiple authors
4. How will you write the references for internet books in particular? Give examples.

*****

Chapter-13
REFERENCING SOFTWARE

STRUCTURE

13.0 Learning Objectives

After going through this lesson, you will be able to:

- Know why the referencing softwares use in research, and
- List the most common referencing softwares used in the research with their strengths and weakness.

13.1 Introduction

In the research work, referencing softwares help you to gather, organize, and cite your sources more effectively- saving you time and energy in the long run. Good referencing softwares can make all the difference for academic researchers and Ph.D. students from

making sure your references are formatted correctly to helping you find and use them quickly and easily. They allow you to keep track of your references, create bibliographies, and collaborate with other researchers.But with so many different types of software to choose from, how do you know which one is right for you? This chapter aims to give you an overview of the most common referencing softwares used in the research and discussed their strengths and weakness.

13.2 ReferencingSoftware

Referencing software, or citation manager, is a program or online service that helps you collect, organize, cite, and share your research sources. Most of these programs also allow you to create bibliographies and footnotes in your research papers.

Referencing or Citation softwares help you find sources more quickly and easily. Most softwares have built-in search engines that allow you to quickly find articles and other resources related to your topic. They also allow you to save search parameters and customize your results. The more sources you find, the better equipped you will be to make an informed decision about how to word your paper's thesis statement and plan out the rest of the writing process.

13.3Use of Referencing Software for Research

Whether you are a Ph.D. student or an academic researcher, it's important to use referencing software for research. Here are three reasons why:

1. It can help you find information quickly and easily. With the right software, you can quickly and easily find the information you need- no more wasted time searching through endless pages of results.
2. It makes collaboration much easier. Have a group project? Reference management software will help you share resources with ease. No more passing around notes or spending hours trying to compile everything together by hand!
3. It can help you stay organized. When you're dealing with a lot of information, it's important to have a system for keeping track of it all. Reference manager can help you do just that.

13.4 Best Referencing Softwares

13.4.1 Mendeley

Mendeley is a software that helps researchers manage their references. It can be used to create bibliographies and citations, and it also allows users to collaborate with other researchers. Mendeley can be accessed online or offline, and it is available for both Windows and Mac users.

Mendeley reference manager allows you to store, organize, and search all of your references from just one reference library. It makes it easy to add references and bibliographies to your google docs. Mendeley reference manager allows you to read, highlight, and annotate PDFs, and retain all of your ideas in one location across numerous pages.

www.mendeley.com

Strengths

- Increased collaboration as it allows you to invite your teammates who have Mendeley to share the same paper.
- Portability is made easier as the software can simultaneously be installed on different devices.
- It offers a browser plugin that works with Firefox and Google Chrome, so all you need to do is bookmark your desired web pages, and it saves on your Mendeley library.

Weakness

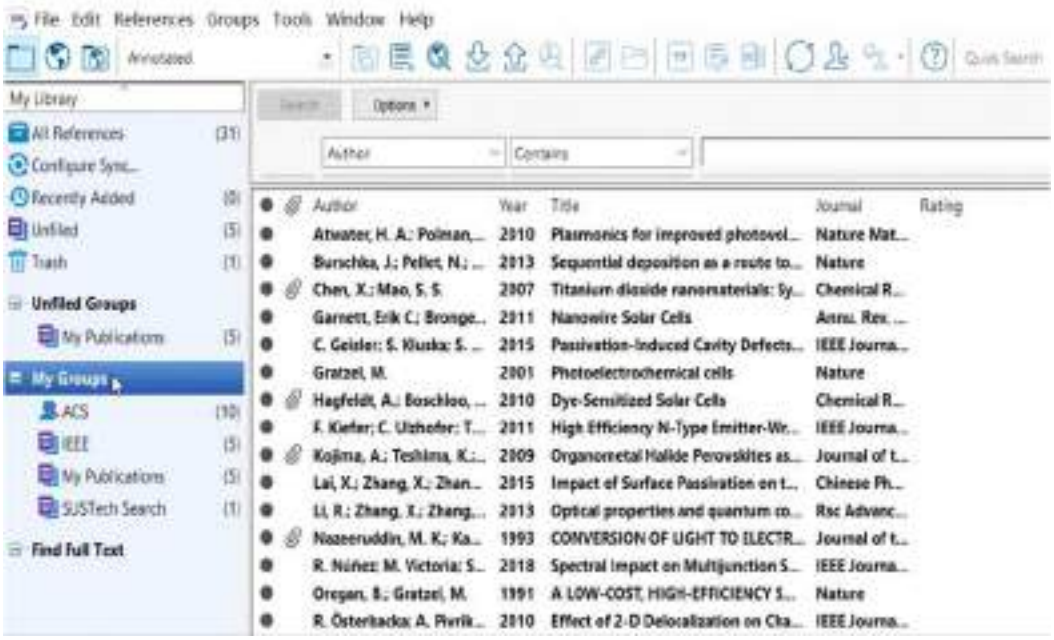
- Not allow you to edit subscript and superscript characters in the title. For instance, number 2 in H2O needs to be in a small subscript which cannot be done through it.

Pricing/Free Version

- Free Version available with up to 2GB of cloud storage.
- Paid plans start from $4.99/month.

13.4.2 EndNote

Endnote software is used to manage and import references. It can help Ph.D. students with compiling, storing, and managing references. Endnote desktop software helps to create citations and bibliographies. It also allows for the sharing of references with colleagues.



sustech.libguides.com

Strengths

- Endnote basic allows you to search databases and import citation info in Microsoft word.
- It has both online and offline options, the ability to edit output styles based on Journal requirements, and allows you to attach pdfs to references.

Weakness

- Does NOT work well with Google Drive
- Not free and takes longer to learn

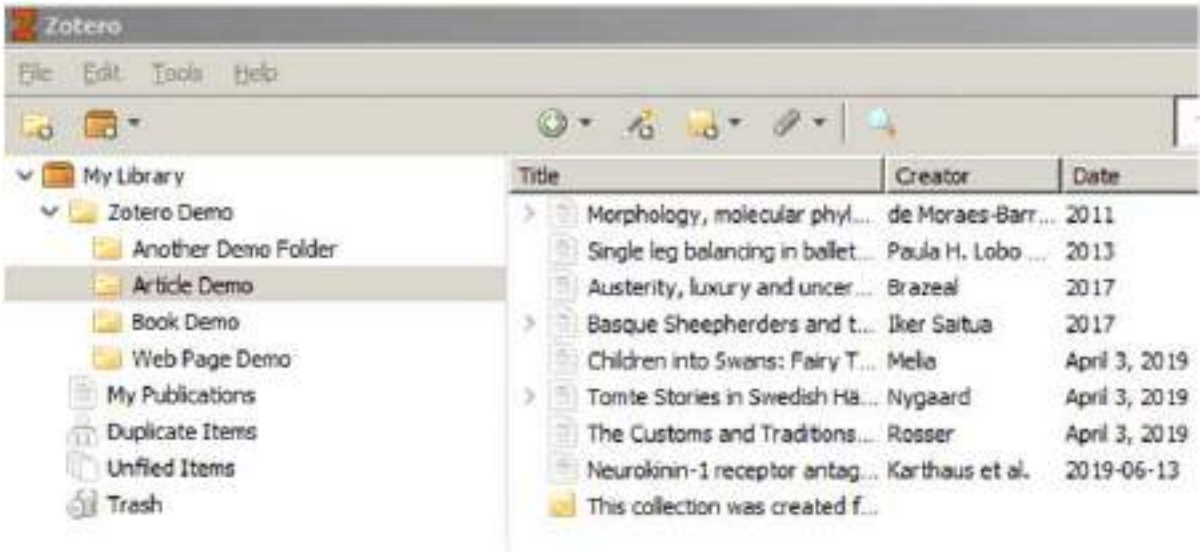
Pricing/Free Version

- Free 30-day trial available.
- Paid version comes with a one-time cost of $99.

13.4.3 Zotero

Zotero is a reference management software that can be used by students and researchers of all levels. It's a great way to keep track of your sources, as well as easily create citations and bibliographies. Here are some of the ways Zotero can be especially helpful for Ph.D. students.

Zotero helps you stay organized by allowing you to collect and save information about your sources in one place.It can be used to create citation information and bibliographies in no time, so you can spend less time on paperwork and more time on your research.Zotero integrates with many popular word processing programs, so you can easily use it as a citation management program for your papers as you write them.



fondrenlearning.blogs.rice.edu

Strengths

- It is an open-source and free citation management software.
- Works as a plugin to your web-based browser thus allowing one-click import of the references.
- It also has social features(shared bibliographies) and can import BibTeX and export to various word processing software (MS Word, Latex, etc.)
- Zotero saves your citation library to your local computer but syncs with multiple computers so you can work from wherever you want.

Weakness

- The only shortcoming I noticed is that it does not work with WordPress, where I write a lot of my papers. Although there is a WordPress widget for Zotero, it still needs some work.

Pricing/Free Version

- Free plan available.

13.4.4 Docear

Docear is one of the most unique and powerful reference management tools that helps researchers manage their references and PDFs. It integrates a number of features, such as PDF management, reference management, mind mapping, and note-taking. Because of its versatile features, Docear is an ideal tool for students, academics, and professionals.

Strengths

- Not just a reference manager, but also a composer of all research work.
- Very good for drafting your new paper by automatically including all of your comments in pdf files in your word file.

Weakness

- Might not be easy to understand at first, as it has a unique way of handling all of your references.

Pricing/Free Version

- Free – open source

13.4.5 Citavi

Citavi is incredibly versatile which makes it so popular among academic researchers. It can be used to manage references for all types of research projects, from essays and theses to books and articles. This makes it an essential tool for any researcher who wants to stay organized and efficient.Citavi is easy to use. It's simple enough that even novice researchers can quickly learn how to use it without any trouble. But it's also powerful enough that more experienced researchers will appreciate all its features.

Strengths

- Compatible with the most common writing software that makes it easy to get your manuscript done in a brief period.
- It is easy to handle and is able to sort all the things you will need in your research(references, notes, tasks).
- Citavi's Add-In for MS Word and its LaTeX support ensures accurate citations. You can choose the style of the bibliography you want automatically inserted. There are over 10,000 professional citation styles available for all academic disciplines.

Weakness

- The software is not always compatible with all devices, which can be a problem for researchers who want to work on their references on the go.

Pricing/Free Version

- Free trial available

13.4.6 Wizfolio

There are a number of different software options available for reference management, each with its own pros and cons. But if you're looking for software that can help you manage your references effectively and efficiently, Wizfolio is definitely worth considering.

Wizfolio is a cloud-based reference management software that was designed specifically for academic researchers. It allows you to quickly and easily gather all of your references in one place, as well as organize them according to your own personal preferences. Wizfolio also comes with a number of helpful features that make it fairly convenient to use.

Strengths

- It integrates with the web browser and word processing software.
- The web browser integration is very useful as all you have to do is click to add a page as a reference. It is also an operating system independent.

- It also integrates with WordPress and allows you to easily share references easily between researchers.

Weakness

- It can be difficult to keep track of all your references if you don't use the software correctly.

Pricing/Free version

- Contact Wizfolio to get a customized quote.

13.4.7 Paperpile

If you're an academic researcher, Paperpile should be your go-to reference management software. It's designed specifically for academics, making it the perfect choice for those who need to keep track of a large number of citations. Paperpile makes it easy to import references from a variety of sources, including PubMed, Google Scholar, and Web of Science.

It also has powerful search features that allow you to quickly find the information you need. And if you're working on a collaborative project, Paperpile makes it easy to share references with your colleagues.

Strengths

- They can link to your Google account, so theoretically, you'll have 15GB of storage and a nice Chrome extension, so adding papers to your library is incredibly simple. In addition, Google Docs integration for citations is available, and a beta test for Word is currently underway.
- Paperpile is a web-based reference management software that makes it easy to import references from databases, journals, and websites.
- It automatically formats citations and bibliographies in a variety of styles, including APA, MLA, and Chicago.

Weakness

- Paperpile is not as comprehensive as some of the other software options available.

Pricing/Free Version

- Free to use for one user and two papers.
- Paid plans from $2.99/month.

13.4.8 RefWorks

If you're an academic researcher, then you know the importance of using the right tools for the job. And when it comes to reference management, there's no better tool than RefWorks. RefWorks is a web-based application that allows you to create and manage your references from anywhere in the world. With RefWorks, you can easily import citations from databases, journals, and websites, and then create bibliographies in any format you need.

But perhaps the best thing about RefWorks is its collaborative features. With RefWorks, you can share your references with colleagues or classmates and work together on projects. You can also create groups to collaborate on research topics.

Strengths

- Has Proprietary, Operating system support, Export file formats, Citation styles and Word processor integration.
- Offers partial support for reference list file formats.
- Supports import file formats.

Weakness

- Does not have database connectivity.
- Doesn't store copies of articles.

Pricing/Free Version

- Free trial subscription available.
- Get a customized quote from the sales team.

13.4.9 Papers

Papers is a Mac OS X and Windows reference management program for academic researchers and Ph.D. students used for managing bibliographies and references for writing essays and articles. It's mostly used to collect references and maintain a PDF document library, but it also offers a unified interface for document repository searches, metadata editing, full screen viewing, and a range of document import and export options.

Strengths

- It is very easy to fill with PDFs and bibliographic data can easily added.
- It is integrated well to work with Word for Mac.
- It is available for the iPhone/iPad, which offers the opportunity to carry all your references with you in your smartphone.

Weakness

- Many users have complained about the software's clunky interface and how difficult it can be to navigate.

Pricing/Free Version

- 30 day free trial available.
- From $3/month.

13.4.10 Sciwheel

SciWheel is a referencing software that can be very significant for academic researchers. It helps manage references, PDFs, notes, and ideas. SciWheel has a powerful search engine that makes it easy to find any document you need. It also allows you to create groups for your documents, making it easy to keep track of your research.

Strengths

- A user-friendly interface that is easy to learn and use.
- Integrated search capabilities that allow you to search for information both inside and outside of SciWheel.
- Collaborative features that allow you to share information with other researchers.

Weakness

- The software can be slow and cumbersome at times.
- It can be difficult to find information that is buried deep in the system.

Pricing/Free Version

- Free plan available.
- From $9.95/month.

13.5 Guide to Best Referencing Softwares for Academic Research

When looking for referencing software, it's important to consider the features that will be most helpful for academic researchers. Some features include:

1) The ability to import citations from a variety of sources, including online databases, journals, and the internet.
2) The ability to organize citations into folders or groups.
3) The ability to create bibliographies or reference lists in a variety of formats, such as MLA, APA, and Chicago.
4) The ability to export citations and bibliographies into Word documents or PDFs.
5) A search function that allows you to quickly find the citation you need.
6) A user-friendly interface that allows for quick and efficient organization.

13.6 Summary

In scholarly articles and research documents, citations play an important role for both researchers and readers. It is also very time-consuming to integrate these citations accurately into research documents without the aid of referencing software. In this chapter, the most common referencing softwares used in research are discussed with their strengths and weaknesses.

13.7 Glossary

- **Referencing software**: is a program or online service that helps to collect, organize, cite, and share the research sources.
- **References:** comprise all documents including journals, books, technical Reports, computer programmers and unpublished works mentioned in the text of the Report.
- **Bibliography**: contains everything that is included in the Reference section plus other publications which are useful but were not cited in text or manuscript.

- **APA style**: uses the author/date method of citation in which the author's last name and the year of the publication are inserted in the actual text of the paper. It is the style recommended by the American Psychological Association and used in many of the social sciences.

13.8 Answers to Self-Check Exercises

1. What are the uses of referencing software for academic research
2. Write a note on Mendeley referencing software
3. How does EndNote referencing software use for academic research.

13.9 Suggested Readings

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13.10 Terminal Questions

1. Discuss the most common referencing softwares used for academic research with their strengths and weaknesses.

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Chapter-14
ANALYZING ECONOMICS IN NEWS

STRUCTURE

14.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand the role of economics in the news
- List the key economic topics in the news
- Understand the Influence of economics reporting on policy
- Discuss therole of economic data and statistics in news
- Understand the future of economics reporting

14.1 Introduction

Economics plays a pivotal role in shaping the world we live in. It governs decisions made by governments, businesses, and individuals, impacting everything from employment rates to the prices of goods and services. Consequently, the study of economics is essential for understanding the mechanisms that drive our global society. One way to gain insight into these mechanisms is by analyzing economics in the news.

The news media, in its various forms, serves as a powerful conduit for disseminating economic information and shaping public opinion. Whether it's reporting on unemployment figures, stock market fluctuations, trade policies, or inflation rates, economics is a frequent

topic in the news. This chapter delves into the importance of analyzing economics in the news, highlighting its role in informing the public, influencing decision-makers, and shedding light on the complex web of economic factors that shape our world.

14.2 The Role of Economics in the News

Economics is often referred to as the “dismal science,” but it is anything but dismal when it comes to its impact on society. From the decisions of central banks to the daily budgeting choices of households, economics plays a critical role in our lives. Here, we explore the multifaceted role of economics in the news.

1. Economic Education and Literacy

One of the fundamental roles of economics in the news is education. The news media serves as a platform to educate the public about economic concepts, policies, and their implications. Many individuals lack formal training in economics, making news outlets a vital source of economic education.

When news articles explain topics like supply and demand, fiscal policy, or international trade, they contribute to economic literacy. A well-informed public is better equipped to make financial decisions, engage in public discourse, and hold policymakers accountable. This education is essential in a world where economic decisions can have far-reaching consequences.

2. Public Awareness

Economic news stories keep the public informed about significant developments that affect their lives. Whether it’s rising gas prices, changes in mortgage rates, or shifts in the job market, people rely on the news to understand how these changes impact their daily routines.

For example, during a financial crisis, news reports can help individuals make informed decisions about their investments and job security. Public awareness is a crucial tool for mitigating the adverse effects of economic shocks, as it enables individuals and businesses to adapt and plan accordingly.

3. Influencing Decision-Makers

Economics in the news has the power to influence policymakers, both at the government and corporate levels. News outlets often play a role in shaping public opinion, which can, in turn, impact the decisions of elected officials. For instance, widespread coverage of income inequality may lead to public pressure on lawmakers to implement policies addressing this issue.

Furthermore, businesses closely monitor economic news to make strategic decisions. A report on potential changes in trade policies, for example, can prompt multinational corporations to reassess their supply chains or investment strategies. Thus, economics in the news can act as a catalyst for change, prompting decision-makers to respond to economic challenges and opportunities.

14.3 Economics Reporting: Opportunities and Challenges

While economics reporting has a vital role to play, it also faces several opportunities and challenges in the modern media landscape. Understanding these dynamics is essential for critically assessing economic news.

1. Opportunities in Digital Media

The rise of digital media has expanded opportunities for economics reporting. Online platforms, blogs, and social media allow for a diverse range of voices and perspectives on economic matters. This democratization of information has enabled economists, researchers, and analysts to share their insights directly with the public.

Additionally, digital media provides interactive tools and data visualization, making complex economic concepts more accessible. Info-graphics, interactive charts, and multimedia presentations can help individuals grasp economic trends and their implications.

2. Challenges of Sensationalism

In the competitive world of news media, sensationalism is a constant challenge. Economic stories with sensational headlines tend to attract more readers or viewers, even if the content lacks nuance or accuracy. This can lead to misinterpretation of economic events and policies.

For example, a headline that screams “Stock Market Crash Imminent” might generate more clicks than a balanced analysis of market fluctuations. Such sensationalism can fuel panic, misinformation, and hasty decision-making among investors and the public.

3. Economic Complexity

Economics is a complex field that often involves intricate models, data analysis, and a deep understanding of human behavior. Simplifying economic concepts for a general audience without oversimplifying them is a constant challenge for economics reporters.

Economists may disagree on the interpretation of data or the effectiveness of policy measures, leading to conflicting narratives in the news. It’s essential for consumers of economic news to be critical thinkers, recognizing that economic issues often involve multiple perspectives and ongoing debates.

14.4 Key Economic Topics in the News

Economics in the news covers a wide range of topics, reflecting the diversity of economic issues that impact society. Here, we delve into some of the key economic topics that frequently make headlines:

1. Unemployment and Labor Market:

- Unemployment rates
- Job creation or loss
- Labor force participation

2. **Inflation and Price Levels:**
    - Consumer Price Index (CPI)
    - Producer Price Index (PPI)
    - Impact on purchasing power
3. **Financial Markets:**
    - Stock market indices
    - Bond yields
    - Commodity prices
    - Cryptocurrencies
4. **Monetary Policy:**
    - Central bank decisions (e.g., interest rates)
    - Quantitative easing
    - Money supply
5. **Fiscal Policy:**
    - Government budgets
    - Tax policies
    - Stimulus packages
6. **International Trade:**
    - Trade deficits/surpluses
    - Tariffs and trade disputes
    - Exchange rates
7. **Income Inequality:**
    - Wage disparities
    - Wealth distribution
    - Policies addressing inequality
8. **Economic Crises:**
    - Financial crises
    - Banking crises
    - Responses and bailouts
9. **Technological Advancements:**
    - Impact on industries and employment
    - Innovation and economic growth

10. **Environmental Economics:**
    - Climate change policies
    - Sustainability and economic development
    - Green technologies

Each of these topics has its own set of complexities, implications, and potential consequences, making them crucial subjects for economic reporting. Moreover, they are interconnected, with developments in one area often affecting others.

14.5 The Influence of Economics Reporting on Policy

Economics reporting plays a significant role in shaping public opinion, which can, in turn, influence policy decisions. Here's how economics in the news impacts policymaking:

1. **Public Awareness and Pressure:** When economic issues gain widespread media attention, the public becomes more aware and concerned. This increased awareness can lead to public pressure on policymakers to address specific economic challenges. For example, extensive reporting on the negative effects of income inequality can lead to demands for policy reforms.
2. **Policy Proposals and Debates**: Economics reporting often covers proposed policy measures to address economic problems. These proposals can spark public debates and discussions. Policymakers pay attention to these debates and may modify their policies in response to public sentiment.
3. **Accountability:** The media holds policymakers accountable for their economic decisions. Investigative reporting can uncover corruption, inefficiencies, or misguided policies, leading to increased scrutiny and potential policy changes.
4. **International Relations**: Economics reporting also affects international relations. Coverage of trade disputes, currency manipulations, or sanctions can influence diplomatic negotiations and trade policies.
5. **Central Bank Independence:** Central banks often rely on maintaining public trust and credibility. Media coverage of their decisions and statements can affect financial markets and economic stability. Consequently, central banks are often cautious in their communications, aware of the potential market reactions.

14.6 The Role of Economic Data and Statistics in News

Economic reporting heavily relies on data and statistics to provide accurate and timely information. Government agencies, research institutions, and private organizations collect and analyze data on various economic indicators. Here's the significance of economic data in news reporting:

1. **Timely Information**: Economic data releases, such as the monthly jobs report or quarterly GDP figures, provide timely snapshots of the economy's health. These releases often generate headlines and discussions in the news.

2. **Market Expectations**: Financial markets closely watch economic data releases and often have expectations about the outcomes. Surprises, whether positive or negative, can lead to market volatility. News outlets report on how these surprises impact market sentiment.
3. **Policy Decisions**: Economic data can influence central bank decisions. For example, a strong jobs report may lead a central bank to consider raising interest rates to prevent overheating. The anticipation and analysis of these data points are integral to economic reporting.
4. **Long-Term Trends:** Economic data also help identify long-term economic trends. News stories that track trends in income inequality, technological advancements, or demographic shifts contribute to our understanding of the evolving economic landscape.
5. **Global Economic Interactions**: International economic data, such as trade balances and currency exchange rates, are essential for understanding global economic interactions. Reporting on these data informs the public about international economic dynamics.

14.7 Bias and Objectivity in Economic Reporting

The objectivity of economic reporting is a subject of debate and scrutiny. It's essential to consider the potential biases and challenges associated with reporting on economic matters:

1. **Political and Ideological Bias**: Some news outlets may have political or ideological biases that can influence their economic reporting. For instance, a conservative-leaning media outlet may have a different perspective on tax policy than a liberal-leaning one. Consumers of economic news should be aware of potential biases and seek diverse sources of information.
2. **Complexity and Simplification**: Economics reporting often involves simplifying complex topics for a general audience. However, oversimplification can lead to misinterpretation or misunderstanding. Striking a balance between simplicity and accuracy is a constant challenge for economic reporters.
3. **Data Interpretation:** Economists and analysts may interpret the same economic data differently, leading to divergent viewpoints in the news. It's important for consumers of economic news to be critical thinkers, examining the data and methodology behind the analysis.
4. **Confirmation Bias:** Consumers of economic news may seek out information that confirms their existing beliefs or biases. This confirmation bias can lead to a skewed understanding of economic issues. It's essential to engage with a variety of perspectives and challenge one's own preconceptions.
5. **Sensationalism:** As mentioned earlier, sensationalism can be a challenge in economic reporting. News outlets may prioritize sensational headlines over nuanced analysis, potentially leading to misguided perceptions of economic events.

14.8 Case Studies: Notable Economic News Events

To illustrate the impact of economic reporting, let's explore a few case studies of notable economic news events:

1. The 2008 Financial Crisis:

- The 2008 financial crisis was extensively covered in the media, leading to public awareness and pressure for action.
- Economic reporting highlighted the role of subprime mortgages, complex financial products, and regulatory failures in the crisis.
- Public sentiment influenced policymakers, leading to the Troubled Asset Relief Program (TARP) and subsequent financial reforms.

2. Brexit:

- The Brexit referendum and negotiations were closely monitored by the media.
- Economic reporting discussed the potential economic consequences of Brexit, including trade disruptions and investment uncertainties.
- Public opinion and economic analyses played a role in shaping the negotiations between the UK and the EU.

3. COVID-19 Pandemic:

- The pandemic's economic impact received extensive media coverage, from job losses to government stimulus packages.
- Economic reporting helped individuals understand the economic consequences of lockdowns, travel restrictions, and supply chain disruptions.
- Policymakers relied on economic data and public sentiment to design economic relief measures.

4. Rise of Cryptocurrencies:

- The surge in cryptocurrencies like Bitcoin garnered significant media attention.
- Economic reporting discussed the potential implications of cryptocurrencies for financial systems and investment portfolios.
- Public interest in cryptocurrencies influenced market dynamics and regulatory discussions.
- These case studies highlight how economics reporting can shape public perception, influence policy decisions, and provide valuable insights into complex economic events.

14.9 The Future of Economics Reporting

The landscape of media and journalism is constantly evolving, and economics reporting is no exception. Several trends and considerations are shaping the future of how economic news is delivered and consumed:

1. **Digital Transformation**: The shift to digital platforms continues, with more people consuming news online and through mobile devices. This trend allows for greater interactivity, multimedia content, and real-time updates.
2. **Data Visualization:** As data becomes increasingly integral to economic reporting, the use of data visualization tools is likely to grow. Interactive charts, graphs, and infographics can help readers better understand economic trends and statistics.
3. **Fact-Checking and Accountability**: Fact-checking organizations and tools are playing a critical role in holding news outlets accountable for accuracy. Ensuring the credibility of economic reporting is essential in an era of information overload.
4. **Diverse Voices:** The digital era allows for a more diverse range of voices in economic reporting. Independent bloggers, economists, and subject matter experts can contribute to a richer and more inclusive economic discourse.
5. **Challenges of Misinformation**: Misinformation and "fake news" are challenges that the news media must address. Economic reporting is not immune to false or misleading information, and combating it is an ongoing concern.
6. **Ethical Considerations**: As economic reporting influences public opinion and policy, ethical considerations become paramount. Journalists must balance the need for transparency and accuracy with the potential impact of their reporting.
7. **Global Perspective**: In an interconnected world, understanding global economic dynamics is crucial. Economics reporting should provide insights into international economic relations and their impact on local economies.

14.10 Summary

Analyzing economics in the news is essential for understanding the complex forces that shape our world. Economics reporting serves as an educational tool, informing the public, influencing decision-makers, and holding institutions accountable. However, it also faces challenges, such as bias, sensationalism, and the need to simplify complex topics.

As consumers of economic news, it's imperative to be critical thinkers, seeking diverse perspectives and fact-checking information. The media's role in economic reporting is evolving in the digital age, with opportunities for data visualization, interactivity, and diverse voices. Ultimately, a well-informed public and responsible journalism are essential for a thriving and economically literate society.

14.11 Glossary

- **Data visualization**: is the graphical representation of information and data.
- **Digital media**: is digitized content that can be transmitted over the internet or computer networks.
- **Economics reporting**: reporting that follows any news that impacts the economy of a community or country.

- **Sensationalism**: the presentation of stories in a way that is intended to provoke public interest or excitement, at the expense of accuracy.

14.12 Answers to Self-Check Exercises

1. Write briefly on the role of economics in the news
2. How does Economics Reporting influence Policy?
3. What is the future of Economics Reporting?

14.13 Suggested Readings

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14.14 Terminal Questions

1. Explain the role of economics in the news. Also mention the key economic topics in the news.
2. What are the opportunities and challenges of economics reporting?

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Chapter-15
CONTEMPORARY ECONOMIC EVENTS

STRUCTURE

15.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand the significance of writing about contemporary economic events,
- Know the role of the media in covering economic events,
- List the key contemporary economic events in the recent history,
- Understand the challenges and responsibilities of journalists
- Know about thecontemporary economic events in a digital age

15.1 Introduction

In today's interconnected world, staying informed about contemporary national and global economic events is of paramount importance. Economic events, whether they are local fiscal policies or global trade agreements, have far-reaching implications that can affect individuals, businesses, and nations on a large scale. This chapter deals with the significance of writing about contemporary economic events, the role of the media, key events in recent history, and the challenges and responsibilities of journalists in covering these topics.

15.2. Significance of Writing about Contemporary Economic Events

Contemporary economic events serve as windows into the complex machinery that drives our world. They are the outcomes of decisions made by governments, central banks, corporations, and individuals, all of which have ripple effects on various aspects of society. Here are several reasons why writing about these events is vital:

1. **Informed Decision-Making**: Knowledge of contemporary economic events empowers individuals and businesses to make informed decisions. Whether it's investing in the stock market, planning for retirement, or starting a new business, understanding economic events is essential.
2. **Policy Implications**: Economic events often stem from government policies and decisions. Writing about these events can shed light on the impact of these policies, promote transparency, and influence public opinion.
3. **Global Interconnectedness**: In an increasingly globalized world, economic events in one part of the globe can reverberate across borders. Writing about these events helps people understand how global interconnectedness affects their lives.
4. **Predictive Value:** Analyzing contemporary economic events can offer insights into future trends. For instance, a series of declining manufacturing orders may indicate an impending economic downturn.
5. **Education:** Writing about economic events can help educate the public about economic concepts, theories, and principles. A well-informed public is more likely to engage in meaningful discussions and make responsible choices.

15.3 Role of the Media in Covering Economic Events

The media plays a crucial role in shaping public understanding of contemporary economic events. Whether through newspapers, television broadcasts, online articles, or social media, the media is a primary source of information for most individuals. Here's how the media fulfills this role:

1. **Information Dissemination:** The media's primary function is to disseminate information. Journalists gather data, conduct interviews, and analyze economic events to provide accurate and timely reports to the public.
2. **Education:** Journalists explain complex economic concepts and events in a way that is accessible to a broad audience. This educational aspect helps demystify economics and empowers individuals to engage with these topics.
3. **Transparency and Accountability**: By reporting on economic events, the media holds institutions and decision-makers accountable for their actions. Investigative journalism can uncover corruption, inefficiencies, and unethical practices.
4. **Influence on Public Opinion:** Media coverage can shape public opinion and influence the decisions of policymakers. Well-researched and balanced reporting can lead to more informed public discourse.
5. **Market Impact:** The media also has a direct impact on financial markets. Breaking news can trigger market reactions, affecting stock prices, exchange rates, and commodity prices.

15.4 Key Contemporary Economic Events in Recent History

To understand the importance of writing about contemporary economic events, let's examine some key events from recent history that have had a significant impact on national and global economies:

1. The Global Financial Crisis (2007-2008):

- This crisis, triggered by the collapse of Lehman Brothers and the housing market bubble burst, had far-reaching consequences.
- It led to a severe recession, bank bailouts, and a global credit crunch.
- The crisis prompted widespread discussions about financial regulation, responsible lending practices, and risk management.

2. The Eurozone Debt Crisis (2010-2015):

- Several Eurozone countries, including Greece, Spain, and Italy, faced crippling levels of public debt.
- The crisis tested the stability of the Eurozone and the European Union.
- Policymakers implemented austerity measures, leading to protests and social unrest in some countries.

3. Brexit (2016):

- The United Kingdom's decision to leave the European Union had significant economic and political ramifications.
- It led to uncertainty in financial markets, currency fluctuations, and changes in trade relationships.
- Negotiations on trade agreements continue to affect the UK and EU economies.

4. The COVID-19 Pandemic:

- The pandemic had a profound impact on the global economy, leading to lockdowns, business closures, and travel restrictions.
- Governments implemented stimulus packages to mitigate economic damage, leading to increased government debt.
- Supply chain disruptions and shifts in consumer behavior have affected various industries.

5. Trade Wars (e.g., U.S.-China Trade War):

- Trade tensions between major economies, such as the United States and China, have led to tariffs and trade restrictions.
- These trade disputes have had implications for global supply chains and international trade relationships.

These events highlight the multifaceted nature of contemporary economic events, as they involve a mix of financial, political, and social factors. Writing about these events provides context, analysis, and insights into their causes and consequences.

15.5 Challenges and Responsibilities of Journalists

Covering contemporary economic events is not without its challenges and responsibilities. Journalists face several hurdles when reporting on complex economic topics:

1. **Complexity**: Economics is often viewed as a complex and technical field. Journalists must simplify economic concepts without oversimplifying them to ensure clarity while maintaining accuracy.
2. **Bias and Objectivity:** Maintaining objectivity in economic reporting can be challenging, especially when political or ideological factors come into play. Journalists must strive for balanced reporting and avoid partisanship.
3. **Data Interpretation:** Economic data can be subject to interpretation, and different experts may have varying views on the same data. Journalists should provide context and multiple perspectives.
4. **Sensationalism**: The media's pursuit of attention-grabbing headlines can sometimes lead to sensationalism, which can distort the true nature of economic events.
5. **Timeliness**: In a fast-paced news environment, journalists often face pressure to report quickly. Balancing speed with accuracy is crucial to avoid errors.
6. **Access to Information**: Some economic events involve proprietary or confidential information, making it challenging for journalists to access critical data.
7. **Globalization:** Understanding the global nature of contemporary economic events requires a broad perspective and access to international sources.

To address these challenges and fulfill their responsibilities, journalists should adhere to ethical principles such as accuracy, fairness, and transparency. Fact-checking, thorough research, and seeking diverse viewpoints are essential practices in economic reporting.

15.6 Contemporary Economic Events in a Digital Age

The digital age has transformed the way we access and consume information about contemporary economic events. Several trends are shaping the landscape of economic journalism:

1. **Online Media**: The shift to online media has allowed for real-time updates and a global audience. News websites, blogs, and social media platforms are primary sources of economic news.
2. **Data Visualization:** Interactive data visualizations, including charts, graphs, and infographics, help readers understand economic trends and statistics more easily.
3. **Citizen Journalism**: The rise of citizen journalism and social media platforms has enabled individuals to report on economic events and share their perspectives.
4. **Data Journalism:** Data-driven journalism involves using data analysis and visualization to tell stories. This approach adds depth and context to economic reporting.

5. **Fact-Checking:** Fact-checking organizations play a crucial role in verifying information and holding news outlets accountable for accuracy.
6. **Personalization:** Some news platforms use algorithms to personalize content based on readers' interests, ensuring that individuals receive relevant economic news.
7. **Global Perspective**: Online access to international news sources allows readers to gain a global perspective on economic events and their impact.

The digital age has democratized access to economic information, allowing more voices to contribute to the discourse. However, it has also brought challenges related to misinformation, filter bubbles, and the need for media literacy.

15.7 Summary

Writing about contemporary national and global economic events is not merely a journalistic endeavor; it is a societal imperative. These events shape our economic well-being, our policy choices, and our understanding of the world. The media plays a pivotal role in providing the public with the information needed to navigate this complex landscape.

While journalists face challenges in reporting on economics, they also have a responsibility to ensure accuracy, objectivity, and transparency. In a digital age where information flows freely and rapidly, the role of journalists in curating, analyzing, and contextualizing economic news is more critical than ever.

Ultimately, the public's understanding of contemporary economic events influences not only individual decisions but also the direction of nations and the global economy. Therefore, the pursuit of excellence in economic journalism is an essential component of a well-informed and empowered society.

15.8 Glossary

- **Citizen journalism**: journalism that is conducted by people who are not professional journalists but who disseminate information using Web sites, blogs, and social media.
- **Data visualization**: is the graphical representation of information and data.
- **Digital media**: is digitized content that can be transmitted over the internet or computer networks.
- **Economics reporting**: reporting that follows any news that impacts the economy of a community or country.
- **Online media:** refers to content that is presented electronically (digital media formats) on websites or servers whereby detail is able to be retrieved through web browsers.
- **Sensationalism**: the presentation of stories in a way that is intended to provoke public interest or excitement, at the expense of accuracy.

15.9 Answers to Self-Check Exercises

1. Define the term 'Citizen Journalism'.
2. What are the challenges and responsibilities of journalists?
3. Explain the role of the media in covering economic events.

15.10 Suggested Readings

- Snow, N. (2020). The role of the media in shaping economic narratives. Journal of Economic Journalism, 8(2), 123-145.
- Williams, J. R. (2018). Economics reporting in the digital age: Challenges and opportunities. Journal of Business and Economic Reporting, 6(1), 45-67.
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- Smith, L. (2019). Economics reporting in the age of fake news. Journal of Economic Analysis, 12(3), 89-101.
- Reuters. (2020). Reporting on global economic crises: Lessons from the past. Reuters Economics Review, 7(4), 321-334.

15.11 Terminal Questions

1. Explain the significance of writing about contemporary economic events.
2. What are key contemporary economic events in recent history.
3. What are contemporary economic events in a digital age.

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Chapter-16
CONTEMPORARY INDIAN ECONOMIC DATA AND POLICIES

STRUCTURE

16.0 Learning Objectives

After going through this lesson, you will be able to:

- Understand some significance subjects of the contemporary Indian economic events, and
- Analyse the Indian Economics Survey, Indian Budget and Annual Policy Reports issued by RBI.

16.1 Introduction

India, the world's second-most populous country, has been a dynamic player on the global economic stage in recent decades. Its growth trajectory, economic policies, and development challenges have drawn the attention of economists, policymakers, and investors worldwide. This chapter delves into contemporary Indian economic data and policies, aiming to provide a comprehensive understanding of the country's current economic landscape and the policies that shape it. Indian Economic Survey, Indian Budget, and various annual policy reports issued by RBI are also analysed in this chapter.

16.2 Economic Overview

1) GDP Growth

India's economic performance has been characterized by fluctuating GDP growth rates in recent years. In the early 2010s, the country experienced robust growth, often exceeding 7 per cent annually. However, this growth decelerated in the latter part of the decade. As of the most recent data available, India's GDP growth rate has been affected by various factors, including the COVID-19 pandemic and the subsequent economic recovery efforts.

2) Sectoral Composition

The structure of India's economy is multi-sectoral, with agriculture, manufacturing, and services playing significant roles. Analyzing data on sectoral contributions to GDP sheds light on the country's economic diversification. It also highlights the shifts in employment patterns, productivity, and the potential for future growth.

3) Inflation and Monetary Policy

Inflation is a critical economic indicator affecting the purchasing power of individuals and the stability of the economy. Examining the data on inflation rates and the Reserve Bank of India's monetary policy interventions provides insights into the country's inflation management strategies.

16.3 Employment and Labour Market

1) Unemployment Rate

The employment situation in India has been a subject of debate and concern. A comprehensive analysis of contemporary employment data, including the unemployment rate and underemployment trends, reveals the challenges faced by the labor market. This section also explores the impact of the COVID-19 pandemic on employment.

2) Labour Force Participation

Understanding labour force participation rates, particularly among various demographic groups, provides insights into the evolving dynamics of India's workforce. Analyzing gender disparities and regional variations in labor force participation is essential for policymaking.

16.4 Industrial and Trade Policies

1) Make in India Initiative

The “Make in India” initiative, launched to promote domestic manufacturing, has been a prominent policy in recent years. Analyzing the data on foreign direct investment (FDI), export trends, and the success of this initiative helps evaluate its effectiveness in bolstering the manufacturing sector.

2) Trade Agreements

India’s trade policies and agreements have a significant impact on its economic interactions with the rest of the world. Investigating data on trade volumes, tariff structures, and the effects of trade agreements can shed light on the country’s international economic relations.

16.5 Fiscal Policies and Government Finances

1) Fiscal Deficit

The fiscal deficit is a critical indicator of a government’s financial health. Analyzing India’s fiscal policies, government spending, and revenue collection provides insights into the country’s budgetary priorities and sustainability.

2) Tax Reforms

Recent tax reforms, such as the Goods and Services Tax (GST), have aimed to simplify India’s tax structure and enhance tax compliance. Evaluating the impact of these reforms through data analysis helps assess their effectiveness and the challenges they have posed.

16.6 Infrastructure and Development

1) Infrastructure Investment

Infrastructure development is crucial for sustained economic growth. Examining data on infrastructure investment, including transportation, energy, and digital infrastructure, offers insights into the government’s commitment to improving the country’s economic backbone.

2) Rural and Urban Divide

India grapples with disparities between rural and urban areas. Analyzing data on rural development programs, access to basic services, and the rural-urban income gap can help gauge the progress made in bridging these divides.

16.7 Healthcare and Education

1) Public Health Expenditure

The COVID-19 pandemic underscored the importance of healthcare infrastructure and public health expenditure. Evaluating data on healthcare spending and access to medical services helps assess India’s preparedness for health crises.

2) Education Quality and Access

Education is a vital determinant of human capital development. Analyzing data on literacy rates, school enrollment, and educational outcomes provides insights into the state of education in India and its implications for future economic growth.

16.8 Environmental Sustainability

1) Pollution and Emissions

Environmental sustainability is an increasingly important consideration in economic policymaking. Examining data on pollution levels, greenhouse gas emissions, and government initiatives for environmental protection helps assess India's commitment to sustainability.

2) Renewable Energy

The promotion of renewable energy sources is a key component of India's sustainable development strategy. Analyzing data on renewable energy adoption and investment in the sector provides insights into the country's progress toward clean energy goals.

16.9 Financial Inclusion and Digital Economy

1) Financial Inclusion Metrics

Financial inclusion is vital for inclusive economic growth. Analyzing data on financial access, digital payment adoption, and the impact of financial inclusion initiatives helps assess progress in this area.

2) Digital Transformation

The digital economy is rapidly growing in India. Examining data on internet penetration, e-commerce, and the adoption of digital technologies sheds light on the country's digital transformation and its potential economic benefits.

16.10 Indian Economic Survey

The Indian Economic Survey is an annual document prepared by the Department of Economic Affairs, Ministry of Finance, Government of India. It serves as a prelude to the Indian Budget and provides a comprehensive review of the country's economic performance, challenges, and opportunities. The survey's significance lies in its role as a policy blueprint and a source of vital economic data for various stakeholders.

16.10.1 Content ofIndian Economic Survey

The survey encompasses a wide range of economic aspects, including:

1) **Economic Growth and Outlook**: It evaluates India's economic growth in the previous year and presents projections for the future, considering sectors like agriculture, industry, and services.
2) **Fiscal Policy**: The survey discusses government revenue, expenditure, deficits, and debt management strategies. It outlines fiscal priorities and policies.
3) **Monetary Policy:** It provides insights into India's monetary policy, including inflation rates, interest rates, and measures adopted by the RBI to regulate the money supply.

4) **External Sector**: This section reviews India's trade balance, balance of payments, foreign exchange reserves, and their implications for the Indian economy.
5) **Social Sectors**: The survey assesses the progress made in social sectors such as education, healthcare, and poverty alleviation, shedding light on the government's initiatives.
6) **Agriculture and Rural Development:** Given the significance of agriculture in India, the survey analyzes the performance of this sector and discusses policies related to rural development.
7) **Industry and Infrastructure:** It provides an overview of industrial growth, infrastructure development, and related challenges and opportunities.
8) **Environmental Sustainability**: Recent surveys have included a chapter dedicated to environmental and sustainability concerns, reflecting global awareness of these issues.

16.10.2 Impact of Indian Economic Survey

The Indian Economic Survey plays a vital role in shaping economic policy decisions:

1) **Policy Recommendations:** The survey offers policy recommendations to address economic challenges, influencing budgetary allocations and policy priorities.
2) **Informed Decision-Making:** Policymakers use the survey's data and analysis to make informed decisions regarding fiscal, monetary, and sectoral policies.
3) **Public Discourse:** The survey's findings spark public discourse and debates on the government's economic policies, enhancing transparency and accountability.

16.11 Indian Budget

The Indian Budget is an annual financial statement presented by the Finance Minister to the Parliament of India. It outlines the government's revenue and expenditure for the fiscal year, which typically runs from April 1st to March 31st. The budget is a crucial tool for resource allocation, taxation, and policy implementation.

16.11.1 Content of Indian Budget

The Indian Budget comprises several key components:

1) **Revenue and Expenditure:** It presents the government's estimates of revenue receipts, including tax revenue and non-tax revenue. It also outlines planned expenditures, categorizing them into capital and revenue expenditures.
2) **Taxation:** The budget provides details of changes in tax rates, exemptions, and other fiscal measures. It influences the taxation landscape for businesses and individuals.
3) **Sectoral Allocations**: The budget allocates resources to various sectors, including education, healthcare, defense, infrastructure, and social welfare. It reflects the government's policy priorities.

4) **Fiscal Deficit and Borrowings:** It highlights the fiscal deficit, which is the gap between government revenue and expenditure. The budget details how the deficit will be financed, including domestic and external borrowings.

16.11.2 Impact of Indian Budget

The Indian Budget's impact is multi-faceted:

1) **Resource Allocation:** It allocates resources to sectors and programs, impacting economic development, social welfare, and infrastructure.
2) **Economic Stability:** The budget's fiscal deficit and borrowing strategies affect economic stability and investor confidence.
3) **Policy Direction:** The budget sets the policy direction for taxation, public spending, and economic reform initiatives.

16.12 Annual Policy Data of RBI

The Reserve Bank of India (RBI) publishes its annual policy statement, outlining its monetary policy decisions and macroeconomic assessments. This document is instrumental in steering India's monetary policy, influencing interest rates, inflation, and financial stability.

16.12.1 Content of Annual Policy Data of RBI

The annual policy data of RBI typically includes:

1) **Monetary Policy Review:** It outlines the RBI's decisions regarding key interest rates like the repo rate, reverse repo rate, and cash reserve ratio (CRR).
2) **Inflation Assessment**: The document provides an analysis of inflation trends, factors influencing inflation, and the RBI's inflation targets.
3) **Economic Outlook:** It offers insights into the RBI's assessment of India's economic prospects, growth expectations, and challenges.
4) **Financial Stability**: The annual policy statement discusses financial stability, risks, and regulatory measures.
5) **Banking and Credit Policies**: The RBI's stance on banking regulations, credit availability, and measures to enhance the efficiency of the financial sector is detailed.

16.12.2 Impact of Annual Policy Data of RBI

The annual policy data of RBI has a profound impact on the Indian economy:

1) **Interest Rates:** RBI's decisions on interest rates directly affect borrowing costs for individuals and businesses, influencing consumption and investment.
2) **Inflation Control:** The policy statement outlines measures to control inflation, ensuring price stability and economic predictability.
3) **Financial Markets**: Monetary policy decisions impact financial markets, including equity, bond, and currency markets.
4) **Banking Sector**: It guides the banking sector in terms of lending practices, regulatory compliance, and financial stability.

16.13 Summary

In conclusion, analyzing contemporary Indian economic data and policies reveals a complex economic landscape marked by both challenges and opportunities. To navigate these challenges and capitalize on the opportunities, policymakers must consider evidence-based recommendations across various sectors, including employment, fiscal policy, infrastructure, healthcare, education, and sustainability. India's economic trajectory will continue to influence its position on the global stage, making data-driven policymaking more critical than ever.

The Indian Economic Survey, Indian Budget, and annual policy data of RBI are the cornerstones of India's economic governance. They collectively define the country's economic priorities, policies, and resource allocation strategies. These documents serve as critical references for policymakers, economists, investors, and the general public, shaping the economic direction of the nation. Their coordination and alignment are essential in ensuring India's economic stability, growth, and development

16.14 Glossary

- **Fiscal Policy**: is defined as the policy under which the government uses the instrument of taxation, public spending and public borrowing to achieve various objectives of economic policy.
- **Monetary Policy**: *Monetary policy* refers to the steps taken by a country's central bank to control the money supply for economic stability
- **Fiscal deficit:** is the difference between the total revenue and total expenditure of a government in a financial year.
- **Make in India**: initiative is based on four pillars, which have been identified to give boost to entrepreneurship in India, not only in manufacturing but also other sectors.
- **Labour Force Participation**: The labour force participation rate *is calculated as the labour force divided by the total working-age population*.
- **Digital Economy:** is defined as *an economy that focuses on digital technologies*, i.e., it is based on digital and computing technologies.

16.15 Answers to Self-Check Exercises

1. Define Digital Economy.
2. Write a note on Indian Economic Survey
3. What is meant by Indian Budget?

16.16 Suggested Readings

- Snow, N. (2020). The role of the media in shaping economic narratives. Journal of Economic Journalism, 8(2), 123-145.
- Williams, J. R. (2018). Economics reporting in the digital age: Challenges and opportunities. Journal of Business and Economic Reporting, 6(1), 45-67.

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- Smith, L. (2019). Economics reporting in the age of fake news. Journal of Economic Analysis, 12(3), 89-101.
- Reuters. (2020). Reporting on global economic crises: Lessons from the past. Reuters Economics Review, 7(4), 321-334.

16.17 Terminal Questions

1. How does the Indian government use data from the Economic Survey and Union Budget to formulate economic policies? Provide examples of recent policy decisions influenced by these documents and their impact on the Indian economy.
2. Examine the key economic indicators outlined in the annual policy data released by the Reserve Bank of India (RBI). How do changes in interest rates, inflation, and monetary policy affect the Indian economy, and what role does the RBI play in managing these factors?
3. Examine the government's initiatives in sectors such as agriculture, manufacturing, and services to promote sectoral growth and employment generation.

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