SRM Institute of Science and Technology

Delhi – Meerut Road, Sikri Kalan, Ghaziabad, Uttar Pradesh – 201204

Department of Computer Applications

Circular – 2023-24

B.Sc. CS 3rd Sem

ADVANCED EXCEL FOR DATA ANALYTICS (UCS23503L)- Lab Manual

This manual provides a structured guide for practical exercises in Advanced Excel for Data Analytics. Each laboratory session is designed to enhance your understanding and proficiency in various Excel functionalities.

Laboratory 1: Working with formulas and functions

- **Title:** Working with Formulas and Functions
- **Aim:** To understand and apply basic arithmetic formulas and built-in functions in Microsoft Excel for fundamental data manipulation.
- **Procedure:**
    1. Open a new Excel workbook.
    2. Enter numerical data into a range of cells (e.g., `A1:B2`).
    3. In an empty cell, type a simple arithmetic formula (e.g., addition, subtraction, multiplication, division) referencing the data cells.
    4. In another empty cell, use a basic aggregate function like `SUM`, `AVERAGE`, `MAX`, or `MIN` to perform calculations on a range of cells.
    5. Press Enter to see the calculated results.
    6. Experiment with different cell references (relative, absolute) and functions.
- **Source Code (Excel Formulas/Functions):**
    1. `=A1+B1` (Addition)
    2. `=A2-B2` (Subtraction)
    3. `=A1*A2` (Multiplication)
    4. `=B1/B2` (Division)
    5. `=SUM(A1:A2)` (Sum of a range)
    6. `=AVERAGE(A1:B2)` (Average of a range)
- **Input:**

Cell	Value
A1	10
A2	20
B1	5
B2	15

- **Expected Output:**

Formula	Result
`=A1+B1`	15
`=A2-B2`	5

`=A1*A2`	200
`=B1/B2`	0.333...
`=SUM(A1:A2)`	30
`=AVERAGE(A1:B2)`	12.5

Laboratory 2: IF function, Nested IF, IF with AND/OR/NOT

- **Title:** Conditional Logic with IF, Nested IF, and Logical Operators (AND/OR/NOT)
- **Aim:** To utilize the IF function for conditional decision-making and combine it with logical operators (AND, OR, NOT) for complex criteria.
- **Procedure:**
    1. Open a new Excel workbook.
    2. Enter sample data that requires conditional evaluation (e.g., student scores, product quantities).
    3. Use a simple `IF` function to check a single condition and return different values based on the outcome.
    4. Construct a `Nested IF` statement to evaluate multiple sequential conditions.
    5. Apply `IF` in conjunction with `AND` to check if all specified conditions are true.
    6. Apply `IF` in conjunction with `OR` to check if at least one of the specified conditions is true.
    7. Apply `IF` in conjunction with `NOT` to invert a condition.
- **Source Code (Excel Formulas/Functions):**
    1. Simple IF: `=IF(A2>=60, "Pass", "Fail")`
    2. Nested IF: `=IF(B2>=90, "A", IF(B2>=80, "B", IF(B2>=70, "C", "D")))`
    3. IF with AND: `=IF(AND(C2>50, D2<100), "Eligible", "Not Eligible")`
    4. IF with OR: `=IF(OR(E2="Admin", E2="Manager"), "Access Granted", "Access Denied")`
    5. IF with NOT: `=IF(NOT(F2="Completed"), "Pending", "Done")`
- **Input:**

Name	Score (A)	Score (B)	Quantity	Status
Alice	75	85	60	Admin
Bob	55	65	120	User
Charlie	90	92	40	Manager
David	60	70	90	Completed

- **Expected Output:**

Name	Pass/Fail (A)	Grade (B)	Eligible (C & D)	Access (E)	Done (F)
Alice	Pass	B	Eligible	Access Granted	Pending
Bob	Fail	D	Not Eligible	Access Denied	Pending
Charlie	Pass	A	Eligible	Access Granted	Done
David	Pass	C	Eligible	Done	Done

Laboratory 3: LookUp Functions (V-Lookup)

- **Title:** Data Retrieval using VLOOKUP Function
- **Aim:** To effectively use the VLOOKUP function to search for and retrieve specific data from a table based on a lookup value.
- **Procedure:**
  1. Open a new Excel workbook.
  2. Create two tables: one with primary data (e.g., Product ID, Product Name) and another with related information (e.g., Product ID, Price, Stock).
  3. In a new column in the primary data table, use the `VLOOKUP` function to retrieve information (e.g., Price) from the second table using a common identifier (e.g., Product ID).
  4. Ensure the lookup range is correctly specified and the column index number matches the desired data.
  5. Experiment with exact match (`FALSE` or `0`) and approximate match (`TRUE` or `1`).
- **Source Code (Excel Formulas/Functions):**
  1. `=VLOOKUP(A2, $D$2:$F$5, 2, FALSE)` (Retrieving Product Name)
  2. `=VLOOKUP(A2, $D$2:$F$5, 3, FALSE)` (Retrieving Price)
- **Input:**

  Table 1 (Sales Data):

Order ID	Product ID	Quantity
101	P002	5
102	P001	2
103	P004	1

  Table 2 (Product Master):

Product ID	Product Name	Price	Stock
P001	Laptop	1200	50
P002	Mouse	25	200
P003	Keyboard	75	100
P004	Monitor	300	30

- **Expected Output:**

  Table 1 with VLOOKUP results:

Order ID	Product ID	Quantity	Product Name	Price
101	P002	5	Mouse	25
102	P001	2	Laptop	1200
103	P004	1	Monitor	300

Laboratory 4: Data Validation Methods of data validation

- **Title:** Implementing Data Validation for Input Control
- **Aim:** To apply various data validation rules to cells to ensure data accuracy and consistency, restricting user input to predefined criteria.
- **Procedure:**
    1. Open a new Excel workbook.
    2. Select the cell(s) where you want to apply data validation.
    3. Go to the "Data" tab on the Excel ribbon and click "Data Validation".
    4. In the Data Validation dialog box, choose different validation criteria:
        - **Whole number:** Allow only whole numbers within a specified range.
        - **Decimal:** Allow only decimal numbers within a specified range.
        - **List:** Create a dropdown list of allowed values.
        - **Date:** Allow only dates within a specific range.
        - **Time:** Allow only times within a specific range.
        - **Text length:** Restrict the length of text input.
        - **Custom:** Use a formula for more complex validation rules.
    5. Configure Input Message and Error Alert tabs to guide users and provide feedback.
    6. Test the validation by trying to enter invalid data.
- **Source Code (Excel Data Validation Settings):**
    1. **Settings Tab:**
        - Allow: `Whole number`, Data: `between`, Minimum: `1`, Maximum: `100`
        - Allow: `List`, Source: `Male,Female,Other`
        - Allow: `Date`, Data: `between`, Start date: `1/1/2023`, End date: `12/31/2023`
    2. **Input Message Tab:**
        - Title: `Enter Age`, Message: `Please enter a whole number between 1 and 100.`
    3. **Error Alert Tab:**
        - Style: `Stop`, Title: `Invalid Entry`, Message: `The age you entered is not valid. Please try again.`
- **Input:**
    1. A cell (e.g., `A1`) set up for Whole Number validation (1-100).
    2. A cell (e.g., `B1`) set up for List validation (Male, Female, Other).
    3. A cell (e.g., `C1`) set up for Date validation (1/1/2023 - 12/31/2023).
- **Expected Output:**
    1. If you type `50` in `A1`, it's accepted. If you type `101` or `abc`, an error alert appears.
    2. `B1` displays a dropdown with "Male", "Female", "Other". Only these values can be entered.
    3. If you type `1/15/2023` in `C1`, it's accepted. If you type `1/1/2022`, an error alert appears.

Laboratory 5: Protecting a worksheet by Password

- **Title:** Protecting a Worksheet with a Password
- **Aim:** To secure a worksheet by applying password protection, preventing unauthorized users from making changes to cells, formatting, or objects.
- **Procedure:**
    1. Open an Excel workbook with data you wish to protect.
    2. Select the worksheet you want to protect.
    3. Go to the "Review" tab on the Excel ribbon.
    4. Click on "Protect Sheet".
    5. In the "Protect Sheet" dialog box, select the actions you want to allow users to perform (e.g., "Select unlocked cells", "Format cells").
    6. Enter a password in the "Password to unprotect sheet" field.
    7. Confirm the password when prompted.
    8. Attempt to modify a protected cell or perform a disallowed action to verify the protection.
- **Source Code (Excel Protection Settings):**
    1. Password: `MySecretPassword` (example)
    2. Allowed actions (checkboxes selected):
        - `Select unlocked cells`
        - `Select locked cells` (optional, usually unchecked for full protection)
        - `Format cells`
        - `Format columns`
        - `Format rows`
        - `Insert columns`
        - `Insert rows`
        - `Insert hyperlinks`
        - `Delete columns`
        - `Delete rows`
        - `Sort`
        - `AutoFilter`
        - `Use PivotTable reports`
        - `Edit objects`
        - `Edit scenarios`
- **Input:**
    1. An Excel worksheet containing various data and formatting.
    2. A password chosen by the user (e.g., "secure123").
- **Expected Output:**
    1. When attempting to type into a locked cell, an alert message appears stating "The cell or chart you are trying to change is on a protected sheet."
    2. Actions like inserting rows/columns or formatting cells might be greyed out or require the password to proceed, depending on the selected permissions during protection.
    3. To make changes, the user must go to "Review" -> "Unprotect Sheet" and enter the correct password.

Laboratory 6: Sorting a database

- **Title:** Sorting Data in a Database
- **Aim:** To organize data within an Excel range or table in a meaningful order (ascending or descending) based on one or more columns.
- **Procedure:**
    1. Open an Excel workbook containing a dataset (e.g., a list of employees with names, departments, salaries).
    2. Select any cell within the data range you wish to sort.
    3. Go to the "Data" tab on the Excel ribbon.
    4. Click on "Sort & Filter" -> "Sort" (for custom sorting) or "Sort A to Z" / "Sort Z to A" (for quick single-column sort).
    5. In the Sort dialog box:
        - Ensure "My data has headers" is checked if your data has a header row.
        - Choose the primary column to sort by (e.g., "Department").
        - Select the sort order (e.g., "A to Z" or "Z to A").
        - Add additional levels if you need to sort by multiple columns (e.g., then by "Salary" from Largest to Smallest).
    6. Click "OK" to apply the sort.
- **Source Code (Excel Sort Settings):**
    1. Sort by: `Department`, Sort On: `Cell Values`, Order: `A to Z`
    2. Add Level: Then by: `Salary`, Sort On: `Cell Values`, Order: `Largest to Smallest`
- **Input:**

Employee ID	Name	Department	Salary
103	Charlie	Sales	60000
101	Alice	HR	50000
104	David	IT	75000
102	Bob	Sales	55000
105	Eve	HR	62000

- **Expected Output:**

Sorted by Department (A to Z), then by Salary (Largest to Smallest):

Employee ID	Name	Department	Salary
105	Eve	HR	62000
101	Alice	HR	50000
104	David	IT	75000
103	Charlie	Sales	60000
102	Bob	Sales	55000

Laboratory 7: Filtering a database (AutoFilter)

- **Title:** Filtering Data using AutoFilter
- **Aim:** To quickly display specific rows in a dataset that meet certain criteria, temporarily hiding rows that do not.
- **Procedure:**
    1. Open an Excel workbook containing a dataset (e.g., a list of products with categories, prices, and stock levels).
    2. Select any cell within the data range you wish to filter.
    3. Go to the "Data" tab on the Excel ribbon.
    4. Click on "Sort & Filter" -> "Filter" (or press `Ctrl+Shift+L`). This will add dropdown arrows to your header row.
    5. Click the dropdown arrow next to the column you want to filter (e.g., "Category").
    6. Uncheck "Select All" and then select the specific criteria you want to display (e.g., "Electronics").
    7. Click "OK".
    8. To clear the filter, click the filter icon on the header again and choose "Clear Filter from [Column Name]" or click the main "Filter" button on the Data tab to remove all filters.
- **Source Code (Excel Filter Settings):**
    1. Filter on `Category` column.
    2. Select `Electronics` from the dropdown list.
- **Input:**

Product ID	Product Name	Category	Price	Stock
P001	Laptop	Electronics	1200	50
P002	Mouse	Electronics	25	200
P003	Shirt	Apparel	30	150
P004	Monitor	Electronics	300	30
P005	Jeans	Apparel	50	80

- **Expected Output:**

  Filtered by Category = "Electronics":

Product ID	Product Name	Category	Price	Stock
P001	Laptop	Electronics	1200	50
P002	Mouse	Electronics	25	200
P004	Monitor	Electronics	300	30

Laboratory 8: Subtotals: Display Subtotal at a single level

- **Title:** Calculating Subtotals at a Single Level
- **Aim:** To summarize data by grouping it based on a specific column and then calculating aggregate functions (like Sum, Average, Count) for each group.
- **Procedure:**
    1. Open an Excel workbook with a dataset that needs aggregation (e.g., sales data with Region, Product, Sales Amount).
    2. **Crucially, sort your data by the column you want to group by first** (e.g., sort by "Region").
    3. Select any cell within your data range.
    4. Go to the "Data" tab on the Excel ribbon.
    5. Click on "Outline" -> "Subtotal".
    6. In the Subtotal dialog box:
        - "At each change in": Select the column you sorted by (e.g., "Region").
        - "Use function": Choose the aggregate function (e.g., "Sum").
        - "Add subtotal to": Select the column(s) you want to subtotal (e.g., "Sales Amount").
        - Ensure "Replace current subtotals" and "Summary below data" are checked.
    7. Click "OK".
    8. Observe the subtotals and the outline buttons on the left.
- **Source Code (Excel Subtotal Settings):**
    1. At each change in: `Region`
    2. Use function: `Sum`
    3. Add subtotal to: `Sales Amount`
- **Input:**

  Sales Data (Sorted by Region):

Order ID	Region	Product	Sales Amount
101	East	A	150
105	East	C	200
102	North	B	100
106	North	A	120
103	West	C	250
104	West	B	180

- **Expected Output:**

  Sales Data with Subtotals by Region:

  | Order ID | Region | Product |