Excel for Data Analysis (Day-2)

- Basic Excel Functions
- IFS functions
- Math and Trigonometric functions

Functions In Excel:

▶ Excel has many premade formulas, called functions.

▶ Functions are typed by = and the functions name.

For example :

=SUM

▶ Once you have typed the function name you need to apply it to a range.

For example :

=SUM(A1:A5)

▶ The range is always inside of parentheses

Basic & Statistical Excel Functions:

▶ Basic functions in excel are :

=MIN()   =LARGE()

=MAX()   =SMALL()

=AVERAGE()   =RANK()

=AVERAGEIF()   =MEDIAN()

=SUM()   =MODE()

=SUMIF()   =MODE.MULT()

=COUNT()

=COUNTIF()

=COUNTA()

=COUNTBLANK()

1. =MIN(range)

Returns the smallest number in a range.

Use Case: Identify the lowest sale, score, or value.

📌 *Example:*

=MIN(B2:B10) → If B2:B10 = {45, 60, 78}, result = 45

2. =MAX(range)

Returns the largest number in a range.

Use Case: Identify highest sale, top-performing employee, etc.

📌 *Example:*

=MAX(B2:B10) → {45, 60, 78} → 78

3. =AVERAGE(range)

Calculates the mean of selected values.

Use Case: Track average sales, performance, growth, etc.

📌 Example:

=AVERAGE(B2:B10) → {50, 60, 70} → 60

4. =AVERAGEIF(range, criteria)

Average of values that meet a specific condition.

Use Case: Average sales above ₹1000, scores > 60.

📌 *Example:*

=AVERAGEIF(B2:B10, ">60") → {75, 80} → **77.5**

5. =SUM(range)

Adds all values in the range.

Use Case: Total sales, total orders, etc.

📌 *Example:*

=SUM(B2:B10) → {10, 20, 30} → 60

6. =SUMIF(range, criteria)

Sums values that match a condition.

Use Case: Total revenue for orders > ₹500.

📌 *Example:*

=SUMIF(B2:B10, "<60") → {50,45} → 95

7. =COUNT(range)

Counts only numbers in the range.

Use Case: How many numeric entries are there?

📌 *Example:*

=COUNT(B2:B10) → {60, "", 80, "text"} → 2

8. =COUNTIF(range, criteria)

Counts values that match a condition.

Use Case: Count how many times a score > 70 occurs.

📌 *Example:*

=COUNTIF(B2:B10, ">60") → {61, 78} → 2

9. =COUNTA(range)

Counts non-empty cells, including text, numbers and whitespaces .

Use Case: Total filled rows in a dataset.

📌 *Example:*

=COUNTA(A2:A10) → {"John", "", 45," "} → 3

10. =COUNTBLANK(range)

Counts empty cells in a range.

Use Case: Missing data tracking.

📌 *Example:*

=COUNTBLANK(C2:C10) → {"", 45, "", "Yes"} → 2

11. =LARGE(range, k)

Returns the k-th largest value.

Use Case: Find 2nd or 3rd top scores/sales.

📌 *Example:*

=LARGE(B2:B10, 2) → 2nd largest value

12. =SMALL(range, k)

Returns the k-th smallest value.

Use Case: Find 2nd lowest delay time or cost.

📌 *Example:*

=SMALL(B2:B10, 1) → Smallest value

13. =RANK(number, range, [order])

Ranks a number in a range.

Use Case: Score ranking, sales leaderboard.

📌 *Example:*

=RANK(75, B2:B10) → Ranks 75 among other values

14. =MEDIAN(range)

Middle value in a sorted list.

Use Case: Find central tendency, avoid outlier effect.

📌 *Example:*

=MEDIAN(B2:B10) → {10, 20, 30, 50, 60} → 30

15. =MODE(range)

Most frequent value in a range.

Use Case: Identify repeated issues, common values.

📌 *Example:*

=MODE(B2:B10) → {10, 10, 20, 30} → 10

16. =MODE.MULT(range)

Returns all modes (if more than one value is frequent).

Use Case: Identify multiple most occurring values.

📌 *Example:*

=MODE.MULT({10, 10, 20, 20, 30}) → 10, 20

How These Help in Data Analysis

Feature	Purpose
• MIN, MAX	- Identify range of values (e.g., lowest/highest sale)
• AVERAGE, MEDIAN	- Central value for trend tracking
• COUNT, COUNTA, COUNTBLANK	- Data completeness and size tracking
• SUM, SUMIF	- Financial totals, filtered summaries
• RANK, LARGE, SMALL	- Performance comparison and ranking
• MODE, MODE.MULT	- Repeated patterns detection
• AVERAGEIF, COUNTIF	- Conditional analysis (e.g., how many > threshold)

IFS Functions:

▶ These allow you to apply **multiple conditions** (criteria) instead of just one. They're very useful in **data analysis**, especially when filtering datasets using **more than one logical condition** (like by region *and* sales amount).

▶ They are:

1. Averageifs

2. countifs

3. maxifs

4. minifs

5. sumifs

1. =AVERAGEIFS(average_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)

Returns the average of values that meet multiple conditions.

📌 Example:

=AVERAGEIFS(C2:C10, A2:A10, "East", B2:B10, ">500")

Use Case: Average sales in the East region where quantity > 500

2. =COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2], ...)

Counts how many times multiple conditions are met.

📌 Example:

=COUNTIFS(A2:A10, "North", B2:B10, ">1000")

Use Case: Count how many North region sales were above ₹1000

3. =MAXIFS(max_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)

Returns the maximum value where multiple criteria are met.

📌 Example:

=MAXIFS(C2:C10, A2:A10, "South", B2:B10, "<1000")

Use Case: Maximum order value in South where quantity < 1000.

4. MINIFS(min_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)

Returns the smallest value matching multiple conditions.

📌 Example:

=MINIFS(C2:C10, A2:A10, "West", B2:B10, ">500")

Use Case: Minimum profit in West for orders > 500.

5. SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)
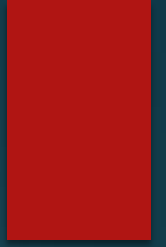
Sums values that match multiple conditions.

📌 Example:

=SUMIFS(C2:C10, A2:A10, "East", B2:B10, ">600")

Use Case: Total sales in East region with quantity above 600.

Why These Are Powerful in Data Analysis:

Function	Use Case
MAXIFS, MINIFS	Find extreme values with specific filters
SUMIFS	Total revenue based on multiple filters
COUNTIFS	Count how many records match region + category
AVERAGEIFS	Average profit for specific regions & product types

Math and Trigonometric functions

1. =INT()

2. =ROUND()

3. =ROUNDUP()

4. =ROUNDDOWN()

5. =POWER()

6. =ROMAN()

7. =ARABIC()

8. =REPT()

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1. INT()

Removes the decimal part of a number and returns the largest integer less than or equal to it.

📌 Syntax: =INT(number)

Example:

   =INT(12.9) → 12

   =INT(-4.7) → -5

Use Case: Clean decimal values for IDs, age, unit counts.

2. ROUND()

Rounds a number to the specified number of digits.

📌 Syntax: =ROUND(number, num_digits)

Example:

   =ROUND(12.456, 2) → 12.46

   =ROUND(89.99, 0) → 90

Use Case: Format numbers for reporting with precise decimal control

3. ROUNDDOWN()

Always rounds down (toward 0), ignoring the decimal part.

📌 Syntax: =ROUNDDOWN(number, num_digits)

Example:

        =ROUNDDOWN(5.9, 0) → 5

        =ROUNDDOWN(-5.9, 0) → -5

Use Case: Inventory or floor pricing scenarios

4. ROUNDUP()

Always rounds up (away from 0), regardless of the decimal value.

📌 Syntax: =ROUNDUP(number, num_digits)

Example:

        =ROUNDUP(5.1, 0) → 6

        =ROUNDUP(-5.1, 0) → -6

Use Case: Budgeting, billing, pricing (e.g., round ₹45.10 to ₹46).

5. POWER()

Raises a number to the power of another.

📌 Syntax: =POWER(number, power)

Example:

=POWER(2, 3) → 8

$(2^3 = 2×2×2)$

Use Case: Compound interest, exponential growth, physics formulas

6. REPT()

Repeats a character or string a specific number of times.

📌 Syntax: =REPT(text, number_times)

Example:

=REPT("*", 5) → *****

=REPT("-", 3) → ---

Use Case: Create in-cell bar charts, rating stars, visual formatting

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7. ARABIC()

Converts Roman numerals to Arabic numbers (normal numbers).

📌 Syntax: =ARABIC(text)

 Example:

=ARABIC("X") → 10

=ARABIC("MMXXV") → 2025

Use Case: Reverse conversion for analysis or validation

8.ROMAN()

Converts a number to Roman numerals.

📌 Syntax: =ROMAN(number)

 Example:

=ROMAN(2025) → MMXXV

=ROMAN(9) → IX

Use Case: Styling reports, chapters (e.g., Part I, II, III).

Why These Matter in Data Analysis

Function	Use Case
INT, ROUND, ROUNDUP, ROUNDDOWN	Clean numerical outputs
POWER	Exponential growth or financial modeling
ROMAN, ARABIC	Formatting or conversion in reports
REPT	Text-based visuals, formatting, indicators