

Data Analytics

4 – Months Duration

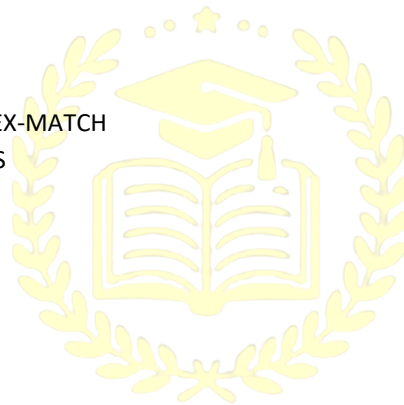
Foundations of Data & Analytics

- What is Data Analytics?
- Types of Analytics
- Descriptive
- Diagnostic
- Predictive
- Prescriptive
- Data lifecycle
- Structured vs Unstructured data
- Data-driven decision making
- KPIs & Metrics
- Business domains overview (Finance, Marketing, Operations, Product)



*****Excel for Data Analysis*****

- Excel Interface & Shortcuts
- Data Cleaning in Excel
- Functions:
- IF, VLOOKUP/XLOOKUP, INDEX-MATCH
- COUNT, SUMIFS, AVERAGEIFS
- TEXT functions
- Logical functions
- Pivot Tables & Pivot Charts
- Conditional Formatting
- Data Validation
- What-If Analysis
- Power Query Basics
- Dashboards in Excel



*****Advance Excel*****

MODULE 1: Excel Advanced Formulas & Functions

Lookup Functions (Most Important for Job)

Ye functions company mein daily use hote hain:

- VLOOKUP – Data search karne ke liye
- HLOOKUP – Horizontal data search
- XLOOKUP – Latest and most powerful lookup
- INDEX Function
- MATCH Function
- INDEX + MATCH Combination (Industry standard)

Practical Use:

Employee ID se employee name fetch karna
Product code se price fetch karna

Logical Functions

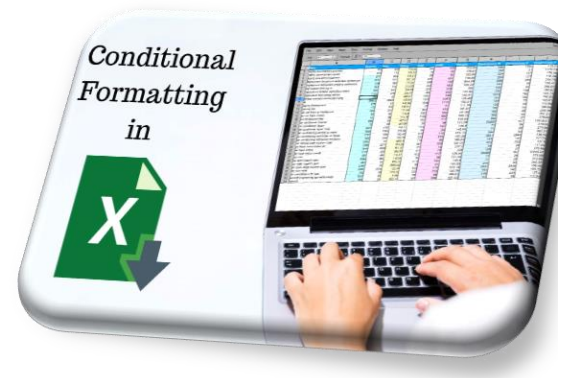
- IF Function
- Nested IF
- AND Function
- OR Function
- IFERROR Function

Practical Use:

Result calculate karna (Pass / Fail)
Salary calculate karna
Error hide karna

Text Functions

- LEFT
- RIGHT
- MID
- LEN
- TRIM
- UPPER
- LOWER
- PROPER
- CONCAT / CONCATENATE



Practical Use:

Full name ko separate karna
Extra space remove karna

Mathematical & Statistical Functions

- SUMIFS
- COUNTIFS
- AVERAGEIFS
- ROUND
- SUBTOTAL

Practical Use:

Department wise salary calculate karna
Attendance count karna

MODULE 2: Pivot Table & Pivot Chart (MIS Reporting)

Pivot Table industry mein report banane ka sabse powerful tool hai.

Topics Covered:

- Pivot Table create karna
- Pivot Table formatting
- Data summarization
- Grouping data
- Multiple reports create karna
- Pivot Chart create karna
- Slicer use karna

Practical Work:

Sales Report

Employee Report

Monthly Report

MODULE 3: Data Validation & Data Control

Ye feature company mein data entry control karne ke liye use hota hai

Topics:

- Drop down list create karna
- Data restriction lagana
- Custom validation
- Error alert set karna

Practical Work:

Department dropdown

Attendance dropdown

MODULE 4: Conditional Formatting

Ye feature important data ko highlight karta hai

Topics:

- Duplicate value highlight
- Top 10 highlight
- Color scale
- Custom formatting

Practical Work:

Low performance highlight

High sales highlight



MODULE 5: Charts & Dashboard

Excel dashboard company mein management ko report dikhane ke liye use hota hai

Topics Covered:

- Column Chart
- Bar Chart
- Pie Chart
- Line Chart
- Dynamic Chart
- Dashboard create karna

Practical Work:

Sales Dashboard

Employee Dashboard

MODULE 6: Data Tools (Industry Level Data Handling)

Topics:

- Sort (Single & Multiple)
- Filter (Advanced Filter)
- Remove Duplicate
- Text to Columns
- Flash Fill



Practical Work:

Data cleaning

Duplicate remove

MODULE 7: Excel Tables

Topics Covered:

- Table create karna
- Table formatting
- Structured references

MODULE 8: What-If Analysis

Ye feature future prediction aur calculation ke liye use hota hai

Topics:

- Goal Seek
- Scenario Manager

MODULE 9: Macro (Excel Automation)

Macro Excel ka automation tool hai jo time save karta hai

Topics:

- Macro introduction
- Macro record karna
- Macro run karna

Practical Work:

Report automation

MODULE 10: MIS Reporting (Most Important Module)

MIS ka matlab hota hai Management Information System

Ye job ke liye sabse important skill hai

Practical MIS Reports:

- Salary Sheet
- Attendance Sheet
- Employee Database
- Sales Report
- Stock Report
- Invoice



MODULE 11: Real Company Projects

Students ko real project banwaye jayenge:

- Employee Management System
- Salary Management System
- Sales Dashboard
- Student Record System

*****Statistics for Data Analysts*****

- Types of Data
- Mean, Median, Mode
- Variance & Standard Deviation
- Probability Basics
- Probability Distributions:
- Normal Distribution

- Binomial Distribution
- Sampling Techniques
- Hypothesis Testing
- Confidence Intervals
- Correlation vs Causation
- A/B Testing
- Regression Basics

*****SQL (Structured Query Language)*****

◆ 1. Introduction to SQL- What is SQL?

- Difference between SQL, MySQL, PostgreSQL, etc.
- SQL vs NoSQL
- DBMS vs RDBMS
- Basic terminology: table, row, column, record, field, schema

◆ 2. Getting Started- Installing MySQL / PostgreSQL / SQLite

- Using SQL editors (DBeaver, MySQL Workbench, pgAdmin, etc.)
- Creating databases and tables
- Data types (INT, VARCHAR, DATE, etc.)

◆ 3. Basic SQL Commands- CREATE DATABASE, DROP DATABASE

- CREATE TABLE, ALTER TABLE, DROP TABLE
- INSERT INTO, SELECT, UPDATE, DELETE
- TRUNCATE vs DELETE

◆ 4. Querying Data- SELECT, FROM, WHERE

- - AS (aliasing)
- - DISTINCT
- - ORDER BY, LIMIT, OFFSET
- - Operators: AND, OR, NOT, IN, BETWEEN, LIKE, IS NULL

◆ 5. Functions- Aggregate functions: COUNT(), SUM(), AVG(), MIN(), MAX()

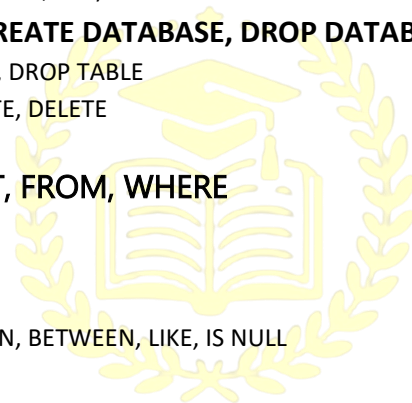
- - Scalar functions: UPPER(), LOWER(), LENGTH(), CONCAT(), SUBSTR()
- - Date functions: NOW(), CURDATE(), DATE_FORMAT(), DATEDIFF()
- - Math functions: ROUND(), FLOOR(), CEIL(), MOD()

◆ 6. Grouping and Filtering- GROUP BY

- - HAVING vs WHERE
- - ROLLUP, CUBE (advanced grouping)

◆ 7. Joins- INNER JOIN

- - LEFT JOIN (or LEFT OUTER JOIN)
- - RIGHT JOIN
- - FULL OUTER JOIN (in PostgreSQL, not MySQL)
- - CROSS JOIN
- - Self-join
- - Using aliases in joins



- ◆ **8. Subqueries- Subquery in SELECT, FROM, WHERE**
 - - Correlated subqueries
 - - EXISTS, NOT EXISTS
 - - ANY, ALL

- ◆ **9. Set Operations- UNION vs UNION ALL**
 - - INTERSECT (PostgreSQL, SQL Server)
 - - EXCEPT or MINUS (PostgreSQL, Oracle)

- ◆ **10. Constraints & Keys- PRIMARY KEY, FOREIGN KEY**
 - - UNIQUE, NOT NULL, DEFAULT, CHECK
 - - ON DELETE CASCADE, ON UPDATE SET NULL

- ◆ **11. Indexes- What is an index?**
 - - CREATE INDEX, DROP INDEX
 - - Clustered vs Non-clustered index
 - - When to use / avoid indexes

- ◆ **12. Views- CREATE VIEW, DROP VIEW**
 - - Updatable views
 - - Advantages and limitations

- ◆ **13. Stored Procedures & Functions- DELIMITER, CREATE PROCEDURE, CALL**
 - - Parameters (IN, OUT, INOUT)
 - - CREATE FUNCTION
 - - Control flow: IF, CASE, WHILE, LOOP

- ◆ **14. Triggers- BEFORE INSERT, AFTER UPDATE, etc.**
 - - Use cases: audit logs, validation
 - - CREATE TRIGGER, DROP TRIGGER

- ◆ **15. Transactions & ACID Properties- START TRANSACTION, COMMIT, ROLLBACK**
 - - SAVEPOINT, RELEASE SAVEPOINT
 - - ACID: Atomicity, Consistency, Isolation, Durability

- ◆ **16. Normalization- 1NF, 2NF, 3NF, BCNF**
 - - Purpose of normalization
 - - Denormalization (when and why)

- ◆ **17. Window Functions (Advanced)- ROW_NUMBER(), RANK(), DENSE_RANK()**
 - - NTILE(), LAG(), LEAD()
 - - OVER(PARTITION BY ... ORDER BY ...)



- ◆ **18. Common Table Expressions (CTE)- WITH clause**
 - - Recursive CTEs (e.g., for hierarchy or tree data)
- ◆ **19. Performance Tuning- EXPLAIN and execution plans**
 - - Index optimization
 - - Avoiding SELECT *
 - - Query refactoring tips
- ◆ **20. Real-World Projects- Student database system**
 - - Inventory management
 - - Library management
 - - Blog or e-commerce backend
 - - Employee payroll system

*****Python for Data Analysis*****

- ◆ **1. Basics- Introduction to Python**
 - Installing Python & IDEs (VSCode, PyCharm)
 - Syntax, Indentation, Comments
 - Variables & Data Types
 - Type Casting
 - Input/Output (input(), print())
 - Operators (Arithmetic, Logical, Comparison, etc.)
- ◆ **2. Control Flow- if, elif, else**
 - Nested conditions
 - for and while loops
 - break, continue, pass
 - Match-case (Python 3.10+)
- ◆ **3. Data Structures- Strings (slicing, methods)**
 - Lists (indexing, methods, list comprehension)
 - Tuples (immutable sequences)
 - Sets (unique collections)
 - Dictionaries (key-value pairs)
 - Nested structures
- ◆ **4. Functions- Defining and calling functions**
 - Parameters and return values
 - Default, keyword, and variable-length arguments (*args, **kwargs)
 - Lambda functions
 - Scope and lifetime (local, global)
 - Recursion
- ◆ **5. Modules & Packages- Importing modules (math, random, datetime, etc.)**



- Creating your own modules
 - `__name__ == "__main__"`
 - Package structure and `__init__.py`
- ◆ **6. File Handling- Reading and writing text files**
 - Working with CSV and JSON files
 - File modes and context managers (with `open(...)`)
 - ◆ **7. Error Handling- try, except, finally**
 - Raising exceptions
 - Custom exception classes
 - ◆ **8. Object-Oriented Programming (OOP)- Classes and Objects**
 - `__init__` constructor
 - Instance vs Class variables
 - Inheritance, Polymorphism, Encapsulation, Abstraction
 - Dunder methods (`__str__`, `__repr__`, etc.)
 - ◆ **9. Advanced Topics- List, Set, Dict Comprehensions**
 - Generators and yield
 - Decorators
 - Context Managers (with statement)
 - Iterators and `__iter__`, `__next__`
 - Type Hinting and typing module
 - ◆ **10. Standard Libraries & Tools- collections, itertools, functools**
 - `datetime`, `time`, `calendar`
 - `os`, `sys`, `shutil`, `pathlib`
 - `re` (Regular Expressions)
 - `json`, `csv`, `xml`
 - `logging`, `argparse`, `configparser`
 - ◆ **11. Working with Data- NumPy (arrays, operations)**
 - Pandas (DataFrames, analysis)
 - Matplotlib / Seaborn (data visualization)
 - Reading/writing Excel, CSV, SQL
 - ◆ **12. Web Development (Optional)- Flask or Django basics**
 - Routing, templates, forms
 - REST APIs with Flask-RESTful or Django REST Framework
 - ◆ **13. Database Interaction- SQLite and MySQL with `sqlite3`, `mysql-connector`, or SQLAlchemy**
 - CRUD operations
 - ORM basics



- ◆ 14. Testing & Debugging- unittest, pytest
 - Debugging with pdb and IDE tools
 - Writing test cases
- ◆ 15. Automation & Scripting- Web scraping (BeautifulSoup, Scrapy)
 - Automating tasks with selenium, pyautogui
 - Working with APIs (requests module)
- ◆ 16. Concurrency- Threading vs Multiprocessing
 - asyncio and await
 - Coroutines and event loops
- ◆ 17. Packaging & Deployment- pip and requirements.txt
 - Virtual environments (venv, pipenv, conda)
 - Building packages
 - Deploying to servers or cloud (Heroku, AWS, etc.)
- ◆ 18. Projects & Practice- To-do app, calculator, weather app
 - Web scraper, automation bot
 - Blog or portfolio site (Flask/Django)
 - Data analysis project (Pandas + Matplotlib)

*****Data Visualization & BI Tools Power BI *****

- Data Loading
- Data Transformation (Power Query)
- Data Modeling
- DAX Basics
- Measures & Calculated Columns
- Dashboards & Reports
- Publishing Reports

*****Tableau *****

- Data Connection
- Charts & Graphs
- Filters
- Calculated Fields
- Dashboards
- Storytelling with Data

*****Data Cleaning & Preparation*****

- Handling Missing Values
- Outlier Detection

- Data Transformation
- Feature Engineering Basics
- Data Normalization
- Data Validation

