NAV BHARAT
COMPUTER EDUCATION
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Data Analytics

Core and Advance Python

- Introduction to Python
  - Why Python
  - Application areas of python
  - Python implementations
    - i) Cpython
    - ii) Jython
    - iii) Ironpython
    - iv) Pypy
  - Python versions
  - Installing python
  - Python interpreter architecture
    - i) Python byte code compiler
    - ii) Python virtual machine(pvm)
- Writing and Executing First Python Program
  - Using interactive mode
  - Using script mode
    - i) General text editor and command window
    - ii) IDLE editor and IDLE shell
  - Understanding print() function
  - How to compile python program explicitly
- Python Language Fundamentals
  - Character set
  - Keywords
  - Comments
  - Variables
  - Literals
  - Operators
  - Reading input from console
  - Parsing string to int, float
- Python Conditional Statements
  - If statement
  - If else statement
  - If elif statement
  - If elif else statement

- Nested if statement
- Looping Statements
  - While loop
  - For loop
  - Nested loops
  - Pass, break and continue keywords
  - Parallel Traversaling using zip()
- Standard Data Types
  - Int, float, complex, bool, nonetype
  - Str, list, tuple, range
  - Dict, set, frozenset
- String Handling
  - What is string
  - String representations
  - Unicode string
  - String methods
    i) count(), find(), rfind(), capitalize(), title(), lower(), upper(), swapcase(), islower(), isupper(), istitle(), replace(), strip(), lstrip(), rstrip(), split(), partition(), join(), isspace(), isalpha(), isdigit(), isalnum(), startswith(), endswith() etc.
  - Slicing
  - String indexing and slicing
  - String formatting
- Python List
  - Creating and accessing lists
  - Indexing and slicing lists
  - List methods
  - Nested lists
  - List comprehension
- Python Tuple
  - Creating tuple
  - Accessing tuple
  - Immutability of tuple
- Python Set
  - How to create a set
  - Iteration over sets
  - Python set methods
  - Python frozenset
- Python Dictionary
  - Creating a dictionary
  - Dictionary methods
  - Accessing values from dictionary
  - Updating dictionary
  - Iterating dictionary
  - Dictionary comprehension
- Python Functions
  - Defining a function

- Calling a function
- Types of functions
- What is Namespace?
- LEGB Rule
- global, nonlocal statements
- Function arguments
  i) Positional argument
  ii) Keyword argument
  iii) Default argument
  iv) Non-default argument
  v) Arbitrary arguments
  vi) keyword arbitrary arguments
- Function return statement
- Nested function
- Function as argument
- Function as return statement
- Decorator function
- Closure
- Map(), filter(), reduce(), any() functions
- Anonymous or lambda function
- Command Line Argument

- **Modules & Packages**
  - Why modules
  - Script v/s module
  - Importing module
  - Standard v/s third party modules
  - Why packages
  - Understanding pip utility
- **File I/O**
  - Introduction to file handling
  - File modes
  - Functions and methods related to file handling
  - Understanding with block
  - Pickle module
  - JSON module
  - Using OS module

- **Regular Expressions(Regex)**
  - Need of regular expressions
  - Re module
  - Functions/methods related to regex
  - Meta characters & special sequences
- **Object Oriented Programming**
  - Procedural v/s Object Oriented Programming

- OOP Principles
- Inheritance
- Defining a Class & Object Creation
- Encapsulation
- Polymorphism
- Abstraction
- Garbage Collection
- Iterator & Generator

- Exception Handling
  - Difference Between Syntax Errors and Exceptions
  - Keywords used in Exception Handling
    i) try, except, else, finally, raise, assert
  - Types of Except Blocks
  - User-defined Exceptions
- GUI Programming
  - Introduction to Tkinter Programming
  - Tkinter Widgets
  - Layout Managers
  - Event handling
  - Displaying image
- Multi-Threading Programming
  - Multi-processing v/s Multi-threading
  - Need of threads
  - Creating child threads
  - Functions /methods related to threads
  - Thread synchronization and locking
- SQL Using MySQL
  - Introduction to RDBMS
  - What is Relational Database Package
  - Difference between SQL & Database
  - Installing MySQL Server database
- SQL Basic
  - DDL: Create, Alter, Drop, etc.
  - DML: Insert, Update, Delete, etc.
  - DQL : Select
  - Auto_increment field
  - SQL Comments
  - SQL Aliases
  - Savepoint & rollback
- SQL Constraints
  - Not NULL, Unique key
  - Primary key, Check
  - Default, Foreign key
  - SQL Operators
  - Arithmetic operators
  - Logical operators

- Conditional operators
- Like, between, in operators

- SQL Clauses
  - Order by
  - Where
  - Limit/top
  - Group by
  - having
- SQL Joins
  - Inner Join
  - Left Join
  - Right Join
  - Full Join
- SQL View
  - creating view
  - updating view
  - fetching data from view
- SQL Functions
  - String functions
  - Aggregate functions
  - Date & time functions
- Stored Procedures & Functions
  - Understanding stored procedures and their key benefits
  - Working with stored procedures
  - Studying user-defined functions
- Working with CSV Files
  - How to write result to csv file
  - How to read csv file
- Python Database Connectivity
  - Database Drivers and connectors
  - Creating connection object
  - Understanding cursor obje ct
  - Executing SQL statements using curso r
  - Fetching records fromcurs or
  - Storing and retrieving Date and Time
- MONGODB
  - Introduction To MongoDB
  - Understanding NoSQL DB
  - NoSQL vs. SQL DB
  - Understanding Mongo DB
  - Downloading & Installation
  - Downloading & Installation
  - Introduction of MongoDB shell and Compass
  - Understanding database, collection & document
- Crud Operations
  - Insert Document

- Delete Document
- Update Document
- Query Document

- Operators In MongoDB
  - Query and Projection operators
  - Update operator
  - Aggregation Pipeline operators
- Methods In MongoDB
  - limit and sort
  - bulk methods
  - other methods
- Indexing And Relationships
  - Types of Indexes
  - Creating Dropping an Indexes
  - Defining Relationships between Documents
- Python Connectivity With MongoDB
  - Introduction to pymongo
  - Installing pymongo module
  - MongoClient
  - Getting database and collection
  - CRUD operations
  - Range Queries

STATISTICS & ANALYTICS

- NUMPY PACKAGE
  - Difference Between List and Numpy Array
  - Vector and Matrix Operations
  - Array Indexing and Slicing
- PANDAS PACKAGE
  - Introduction to Pandas
  - Labeled and Structured Data
  - Series and DataFrame Objects
- HOW TO LOAD DATASETS
  - From Excel
  - From CSV
  - From HTML Table
- Accessing Data from Data Frame
  - At & Iat, Loc & Iloc, Head () & Tail()
- EXPLORATORY DATA ANALYSIS
  - Describe()
  - Groupby()
  - Crosstab()
  - Boolean Slicing / Query()
- DATA MANIPULATIION & CLEANING
  - Map(), Apply()

- Combinig Data Frames
- Adding/Removing Rows & Columns
- Sorting Data Handling Missing Values
- Handling Duplicacy
- Handling Data Error

POWER BI

- INTRODUCTION TO POWER BI
  - Introduction to Power BI
  - Why Power BI?
  - Power BI Components
  - Installation of Power BI Desktop
  - Understanding Report, Data, Model & Dax Query Views
  - Page Layout and Formatting
  - Column Chart, Pie Chart, Donut Chart
  - Scattered Chart, Funnel Chart, KPI, Line Chart
  - Table & Matrix
  - Geographical Data Visualization Using Maps
  - Use of Hierarchies in Drill Down Analysis
  - Drill Through
  - Page Navigation
  - Bookmarks
  - Selection Pane to Show/Hide Visuals
  - Combination Charts (Dual Axis Charts)
  - Filter Pane
  - Slicers
  - Sync Slicers
  - Tooltips & Custom Tooltips
  - Conditional Formating on Visuals
- DAX AND DATA MODELING
  - Introduction of DAX
  - Why DAX is Used?
  - DAX Functions
  - Calculated Columns Using DAX
  - Measures Using DAX
  - Calculated Table Using DAX
  - Learning about Table, Information, Logical, Text, Iterator
  - Date and Time Functions
  - Introduction of Relationships
  - Creating Relationships
  - Cardinality
  - Cross Filter Direction
  - Use of Inactive Relationships

- DATA TRANSFORMATION (ETL)
  - Shaping Data Using Power Query Editor
  - Formatting Data
  - Transformation of Data
  - Understanding of Data Types
  - Naming Conventions & Best Practices to Consider
  - Working with Parameters
  - Merge Query
  - Append Query
  - Group By of Data
  - Duplicate & Reference Tables
  - Fill
  - Pivot & Un-Pivot of Data
  - Custom Columns
  - Conditional Columns
  - Replace Data From the Tables
  - Spilit Columns Values
  - Move Columns & Sorting of Data
  - Detect Data Type, Count Rows & Reverse Rows
  - Promote Rows as Column Headers
- POWER BI SERVICE, PUBLISHING & SHARING
  - Introduction to Power BI Service
  - Using 3rd Party Visuals
  - Introduction of Workspaces
  - Dash Board
  - Creating & Configuring Dashboards
  - Dashboard Theme
  - Reports v/s Dashboard
  - Sharing Reports & Dashboards
  - Auto Refresh
  - On-Premises Data Gateway Integration

TABLEAU

- Comparing Tableau with Power BI
- Dimension & Measure
- Tableau Charts
- Tableau Filters
- Tableau Dashboards
- Tableau Story
- Calculated Fields
- Publishing Report to Server

ADVANCE EXCEL

- Overview of the Basics of Excel
  - Customizing common options in Excel
  - Excel formatting
  - Cell Alignment and Orientation
  - Number and Custom Number Formatting
  - Absolute and relative cells
  - Protecting and un-protecting worksheets and cells
  - Uses of format as table and benefits
- Use Fill Series
  - Auto Fill
  - Justify
  - Flash Fill
- Page Setup
  - Margin, Orientation
  - Page Size
  - Print Area, Print Title
  - Page Breaks
- Working with Functions
  - Writing conditional expressions (using IF)
  - Using logical functions (AND, OR, NOT)
  - Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX)
  - VlookUP with Exact Match, Approximate Match
  - Nested VlookUP with Exact Match
  - VlookUP with Tables, Dynamic Ranges
  - Nested VlookUP with Exact Match
  - Using VLookUP to consolidate Data from Multiple Sheets
  - Using VLookUP to consolidate Data from Multiple Sheets
- Data Validations
  - Specifying a valid range of values for a cell
  - Specifying a list of valid values for a cell
  - Specifying custom validations based on formula for a cell
- Working with Templates
  - Designing the structure of a template
  - Using templates for standardization of worksheets
- Sorting and Filtering Data
  - Sorting tables
  - Using multiple-level sorting
  - Using custom sorting

- Filtering data for selected view (AutoFilter)
- Using advanced filter options
- Using Wildcard Character with advance filter
- Using Filter fuction
- Understanding OR and AND logic in filter function

- **Working with Reports**
  - Creating subtotals
  - Multiple-level subtotals
  - Creating Pivot tables
  - Formatting and customizing Pivot tables
  - Using advanced options of Pivot tables
  - Pivot charts
  - Consolidating data from multiple sheets and files using Pivot tables
  - Using external data sources
  - Using data consolidation feature to consolidate data
  - Show Value As (% of Row, % of Column, Running Total, Compare with Specific Field)
  - Viewing Subtotal under Pivot
  - Creating Slicers (Version 2010 & Above)
- **More Functions**
  - Date and time functions
  - Text functions
  - Database functions
  - Power Functions (Countif, Countifs, Sumif, Sumifs)
  - Lookup and Reference functions
  - Information functions
  - Statistical functions
- **Formatting**
  - Using auto formatting option for worksheets
  - Using conditional formatting option for rows, columns and cells
  - Uses of format as table and benefits
- **Macros**
  - Relative & Absolute Macros
  - Editing Macro
- **What-If Analysis**
  - Goal Seek
  - Data Tables
  - Scenario Manager
- **Charts**

- Using Charts - Column, Line, Pie, Bar etc
- Formatting Charts
- Using 3D Graphs
- Using Bar and Line Chart together
- Using Secondary Axis in Graphs
- Sharing Charts with PowerPoint / MS Word, Dynamically
- (Data Modified in Excel, Chart would automatically get updated)

- New Features Of Excel
  - Sparklines, Inline Charts, data Charts
  - Overview of all the new features
- Final Assignment
  - The Final Assignment would test contains questions to be solved at the end of the Course

VBA

- VBA (VISUAL BASIC FOR APPLICATION) & MACROS
  - Create a Macro
  - Swap Values
  - Run Code from a Module
  - Macro Recorder
  - Use RelativeReferences
  - FormulaR1C1
  - Add a Macro to the Toolbar
  - Macro Security
  - Protect Macro
- MsgBox
  - MsgBox Function
  - Input Box Function
- Workbook and Worksheet Object
  - Path and Full Name
  - Close and Open
  - Loop through Books and Sheets
  - Sales Calculator
  - Files in a Directory
  - Import Sheets
  - Programming Charts
- Range Object
  - Current Region

- Dynamic Range
- Resize, Entire Rows and Columns
- Offset
- From Active Cell to Last Entry
- Union and Intersect
- Test a Selection
- Possible Football Matches
- Font,Background Colors
- Areas Collection
- Compare Ranges

- Variables
  - Option Explicit
  - Variable Scope
  - Life of Variables
  - If Then Statement
  - Logical Operators
  - Select Case
  - Tax Rates
  - Mod Operator
  - Prime Number Checker
  - Find Second Highest Value
  - Sum by Color
  - Delete Blank Cells
- Loop
  - Loop through Defined Range
  - Loop through Entire Column
  - Do Until Loop
  - Step Keyword
  - Create a Pattern
  - Sort Numbers
  - Randomly Sort Data
  - Remove Duplicates
  - Complex Calculations
  - Knapsack Problem
- Procedures and Functions
  - Subroutines vs Functions
  - Calling procedures
  - Passing arguments (ByVal vs ByRef)
- Macro Errors

- Debugging
- Error Handling
- Err Object
- Interrupt a Macro
- Macro Comments

- String Manipulation
  - Separate Strings
  - Reverse Strings
  - Convert to Proper Case
  - Count Words
  - Date and Time
  - Compare Dates and Times
  - DateDif Function
  - Weekdays
  - Delay a Macro
  - Year Occurrences
  - Tasks on Schedule
  - Sort Birthdays
- Events
  - Before DoubleClick Event
  - Highlight Active Cell
  - Create a Footer Before Printing
  - Bills and Coins
  - Rolling Average Table
- Array
  - Dynamic Array
  - Array Function
  - Month Names
  - Size of an Array
- Function and Sub
  - User Defined Function
  - Custom Average Function
  - Volatile Functions
  - ByRef and ByVal
- Application Object
  - Status Bar
  - Read Data from Text File
  - Write Data to Text File

- ActiveX Controls
  - Text Box
  - List Box
  - Combo Box
  - Check Box
  - Option Buttons
  - Spin Button
  - Loan Calculator
- User form
  - User form and Ranges
  - Currency Converter
  - Progress Indicator
  - Multiple List Box Selections
  - Multicolumn Combo Box
  - Dependent Combo Boxes
  - Loop through Controls
  - Controls Collection
  - User form with Multiple Pages
  - Interactive User form