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Tekla Open API with ML & AI

Language: **Python**

Training Structure

Module 1: Python Programming
Module 2: Tekla Open API
Module 3: Machine Learning, AI and integration.

Features:

- ✓ Personal coaching - no recorded videos.
- ✓ Flexible timings, weekend batches are also conducted.
- ✓ CSharp programming – in depth training included!
- ✓ Unlimited support after training - at no extra cost!

Training Highlights

Module 1: Python Programming

1. Python and IDE Installation

- Installing Python.
- Installing Python Editors - VS Code, IDLE.
- Project Explorer, output and error windows.

2. Python programming

- Setting up user interaction and collecting inputs.
- Running Python programs.
- Calculations and output display.
- Arithmetic operators.
- Using the Math library functions.
- Syntax, Comments, User Input, Print results, and control Program Flow.
- Variables: Float, Integer, and String.
- String Variables: Find, Replace, Formatting and Slicing operations.
- Datatypes and Typecasting.

3. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- List Operations - Slicing and Data Extraction.
- String Operations - Slicing and Manipulations.

- Conditionals: If- Elif and If-Else, Nested If.
- Chaining Comparison Operators.
- Loops: For loop, nested For loops.

4. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.

5. Exception Handling

- Errors - syntax, logical and exceptions.
- Exception handling.
- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

6. OS Functions

- Installing 3rd party packages using pip.
- Performing File, Folder, Path and operations.
- Manipulating file paths and extensions.
- Handling Files, File Filters.
- Text files - read, append and write with practical applications.
- Storing and retrieving data.
- Folders and Folder operations.

Module 2: Tekla Open API

8. Tekla Open API Overview

- Connect to Tekla Structures.
- Tekla model and Connection Status.
- Tekla interface elements - message boxes and prompts.
- Model name and path.

9. Modeling API

- Using Tekla Geometry 3D and creating aliases.
- Creating beam and column objects.
- Beam geometry, profile, material and class.
- Inserting the beam and committing changes.
- Picker class, picking single points and objects.
- Filtering objects in the model.
- Selecting multiple objects in the model.
- Object enumerator and ArrayList of model objects.
- Using the foreach loop to enumerate model objects.

10. Object Creation and Modification

- Creating contour plate.
- Multiple point picking.
- Contour points
- Cut plane, axes and orientation.

11. Drawing Handling

- Creating Drawings of models.
- Accessing current drawing and sheets.
- Access sheet and placing views.
- Inserting single part drawings.

12. User Defined Properties

- Setting, retrieving properties.
- Inspecting and exporting UDAs.

13. Debugging Techniques

- Debugging techniques in Tekla apps.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fix errors in the code.

14. Excel Automation and Integration

- Integrating Tekla API with Excel.
- Reading data from Excel and creating objects in Tekla.
- Writing out Tekla model data to Excel sheets.
- Invoking Excel from CSharp.
- Creating new workbook.
- Connecting to Excel.
- Connecting to existing worksheets.
- Accessing range and cells.
- Writing and reading values from cells.
- Formulas and results.
- Formatting cells - font and layout.
- Excel Macro recording and integration.

❖ Industry Project - Writing Tekla Information to Excel.
❖ Industry Project - Reading from Excel into Tekla.

Module 3: Machine Learning and AI

21. NumPy

- Arrays.
- One Dimensional Array.
- Multidimensional Array.
- Create Arrays from Data.
- Create array from Ranges.
- Shape.
- Sum.
- Slicing Array.

22. Pandas

- Series.
- DataFrames.
- Dataframe Indexing.
- Dataframe Head, Tail.
- Dataframe Shape.
- Read DataFrame from CSV.

23. Matplotlib Visualization

- Line Plots.
- Sub Plots.
- Plot Properties - Color, Style.
- Grid, xLabel, yLabel.
- Bar Plots.
- Bar SubPlots and Orientation.
- Scatter Plots and Subplots.
- Mixed Plots and Overlapping.
- Markers and LineWidth.
- Exporting Plots.
- Pie Charts.

24. Decision Trees

- Decision Tree Classifiers.
- Extracting Features & Labels from a Dataframe.
- Fitting Features & Labels into a decision algorithm.
- Predicting values based on classification.
- Dual Classification and Multiclass classification.
- Reading CSV data into Dataframes.
- Separating input and output.
- Dropping frames from dataframes.
- Label Encoders.
- Fit Transforms and Predicting results.

25. Linear Regression Analysis

- Reading a CSV data file.
- Create Linear regression model.
- Fit data columns directly to the algorithm.
- Determine coefficient and intercept.
- Reading inputs data from CSV.
- Predicting output for entire column.
- Exporting output dataframes to CSV.
- Create a scatter plot of the data.

26. K-Means Clustering

- Importing data.
- Determining clusters.
- Determining the cluster to which a point belongs.
- Visualize cluster using scatter plots.
- Visualize cluster centers.

27. How to use ChatGPT for API Development

- Creating smart queries.
- Enhancing queries for best results.
- Refining queries for exploring more APIs.
- ChatGPT Code cleanup and adaptation.

28. Integrate AI and ML in Automation

- **Capstone Project** Integrate Automation with Machine Learning to create AI-enabled apps.

Other eBooks and Training Programs from CADVertex:

- CATIA Automation: VB.Net or CSharp or Python
- SolidWorks Automation: VB.Net or CSharp or Python
- Solid Edge Automation: VB.Net or CSharp or Python
- Inventor Automation: VB.Net or CSharp or Python
- NX Open: VB.Net or CSharp with Win Forms
- NX Open: VB.Net or CSharp with Block UI Styler

- Knowledge Fusion
- Knowledge Fusion with Block UI Styler

- Revit Automation using CSharp.Net
- Tekla Automation using CSharp.Net

- cMayoCAD: Learn to build a new CAD program from scratch using a Geometric Modeling Kernel and CSharp

- Machine Learning for Engineers with Python

- CATIA Automation with Python and Machine Learning
- NX Automation and Machine Learning with Python
- Solid Edge Automation with Python + Machine Learning
- SolidWorks Automation with Python + Machine Learning
- Inventor Automation with Python + Machine Learning

- Fast track course in Python with Machine Learning for VB.Net experts
- Fast track course in Python with Machine Learning for CSharp experts

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