| DATE | 28-02-2026 |
|---|---|
| TEAM ID | LTVIP2026TMIDS90651 |
| PROJECT NAME | Weather-Based Prediction of Wind Turbine Energy Output: A Next-Generation Approach to Renewable Energy Management |
| MAXIMUM MARKS | 3 MARKS |

## 3.4 - Technology Stack:

The technology stack defines the set of tools, programming languages, frameworks, and platforms used to design, develop, and deploy the Weather-Based Prediction of Wind Turbine Energy Output System. The selected technologies ensure accuracy, scalability, ease of development, and efficient performance of the system.

**1. Programming Language**

- **Python**

  Python is used as the primary programming language due to its simplicity, readability, and strong support for data science and machine learning applications. It provides a rich ecosystem of libraries for data processing, analysis, visualization, and model development.

**2. Data Handling and Processing**

- **Pandas** – Used for data loading, cleaning, preprocessing, and manipulation.
- **NumPy** – Used for numerical computations and handling multi-dimensional arrays.

**3. Machine Learning Libraries**

- **Scikit-learn** – Used for building, training, testing, and evaluating machine learning models such as regression models, decision trees, and ensemble methods.
- **(Optional) TensorFlow / PyTorch** – Can be used for advanced deep learning models if required for higher accuracy.

**4. Data Visualization**

- **Matplotlib** – Used to create basic plots and graphs for data analysis and result visualization.
- **Seaborn** – Used for advanced and attractive statistical visualizations (optional).

**5. Development Environment**

- **Anaconda** – Used for managing Python environments and packages.

- **Jupyter Notebook** – Used for experimentation, data analysis, and model development.
- **VS Code / PyCharm** – Used for writing and managing project code.

## 6. User Interface / Web Framework (Optional)

- **Flask / Streamlet** – Used to build a simple web-based interface or dashboard to display predictions, charts, and reports in a user-friendly manner.
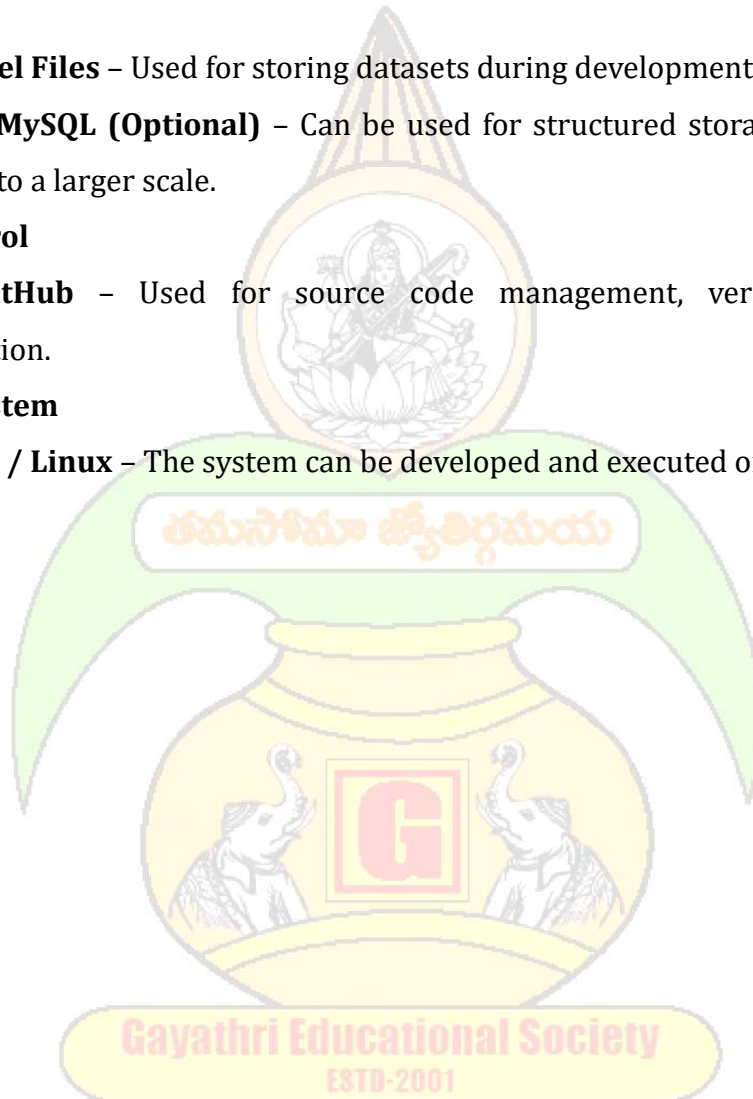
## 7. Data Storage

- **CSV / Excel Files** – Used for storing datasets during development and testing.
- **SQLite / MySQL (Optional)** – Can be used for structured storage if the system is extended to a larger scale.

## 8. Version Control

- **Git / GitHub** – Used for source code management, version control, and collaboration.

## 9. Operating System

- **Windows / Linux** – The system can be developed and executed on either platform.