Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	**8 February 2026**
Team ID	**LTVIP2026TMIDS89922**
Project Name	**Weather-Based Prediction of Wind Turbine Energy Output**
Maximum Marks	**4 Marks**

Functional Requirements

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Weather Data Retrieval	User enters city name
		System fetches real-time weather data using Weather API
		System extracts wind speed, temperature, humidity, pressure
FR-2	Energy Prediction	User enters/auto-fills wind speed
		User enters/auto-fills theoretical power curve value
		System loads trained ML model (.sav file)
		System predicts wind turbine energy output
FR-3	Display Results	Predicted energy output displayed on web page
		Weather details displayed clearly
FR-4	Model Management	Trained model saved using joblib
		Model loaded automatically when application starts
FR-5	User Interface	Intro page explaining project
		Prediction dashboard with input forms
		Responsive and user-friendly design

Non-Functional Requirements

Following are the non-functional requirements of the proposed solution:

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The system shall provide a simple and intuitive web interface for entering city name and prediction inputs.
NFR-2	Security	API key shall be stored securely and not exposed in the frontend.
NFR-3	Reliability	The prediction model shall consistently provide accurate results based on trained data.
NFR-4	Performance	The system shall generate predictions within a few seconds of user input.
NFR-5	Availability	The web application shall be accessible whenever the Flask server is running.
NFR-6	Scalability	The system design shall allow future integration of additional weather parameters and larger datasets.