**FORMAT OF SYNOPSIS**

**Name of the Student:** Aniket Asawale **Student ID:**  22102140 **Class and Batch:** BE - A - Computer Engineering (2025-2026) **Roll No:** 6

**TITLE:** Machine Learning-Based Crop Recommendation System

* **INTRODUCTION:**

Agriculture remains the backbone of the Indian economy, yet farmers often struggle with crop selection due to variable soil conditions, rainfall, and temperature. This project aims to design a Machine Learning-based Crop Recommendation System that predicts the most suitable crop for cultivation based on soil nutrients (N, P, K), temperature, humidity, rainfall, and pH level. The model applies supervised learning techniques to analyze patterns from historical data, providing precise recommendations to enhance productivity and sustainability.

* **OBJECTIVES:**

1. To recommend the best crop for cultivation based on environmental and soil parameters.
2. To improve agricultural yield and reduce losses due to improper crop selection.
3. To design a user-friendly interface that provides instant recommendations to farmers.
4. To integrate predictive analytics into precision agriculture for data-driven decisions.

* **MODULES:**

1. Data Collection Module – Collect soil and weather data (N, P, K, temperature, humidity, rainfall, pH).
2. Model Training Module – Apply algorithms such as Random Forest and Decision Tree for classification.
3. Prediction Module – Predict and recommend the best crop for given input values.
4. User Interface Module – Display prediction results through a simple and accessible UI.

* **MATERIAL AND METHODS:**

Python, scikit-learn, pandas, numpy, matplotlib. Dataset obtained from Kaggle. Implementation done in Jupyter Notebook. Visualization and preprocessing performed using Python libraries. Model evaluation using accuracy, confusion matrix, and precision-recall metrics.

* **DURATION OF STUDY:**

3 Months (Data Collection – 2 week, Model Development – 5 weeks, Testing – 3 weeks, UI Integration & Deployment– 2 weeks)

* **REFERENCES:**

1. Kaggle Crop Recommendation Dataset
2. Python Machine Learning Documentation (scikit-learn.org)
3. Research Paper: “A Machine Learning Approach for Crop Recommendation Based on Climatic Conditions” – IEEE Xplore
4. GitHub Repository: https://github.com/Aniket-Asawale/ML-Crop-Recommendation