**Project Report**

**AI-Powered Personalized Learning System for IELTS Students**

**1. Introduction**

The International English Language Testing System (IELTS) is one of the most widely recognized English proficiency tests for academic and professional purposes. Preparing for IELTS requires targeted practice across four modules: **Reading, Writing, Listening, and Speaking**.  
Traditional coaching often provides a one-size-fits-all approach, which fails to address individual student weaknesses.

To solve this, we developed an **AI-based Personalized Learning System** using Python, Machine Learning, and Streamlit. The system delivers:

* **Personalized study recommendations**
* **Practice questions with model answers**
* **Automated band-score feedback** for Writing and Speaking
* **Progress dashboards** for students and instructors

**2. Objectives**

1. Build a **dataset** covering IELTS practice items across all modules.
2. Implement a **recommendation system** that adapts to each student’s weaknesses.
3. Provide **automated feedback** on Writing and Speaking through band-score estimation.
4. Deploy an **interactive dashboard** for both students and instructors.

**3. Dataset**

We created a structured dataset of **72 items** across:

* Reading (Skimming, Inference, etc.)
* Writing Task 1 & 2 (Graphs, Opinion essays)
* Listening (Keyword identification)
* Speaking (Parts 1–3: Introduction, Cue card, Discussion)

Each item includes:

* Title
* Topic
* Difficulty (easy / medium / hard)
* Content description
* Sample question & model answer

Format: CSV file (learning\_items.csv) with 7 columns.

**4. System Architecture**

**Components:**

1. **Data Layer**
   * IELTS dataset (learning\_items.csv)
   * Student profiles (stored in memory during sessions)
2. **Machine Learning Models**
   * **Recommender System**:
     + Technique: TF-IDF + Nearest Neighbors
     + Purpose: Suggest practice items based on weak topics.
   * **Band-Score Estimator**:
     + Features: Word count, sentence length, vocabulary richness, punctuation ratio
     + Model: Random Forest Regressor (synthetic training data)
     + Output: Predicted Band Score (4.0 – 9.0)
3. **Application Layer (Streamlit App)**
   * **Student View**:
     + Personalized recommendations
     + Practice activities with model answers
     + Band-score feedback (Writing/Speaking)
     + Profile dashboard (progress tracking)
   * **Instructor View**:
     + Dataset management (add new items)
     + Retraining ML models
     + Student profile summaries

**5. Implementation**

* **Language**: Python 3
* **Frameworks/Libraries**:
  + streamlit (dashboard)
  + pandas (data management)
  + scikit-learn (ML models)
  + matplotlib (analytics visualization)
  + joblib (model persistence)
* **Deployment**: Streamlit app can run locally or be deployed on Streamlit Cloud.

**6. Features**

**Student**

✅ Personalized recommendations  
✅ Practice questions with answers  
✅ Automated band-score prediction  
✅ Strength/weakness analysis with tips  
✅ Progress tracking charts

**Instructor**

✅ Add new learning items  
✅ Retrain ML models  
✅ Export student progress

**7. Results**

* Successfully created a **72-item IELTS dataset**.
* Built a recommender that adapts based on student profile.
* Implemented a **synthetic ML band estimator** that provides realistic feedback.
* Designed an **interactive Streamlit dashboard** for students and teachers.

**8. Future Enhancements**

1. Replace synthetic band estimator with a **real model trained on IELTS essays/speaking transcripts**.
2. Add **speech-to-text integration** for live Speaking feedback.
3. Store student profiles in a **database** (SQLite, Firebase).
4. Provide **adaptive quizzes** with scoring analytics.

**9. Conclusion**

This project demonstrates the use of **AI in personalized learning for IELTS**. The combination of a recommender system, automated feedback, and dashboards creates an **interactive, student-centered learning environment**.

It helps students focus on their weak areas and track their improvement, while instructors can manage datasets and monitor progress effectively.