**Task: “Build & Judge a Mini AI”**

**Part 1 — Chronology of AI**

**Write one real-world example for each stage:**

**Machine Learning → Fraud Detection in Banking**

Banks use machine learning algorithms to detect unusual transaction patterns and flag potential fraud. For example, if a user's card is used in two different countries within a short time, ML models can trigger alerts based on historical behavior.

**Deep Learning → Autonomous Vehicles**

Self-driving cars use deep learning to process sensor data, recognize pedestrians, detect traffic signs, and make real-time driving decisions.

**Computer Vision → Medical Imaging Diagnostics**

Computer vision systems analyze X-rays or MRIs to detect signs of disease . These tools assist radiologists by highlighting areas that may require closer inspection.

**NLP → Email Spam Filtering**

NLP models process and understand email content to classify messages as spam or not. They analyze the language patterns, keywords, and sender metadata to filter out unwanted emails.

**LLMs → AI Customer Support Chatbots**

LLMs like ChatGPT power advanced chatbots that understand and generate human-like responses to customer queries across industries—from tech support to travel booking—improving response times and user experience.

**Part 2 — Deep Learning Architectures**

**Match the model to the use case:**

**1. RNN -Text translation (old Google Translate)**

**2. LSTM -Early speech-to-text systems**

**3. CNN - Image recognition**

**4. Transformer - Predicting the next word in ChatGPT**

**Use cases:**

**Image recognition -CNN**

**Text translation (old Google Translate) - RNN**

**Predicting the next word in ChatGPT -Transformer**

**Early speech-to-text systems -LSTM**

**Part 3 — Frameworks**

**Choose one framework (PyTorch / TensorFlow / Keras).**

**In one sentence, explain why you would use it if you were a student making a cat-vs-dog classifier.**

I’d useKeras because its user friendly, it can make the situation less comples to understand when building a cat-vs-dog classifier as a student.

**Part 4 — Evaluation Metrics**

**Imagine you built a spam filter. Answer:**

**Precision: If it marks 10 emails as spam and 7 are truly spam → what’s Precision?**

Precision = True Positives / (True Positives + False Positives)

Precision = 7/10 = 0.70

**Recall: If there were 12 spam emails in total, how many did it catch? (use same example)**

Recall = True Positives / (True Positives + False Negatives)

Recall = 7/12=0.583

**F1 Score: Use the formula and calculate (round to 2 decimals).**

F1 = 2 × (Precision × Recall) / (Precision + Recall)

= 2 × (0.70 × 0.583) / (0.70 + 0.583)

= 2 × (0.4081) / 1.283

= 0.636

**MSE/MAE: Predict your friend’s age (actual = 15, prediction = 18). Which metric punishes the error more?**

MAE (Mean Absolute Error) = |15 - 18| = 3

MSE (Mean Squared Error) = (15 - 18)^2 = 9

MSE punishes the error more because it squares the difference, amplifying larger errors.

**BLEU/ROUGE: AI translated “The cat sat on the mat” as “Cat is on the mat.” Which metric (BLEU/ROUGE) do you think would give a high score?**

BLEU focuses on precision (how many predicted n-grams match the reference).

ROUGE focuses on recall (how much of the reference is captured).

Since the sentence is short and several key words match, ROUGE would likely give a higher score, especially because "on the mat" is intact and ROUGE rewards overlap with the reference.

**Part 5 — Responsible AI & Explainability**

**You built an AI that predicts loan approvals.**

**A customer asks, “Why was my loan rejected?”**

**Write one simple way to explain the decision fairly (e.g., “Your income was too low compared to the loan size”).**

Your loan was rejected because your credit score and income level were both below the minimum threshold needed for the loan amount you applied for.