Assignment: Sequence Models

Instructions:

- Attempt all questions.
- Write neatly and clearly.
- Diagrams are encouraged wherever applicable.
- You may use Python (Keras/PyTorch) if asked explicitly.

Q1: Conceptual Understanding

a. Define the following sequence model types with diagrams:
i. One-to-One
ii. One-to-Many
iii. Many-to-One
iv. Many-to-Many

b. Give one real-world example for each of the above models.

Q2: Scenario-Based Classification

Classify each of the following tasks into one of the four types of sequence models. Justify your answer.

1. Predicting the emotion of a spoken sentence.
2. Translating a sentence from English to French.
3. Predicting the next 5 words based on a keyword.
4. Classifying a review as positive or negative.
5. Tagging each word in a sentence with its part-of-speech (POS).

Q3: Analytical Thinking

a. Why can't we use a One-to-One model for language translation?
b. What are the key challenges of Many-to-Many sequence modeling?
c. Compare and contrast One-to-Many and Many-to-One using an example of weather forecasting.

Q4: Implementation

For students with Python skills

Implement a simple **Many-to-One** LSTM model using Keras to perform sentiment classification on 3 short sentences:

sentences = ["I love pizza", "I hate rain", "You are amazing"]

labels = [1, 0, 1] # 1 = Positive, 0 = Negative

- Preprocess the text.
- Tokenize and pad sequences.
- Train a simple LSTM model.
- Report accuracy.

Submission Format:

- PDF/DOC for written answers.
- .ipynb or .py files for code (if any).