Q1. DL vs ML

In short, DL is a subset of ML.

Traditional ML algorithms are designed to make predictions based on a limited number of inputs and Feature extraction can be done manually by domain experts or with algorithms. Whereas DL algorithms are designed to handle vast amounts of data and learn from large, complex patterns. Feature extraction is often an automated process.

From Data type aspect, ML works best with structured/tabular data while DL excels with unstructured data like images, text or audio.

From model complexity aspect, ML usually makes use of simple models like SVMs, while DL uses more complex models like CNNs, RNNs, LSTMs.

All these results in difference in computational cost. ML requires low to moderate cost whereas DL requires high cost due to many parameters and layers.

Q2. LSTM Networks in NLP

LSTM networks are a special type of Recurrent Neural Networks (RNNs) designed to handle sequence data (e.g., sentences, time series). They are especially good at capturing long-range dependencies in text due to their memory cell structure.

Unlike vanilla RNNs, LSTMs overcome the vanishing gradient problem through gates:

* Forget Gate – decides what information to discard.
* Input Gate – decides what new information to store.
* Output Gate – decides the output based on the memory.

Use in NLP:  
In text classification, LSTMs process each word in a sequence and retain meaningful context, allowing better understanding of sentence structure and sentiment.