➢ **Q1**.TensorFlow and PyTorch are both deep learning frameworks, but they differ in how they execute computations and where they are most commonly used.

Feature	TensorFlow	PyTorch
Computation Style	Uses **static computation graphs** (build to run).	Uses **dynamic computation graphs** (run as you go).
Ease of Debugging	Harder to debug due to graph abstraction.	Easier to debug because it works like normal Python.
Common Usage	Industry, production systems, deployment.	Research, experimentation, model development.
Deployment Tools	TensorFlow Serving, TensorFlow Lite, TensorFlow.js	Deployment improving but still catching up

- **TensorFlow** can be used if you want to deploy a model to mobile devices, web, or large-scale production systems.
- **PyTorch** can be used when you are researching new models or need rapid experimentation and flexibility.

➢ **Q2:**

Interactive Model Development:
Jupyter allows you to test code in small parts, visualize results immediately, and adjust parameters quickly making it ideal for training ML models step-by-step.

Data Exploration and Visualization:
Researchers use Jupyter to load datasets, clean them, generate plots, analyze patterns, and document insights—all in the same workspace.

➢ **Q3:**

spaCy is an advanced NLP framework that can **understand language structure**, not just manipulate text.

Basic Python string operations only find words or split sentences — they do **not** know grammar or meaning.

spaCy provides:

- **Tokenization** (splitting text correctly into words)
- **Part-of-speech tagging**
- **Named Entity Recognition (NER)** (identifying names, places, brands)
- **Dependency parsing** (understanding sentence structure)

This makes **spaCy** far more powerful for real-world language tasks.

Comparative Analysis: Scikit-learn vs TensorFlow

Aspect	Scikit-learn	TensorFlow
Best Used For	Classical ML (SVM, Logistic Regression, Random Forests)	Deep Learning + Neural Networks
Complexity	Beginner-friendly	More complex, steeper learning curve
Applications	Small-medium datasets, tabular data	Large datasets, images, audio, sequence data
Community Support	Strong for ML basics	Strong for deep learning deployments