Deep Learning Questions and Answers

# 1. What is Deep Learning?

Deep learning is a part of machine learning, which itself is a part of artificial intelligence (AI). It uses artificial neural networks that try to mimic how the human brain works. Deep learning helps computers to learn from large amounts of data, understand patterns, and make decisions on their own. For example, deep learning is used in things like voice assistants (like Alexa), face recognition, and self-driving cars.

# 2. What is a Neural Network and its Types?

A neural network is a system of algorithms that tries to recognize patterns in data, just like a human brain. It is made up of layers of nodes (called neurons), and each layer processes information and passes it to the next layer.

Types of Neural Networks:

- Feedforward Neural Network: The simplest type. Information moves in only one direction – from input to output.  
- Convolutional Neural Network (CNN): Mostly used for image-related tasks like detecting objects in pictures.  
- Recurrent Neural Network (RNN): Used for tasks where the order of information matters, like language translation or time series data.  
- Modular Neural Network: Made up of several smaller networks that work together for a single task.

# 3. What is CNN in Simple Words?

CNN stands for Convolutional Neural Network. It is a type of neural network especially designed to work with images. Instead of looking at the whole image at once, CNNs look at small parts of the image, learn important features like edges or colors, and combine them to understand the full image. This helps the computer to recognize faces, objects, or even diseases in medical scans.

# 4. Short Notes About the Pipeline Discussed in the Lecture

The pipeline shown in the image explains the steps to build a deep learning model, especially for image classification tasks like detecting plant diseases. Here is a simplified breakdown:

1. Data Collection & Loading: First, we collect data (e.g., plant images) and load them, possibly from platforms like Kaggle or Google Colab.  
2. Image Processing & Augmentation: Images are processed and augmented (like rotating or flipping) to make the model learn better.  
3. Building CNN: A Convolutional Neural Network is built using frameworks like TensorFlow to recognize patterns in the image.  
4. Training, Validation, and Testing: The data is split into three parts:  
 - Training: To teach the model.  
 - Validation: To tune and improve the model.  
 - Testing: To evaluate how well the model performs.  
5. Model Evaluation: After training, the model is tested and accuracy is calculated.  
6. Dataset Structure: The dataset is structured with folders like train, test, and validation, each containing labeled images (e.g., cat, dog, etc.).  
7. Output: Finally, the model predicts and classifies whether the image belongs to D1, D2, D3, or D4 categories (types of plant diseases).