Forward and backward propagation

Ques: Explain the concept of forward propagation in a neural network'

**1. Forward Propagation**

Forward propagation is the process of feeding input data through the neural network to get an output. It's the "forward" pass because the data flows from the input layer, through the hidden layers, to the output layer. Essentially, you're making a prediction based on the current weights and biases of the network.

Ques2 What is the purpose of the activation function in forward propagation

**2. Purpose of Activation Functions in Forward Propagation**

Activation functions introduce non-linearity into the neural network. Without them, the network would just be a linear combination of the inputs, no matter how many layers it has. Non-linearity is crucial for learning complex patterns in data. Activation functions decide whether a neuron "fires" or not, based on its input.

Ques 3Describe the steps involved in the backward propagation

(backpropagation) algorithm'

**3. Backward Propagation (Backpropagation) Algorithm**

Backpropagation is the process of calculating the gradients of the loss function with respect to the weights and biases of the network. These gradients tell you how much each weight and bias contributes to the error of the network's predictions. You use these gradients to update the weights and biases during training, moving the network towards better performance. Here are the steps:

1. **Forward Pass:** Perform forward propagation to get the network's output.
2. **Calculate Loss:** Calculate the difference between the network's output and the actual target values using a loss function (e.g., mean squared error).
3. **Backward Pass:**
   * Calculate the gradient of the loss function with respect to the output layer's activations.
   * Use the chain rule (explained below) to propagate these gradients back through the network, layer by layer. At each layer, calculate the gradients of the loss function with respect to the weights, biases, and activations of that layer.
4. **Update Weights and Biases:** Use an optimization algorithm (e.g., gradient descent) to update the weights and biases based on the calculated gradients.

Ques 5 What is the purpose of the chain rule in backpropagation

**4. Purpose of the Chain Rule in Backpropagation**

The chain rule is essential for backpropagation because it allows you to calculate the gradient of a composite function. In a neural network, each layer's output is a function of the previous layer's output, and so on. The chain rule lets you "chain" these gradients together to calculate the gradient of the loss function with respect to the weights and biases in any layer, even layers deep in the network.