PreLab:-

1.**What is the primary objective of the backpropagation algorithm in the context of training neural networks?**
The primary objective of backpropagation is to minimize the loss function by calculating gradients and updating the model's weights to improve prediction accuracy.

2.**Briefly describe the computations involved in the forward pass of the backpropagation algorithm. What is the output of the forward pass?**
The forward pass computes the activations of each layer by passing inputs through the network, ultimately producing the predicted output.

3.**What is the purpose of the backward pass in the backpropagation algorithm? How does it contribute to updating the model parameters?**
The backward pass calculates the gradients of the loss function with respect to each weight using the chain rule, guiding the adjustment of weights to reduce the loss.

4.**Explain the role of the chain rule in backpropagation.**
The chain rule is used to compute the gradient of the loss with respect to each weight by propagating errors backward through the network layers.

VIVA:-

1.**How do different activation functions impact the computations in the forward pass and gradients in the backward pass of the backpropagation algorithm?**
Activation functions determine the non-linearity in the forward pass and affect the gradient values in the backward pass, influencing how effectively the network learns.

2.**Neural networks use non-linear activation functions. Why is non-linearity crucial for the success of backpropagation, and how does it help in capturing complex relationships in data?**
Non-linearity allows neural networks to model complex, non-linear relationships in data, enabling backpropagation to adjust weights effectively across layers to capture these intricacies.

3.**In the context of backpropagation, what role does the learning rate play during the parameter update step?**
The learning rate controls the size of weight updates; it needs to be balanced to ensure stable and efficient convergence during training.

4.**How does backpropagation contribute to the potential issue of overfitting, and what regularization techniques can be employed during training to address this concern?**
Backpropagation can lead to overfitting by minimizing loss too precisely on the training data; regularization techniques like dropout, L2 regularization, and early stopping help mitigate this risk.