Knowledge Test

Time: 3 hrs **Total Marks: 50**

Written Questions (25 marks)

1. **TensorFlow Basics (5 marks)**
   Explain the role of tensors in TensorFlow. How do they differ from regular multidimensional arrays?

2. **Keras Layers (5 marks)**
   Describe the function and usage of the following Keras layers: Dense, Conv2D, and LSTM. Provide one example use case for each.

3. **Model Evaluation (5 marks)**
   Explain the differences between training accuracy and validation accuracy. Why is it important to monitor both during model training?

4. **Activation Functions (5 marks)**
   Compare and contrast the ReLU and Sigmoid activation functions. In what scenarios is each typically used?

5. **Overfitting and Regularization (5 marks)**
   What is overfitting in machine learning models? Describe two techniques used in Keras to prevent overfitting.

Practical Questions (25 marks)

1. **Building a Simple Neural Network (10 marks)**
   Build and compile a simple neural network using Keras to classify the MNIST dataset (handwritten digits). The model should include at least one hidden layer. Provide the code and briefly explain each step.

2. **Data Augmentation (5 marks)**
   Implement data augmentation on a given image dataset using Keras. Show at least three different augmentation techniques and explain how they help improve model performance.

3. **Custom Loss Function (5 marks)**
   Implement a custom loss function in TensorFlow/Keras. Explain the purpose of the loss function and provide an example scenario where it would be useful.

4. **Transfer Learning (5 marks)**
   Use a pre-trained model (such as VGG16 or ResNet) available in Keras for a simple image classification task. Fine-tune the model for a new dataset and describe the steps taken.