KEONICS COMPUTER CENTER, HUBLI				
Artificial Intelligence with Python				
Total Marks:	**50**	**Test – 5**	**Date:**	**20-09-2023**

A. Answer the following for two marks. (Any 6) **Marks (2X6)=12**

1. List any 4 differences between machine learning and deep learning.
2. What is the primary purpose of convolutional layers in a Convolutional Neural Network (CNN), and how do they contribute to feature extraction in image data?
3. What is a shallow neural network, and how does it differ from deep neural networks in terms of its architecture and complexity?
4. In a shallow neural network, explain the role of the hidden layer, and what is its primary function in the network's computation and modeling process?
5. What is a concept of vectorization in Python?
6. What is the primary purpose of creating Lambda functions, and how can they be used to automate tasks within AWS services?
7. What is the primary purpose of feature engineering in machine learning, and how can AWS Data Wrangler assist in this task?

B. Answer the following (3 Marks each) (Answer any 6) **Marks (3X6)=18**

1. Explain the application of deep learning in the context of supervised learning. Provide an example to illustrate its effectiveness.
2. Can you outline the fundamental factors that determine whether deep learning will perform well in a given problem, and under what circumstances might deep learning not be the most suitable approach?
3. Discuss the role of hyperparameter tuning in deep learning models. What are some common techniques for optimizing hyperparameters, and how can they impact model performance?
4. Explain sigmoid function with graph and equation and contrast with RELU.
5. Explain forward-propagation and backward propagation using neural network.
6. Explain the main steps involved in implementing a machine learning algorithm for logistic regression, from data preprocessing to making predictions. Include a discussion of how gradient descent fits into this.
7. Walk through the process of forward propagation and backpropagation in a CNN. How are convolutional layers, activation functions, and pooling layers involved in these computations?

Python Programming Practical

C. Answer Any 4 in following with python programs with outputs. (5 Marks each) **Marks (5X4)=20**

1. Write a Python program to implement a simple feedforward artificial neural network (ANN) to predict a numeric target variable using a dataset of your choice. Train and evaluate the model, and display the accuracy of your predictions.
2. Develop a Python program that uses OpenCV and Keras/TensorFlow to detect objects in images. You can choose a specific object (e.g., faces or cars) and a pre-trained model (e.g., YOLO or SSD) to perform the detection. Display the results visually.
3. Develop a Python program to build a simple Convolutional Neural Network (CNN) using Keras for image classification. Use a small dataset (e.g., handwritten digits or fruits) and train the CNN to classify images. Display the confusion matrix and accuracy of your model.
4. Write a Python program that uses OpenCV to perform basic object detection in images. Detect a specific object (e.g., a red ball or a marker) in a set of images and draw bounding boxes around the detected objects. Visualize the results.
5. Implement a Python program that allows the user to specify coordinates and dimensions for cropping an image using OpenCV. Display the cropped region and the original image side by side.

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