**Assignment 2**

1. **What is Keras? -1 marks**

Keras is a Google-developed high-level deep learning API for implementing neural networks. It is written in Python and is used to make neural network implementation simple. It also allows for the computation of numerous neural networks in the backend.

Keras is simple to understand and use since it gives a high-level python frontend with the flexibility of different backends for computation. Keras is slower than other deep learning frameworks because of this, yet it is incredibly user-friendly.

The Keras High-Level API is responsible for creating models, specifying layers, and configuring various input-output models. Keras also compiles our model with loss and optimizer functions, as well as the training process with the fit function, at this level. Because it has been handled by the "backend" engine, Keras in Python does not handle low-level API such as creating the computational graph, creating tensors, or other variables.

Keras allows you to switch between different back ends. The frameworks supported by Keras are- Tensorflow, Theano, PlaidML, MXNet, CNTK (Microsoft Cognitive Toolkit)

1. **What is Deep learning? -1 marks**

Deep learning is a branch of artificial intelligence that aims to solve extremely difficult problems by simulating the human brain's functions. We use neural networks in deep learning, which use numerous operators placed in nodes to assist break down the problem into smaller sections, each of which is solved separately.

Unlike classical machine learning, which normally employs structured data, deep learning also involves analysing vast amounts of unstructured data. Images, video, audio, text, and other forms of unstructured data might be supplied into the system.

Because a neural network can contain numerous hidden layers, the word "deep" was coined.

1. **What is Tensorflow? -1 marks**

TensorFlow is an open-source library for large-scale machine learning and numerical computing. TensorFlow combines a variety of machine learning and deep learning models and algorithms (also known as neural networks) and makes them usable using conventional programming concepts. It provides an easy front-end API for developing apps using Python or JavaScript, while running those applications in high-performance C++.

Deep neural networks for handwritten digit classification, image recognition, word embeddings, recurrent neural networks, sequence-to-sequence models for machine translation, natural language processing, and PDE (partial differential equation)-based simulations can all be trained and run using TensorFlow. Best of all, TensorFlow allows for large-scale production prediction using the same models that were used for training.

TensorFlow also provides a large pre-trained model library that you can use in your own applications. For training your own models, you can also use code from the TensorFlow Model Garden as an example of best practices.

1. **What is CNN? -1 marks**

CNN stands for Convolutional Neural Network and is a sort of artificial neural network used to recognise and categorise images and objects.

It is a form of deep learning model for processing data with a grid pattern, such as photographs, that is inspired by the organisation of animal visual cortex and meant to learn spatial hierarchies of features, from low- to high-level patterns, automatically and adaptively. Convolutional neural networks (CNNs) are made up of three types of layers (or building blocks): convolution, pooling, and fully connected layers. The first two layers, convolution and pooling, extract information, while the third, a fully linked layer, transfers those features into final output, such as classification.

A convolution layer is an important part of CNN, which is made up of a stack of mathematical operations like convolution, which is a particular sort of linear operation. Because a feature can appear anywhere in a digital image, pixel values are stored in a two-dimensional (2D) grid, i.e., an array of numbers, and a small grid of parameters called kernel, an optimizable feature extractor, is applied at each image position, CNNs are highly efficient for image processing. It also employs a backpropagation method to automatically and adaptively learn spatial hierarchies of data.

Image processing, computer vision tasks such as localization and segmentation, video analysis, recognising obstacles in self-driving cars, and natural language processing are all tasks that CNNs are employed for. CNNs are especially popular in Deep Learning because they are critical in these rapidly evolving and novel fields.