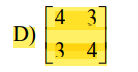
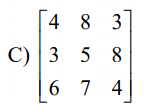
**DEEP LEARNING – WORKSHEET 4 ANSWERSHEET**

**Q1 to Q8 are MCQs with only one correct answer. Choose the correct option.**

1. A) Once we have the pooled feature map, this component transforms the information into a vector. It's the input we need to get on with Artificial Neural Networks.
2. B) Little dependence on pre-processing, decreasing the needs of human effort developing its functionalities.
3. B) False
4. B) 3 – 5 – 1 – 2 – 4
5. A)



1. D) 13×13



1. B) larger the value of strides, smaller is the size of feature map we get

C) smaller the value of strides, larger is the size of feature map we get

1. A) ResNeXt-50 B) Inception-ResNets C) LeNet-5

**Q11 to Q15 are subjective answer type question. Answer them briefly.**

1. **Basic Convolutional Neural Network Architecture:-**

CNN architecture is inspired by the organization and functionality of the visual cortex and designed to mimic the connectivity pattern of neurons within the human brain.

The neurons within a CNN are split into a three-dimensional structure, with each set of neurons analyzing a small region or feature of the image. In other words, each group of neurons specializes in identifying one part of the image. CNNs use the predictions from the layers to produce a final output that presents a vector of probability scores to represent the likelihood that a specific feature belongs to a certain class.

**How a Convolutional Neural Network Works━The CNN layers**

A CNN is composed of several kinds of layers:

**Convolutional layer**━creates a feature map to predict the class probabilities for each feature by applying a filter that scans the whole image, few pixels at a time.

**Pooling layer (downsampling)**━scales down the amount of information the convolutional layer generated for each feature and maintains the most essential information (the process of the convolutional and pooling layers usually repeats several times).

**Fully connected input layer**—“flattens” the outputs generated by previous layers to turn them into a single vector that can be used as an input for the next layer.

**Fully connected layer**—applies weights over the input generated by the feature analysis to predict an accurate label.

**Fully connected output layer**━generates the final probabilities to determine a class for the image.

1. **Convolution in Convolutional Neural Networks**

The convolutional neural network, or CNN for short, is a specialized type of neural network model designed for working with two-dimensional image data, although they can be used with one-dimensional and three-dimensional data.

Central to the convolutional neural network is the convolutional layer that gives the network its name. This layer performs an operation called a “convolution”. It’s used mainly for image processing, classification, segmentation and also for other auto correlated data.A convolution is essentially sliding a filter over the input.

1. Average pooling method smooths out the image and hence the sharp features may not be identified when this pooling method is used. Max pooling selects the brighter pixels from the image. It is useful when the background of the image is dark and we are interested in only the lighter pixels of the image.
2. Padding is a term relevant to convolutional neural networks as it refers to the amount of pixels added to an image when it is being processed by the kernel of a CNN. For example, if the padding in a CNN is set to zero, then every pixel value that is added will be of value zero. If, however, the zero padding is set to one, there will be a one-pixel border added to the image with a pixel value of zero.

There are some of reasons padding is important:

1. It's easier to design networks if we preserve the height and width and don't have to worry too much about tensor dimensions when going from one layer to another because dimensions **will just "work"**.
2. It allows us to design **deeper networks**. Without padding, reduction in volume size would reduce too quickly.
3. Padding actually **improves performance by keeping information at the borders**.
4. There are three types of layers in a convolutional neural network: **convolutional layer, pooling layer, and fully connected layer.** Each of these layers has different parameters that can be optimized and performs a different task on the input data.

**Convolutional layers** are the layers where filters are applied to the original image, or to other feature maps in a deep CNN. This is where most of the user-specified parameters are in the network. The most important parameters are the number of kernels and the size of the kernels.

**Pooling layers** are similar to convolutional layers, but they perform a specific function such as max pooling, which takes the maximum value in a certain filter region, or average pooling, which takes the average value in a filter region. These are typically used to reduce the dimensionality of the network.

**Fully connected layers** are placed before the classification output of a CNN and are used to flatten the results before classification. This is similar to the output layer of an MLP.