

**Department of Computer Science and Engineering**  
**Amrita School of Computing**  
**Amrita Vishwa Vidyapeetham – Coimbatore**

III Year B.Tech. CSE VI Sem CSE/CCE  
19CSE456 – Neural Networks and Deep Learning (PE-3)  
*Lab Evaluation – II*

---

**Instructions:**

- The total mark for the lab evaluation is 10.
  - The questions should be neatly worked out in VS Code/Anaconda's Jupyter IDE and it needs to be made sure that the python notebook is named as Roll\_Number\_NNDL\_Eval1.ipynb (e.g. CB.EN.U8CSE96108\_NNDL\_Eval1.ipynb).
  - The pdf (the file name should be same as the name of ipynb) exported version of ipynb should be uploaded to the outlook form whose link is:  
<https://forms.office.com/r/Ws8ifg1t1F>.
- 

**1. Loading the dataset (3 marks)**

- a. Import all necessary dependencies to construct a Convolutional Neural Network and for carrying out visualization. Load the **CIFAR-10** dataset (with train and test split) from **keras**. (1 mark)
- b. Perform necessary preprocessing on the images loaded from the **CIFAR-10** dataset. (1 mark)
- c. Show the shapes of train and test sets (both predictor and predicted variables). Select a sample set of 16 images from the dataset and visualize in a 4X4 grid. (1 mark)

**2. CNN Construction (3 marks)**

- a. Build a CovNet consisting of three hidden layers (Convolution + Pooling) with 32, 64, and 128 to be the number of filters in each convolution layer, respectively. The kernel size and pool size in all three convolution and pooling layers is (3 x 3) and (2 x 2), respectively. There should be 3 fully connected layers after the hidden layers with 256, 128, and 10 neurons in each layer, respectively. The activation for all convolution layers and dense layers is ReLU. (2 marks)
- b. Compile the model with **adam** to be the optimizer and **sparse\_categorical\_crossentropy** being the loss function. Fit the constructed CNN with training data with values for epochs, batch\_size, and validation\_set being 10, 64, and 0.1, respectively. (1 mark)

**3. Performance Evaluation (4 marks)**

- a. Draw the accuracy and loss plots for training and validation sets for whatever model built because of fitting happening in questions number 2. (1 mark)

- b. Change the number of optimizer, epochs and batch\_size in question number AdaGrad, 2 to 15 and 128. Then, draw the accuracy and loss plots for training and validation sets. (2 mark)
  - c. Present the test set accuracy and loss for both models (model created in question number 2 and 3) (1 mark)
-