March 2023: END SEMESTER ASSESSMENT (ESA)
M TECH DATA SCIENCE AND MACHINE LEARNING_ SEMESTER II

UE20CS935: Introduction to Deep Learning and Applications

Time: 3 Hrs	Answer All Questions	Max Marks: 80

Instructions
1. Answer all the questions.
2. Section A should be handwritten in the answer script provided.
3. Section B and C are coding questions to answered in the system and uploaded.
4. **During model training, use Epoch as 1 or 2**.
5. **Save notebook after successful execution of each cell.**

		SECTION-A (20 marks)	
1	a)	Summarize the Neural network process. Write a short note on Learning Rate and Momentum.	4
	b)	What is Batch Normalization? What are the benefits of Batch Normalization?	4
	c)	What is Gradient Descent? List 3 different variations of Gradient Descent. Explain each of them briefly.	4
	d)	Why do we need Activation Functions? Write a short note on ReLU. What are the drawbacks of ReLU?	4
	e)	Explain the algorithm behind YOLO.	4
		SECTION-B (30 marks)	
2		Build a Convolution Neural Network to classify the 6 different species of Butterfly images. Dataset_Folder Name: **Butterflies_classification_dataset** Conditions to consider: Refer notebook	10
3		Improve the baseline model (model build in question2) performance and save the weights of improved model. Conditions to consider: Refer Notebook	20
		SECTION C – 30 MARKS	
4		Use the Transfer learning technique to improve the previous section model's classification performance.	15

The pre-trained models weights are given to you. The architecture of pre-trained model till convolution layers and its corresponding weights are already saved under the folder 'base_model'. The given model convolution layers already freezed. (Note: This pre-trained model provided is MobileNet).

Load these weights along with architecture using the following syntax:
cust_model = tf.keras.models.load_model("base_model")

"base_model" is the folder name under all the required models files are exist.
Design the remaining layers of network in your own way (from flattening to output layer) and train only its weights with the dataset given.

| 5 | | **The Problem Statement**

The human gastrointestinal (GI) tract is made up of different sections is provided. Refer QP notebook.

The Task

Develop a Semantic segmentation model using Unet architecture on the given dataset.

Dataset Details

Refer QP notebook.

Students can make use of pre-trained Unet segmentation model using the library

  - **import segmentation_models as s**m | 15 |