



Program: Final Year B. Tech Electronics, Chemical and Mechanical Engineering (Minors)							Semester: VII			
Course: Deep Learning							Course Code: DJ19MN6C3			
Course: Deep Learning Laboratory							Course Code: DJ19MN6L2			
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		Total Mark (A+B)	
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	100
				75			25	25	25	
				Laboratory Examination			Term work		Total Term work	
4	2	--	5	Oral	Prac tical	Oral & Practi cal	Labora tory Work	Tutorial / Mini project / presentation/ Journal		50
				25	--	--	15	10	25	

Pre-requisite: --

1. Machine Learning

The objective of this course is

To familiarize students with the concept of deep learning and to enable them to assimilate to different types of neural networks. The course also aims to expose students to the idea of auto encoders and GANs.

Outcomes: On completion of the course, the learner will be able to:

1. Understand the deep learning and its concepts.
2. Interpret working of different types of neural networks.
3. Choose the suitable deep learning architecture for various real-world applications.

Deep Learning (DJ19MN6C3)		
Unit	Description	Duration
1	Fundamentals of Deep Learning Getting started with Neural Network, Fundamental concepts of Biological Neural Network, Perceptron, Multilayer feed-forward network, Terminologies in Deep Learning: weight, bias, threshold, Activation functions, loss functions	08
2	Deep Networks Cost functions, Optimizations: Gradient descent, learning rate, batch size and stochastic gradient descent, Tuning hidden layer count and neuron count, Exploding gradient and vanishing gradient, Avoiding overfitting through model generalization, Fancy optimizers, Hyperparameters	10

3	Artificial Neural Network Artificial Neural Network, Dense Networks, Feedforward and Feedback propagation McCulloch Pitts Neuron: Theory and Architecture; Linear separability; Hebb Network: Theory and Algorithm. ANN with backpropagation.	08
4	Convolutional Neural Network Introduction to CNNs, Kernel filter, Stride, Padding, Principles behind CNNs, Multiple Filters, CNN applications. ConvNet Architectures: AlexNet, VGG, GoogLeNet, ResNet.	08
5	Recurrent Neural Networks Introduction to Sequence Models and Recurrent Neural Network Model, Backpropagation Through Time, Different Types of RNNs: Unfolded RNNs, Seq2Seq RNNs, Long Short- Term Memory (LSTM), BERT, Bidirectional RNN, Vanishing Gradients with RNNs, Gated Recurrent Unit (GRU), RNN applications.	10
6	Auto Encoders and Adversarial Networks Auto encoders (standard, denoising, contractive, etc.), Variational Autoencoder, Introduction to Adversarial Networks, Generative Adversarial Networks, Applications of Adversarial Networks.	08
	Total	52

List of Practicals:

1. To build a Neural Network for the given problem.
2. To perform Image captioning using Convolutional Neural Network.
3. To perform Image classification using Convolutional Neural Network.
4. To perform image classification like digit identification using LSTM
5. Sentiment Analysis using LSTM
6. Implement Recommendation system using LSTM
7. Text Summarization using BERT
8. Fake news detection using BERT
9. To implement EBPTA for the given problem.
10. Text Prediction/ Language Translators using Recurrent Neural Network
11. Implementation of Generative Adversarial Networks
12. Mini Project