DEEP LEARNING

	L	T	P	C
III-B. Tech-II-Sem.				
Subject Code:21P61602	**3**	**1**	**0**	**3**
Pre-Requisite: Nil				

Course Outcomes: At the end of the course, the students will be able to
1. demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and DeepLearning
2. discuss the Neural Network training, various random models
3. explain the Techniques of Keras, TensorFlow, Theano and CNTK
4. classify the Concepts of CNN and RNN
5. implement Interactive Applications of Deep Learning.

Unit-I: Fundamentals of Deep Learning and Machine Learning   **08 hours**
Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, Fundamentals of Machine Learning: Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. [Text Book 2]

Unit-II: Introduction to Deep Learning   **10 hours**
Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. [Text Book3]

Unit-III: Neural Networks   **08 hours**
Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. [Text Book 2]

Unit-IV: Convolutional Neural Networks   **10 hours**
Convolutional Neural Networks: Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation, Recurrent Neural Networks: Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. [Text Book 3]

Unit-V: Interactive Applications of Deep Learning and Deep Learning Research **10 hours** Interactive Applications of Deep Learning: Machine Vision, Natural Language processing, Generative Adversial Networks, Deep Reinforcement Learning. [Text Book 1]
Deep Learning Research: Autoencoders, Deep Generative Models: Boltzmann Machines RestrictedBoltzmann Machines, Deep Belief Networks. [Text Book 1]

Text Books:
1. Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courvile, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications,ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821

Reference Books:
1. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc.,ISBN: 9781492041412
2. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
3. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013
4. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

DEEP LEARNING WITH TENSOR FLOW LABORATORY

		L	**T**	**P**	**C**
III-B.Tech-II-Sem.					
Subject Code:21P61612		**0**	**0**	**3**	**1.5**

Pre-Requisite: Nil

Course Outcomes: At the end of the course, the students will be able to

1. implement deep neural networks to solve real world problems

2. choose appropriate pre-trained model to solve real time problem

3. interpret the results of two different deep learning models

4. implement one hot encoding of words or characters

5. implement word embeddings for IMDB dataset

Software Packages required:•
- Keras
- Tensorflow
- PyTorch

LIST OF EXPERIMENTS

1. Implement multilayer perceptron algorithm for MNIST Hand written Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.
5. Build a Convolution Neural Network for MNIST Hand written Digit Classification.
6. Build a Convolution Neural Network for simple image (dogs and Cats) Classification
7. Use a pre-trained convolution neural network (VGG16) for image classification.
8. Implement one hot encoding of words or characters.
9. Implement word embeddings for IMDB dataset.
10. Implement a Recurrent Neural Network for IMDB movie review classification problem

Text Books:
1. Reza Zadeh and BharathRamsundar, "Tensorflow for Deep Learning", O'Reilly publishers, 2018