Deep Learning
(Professional Elective –III)

Course Code	20IT4701D	**Year**	IV	**Semester**	I
Course Category	**PE3**	**Branch**	IT	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Machine learning and neural networks
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		**Blooms Taxonomy Level**
Upon Successful completion of course, the student will be able to		
CO1	Understand the fundamental techniques and tools required to train a deep learning models	L2
CO2	Analyze deep learning data types and model architectures	L3
CO3	Analyze artificial neural network optimization and regularization in deep learning approaches	L3
CO4	Train and apply fully connected deep neural networks	L3

Correlation between CO – PO, CO- PSO(Use √ symbol for representing correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	√													
CO2		√												
CO3		√												
CO4				√									√	√

Strength of Correlation between CO – PO, CO- PSO in scale of 1-3

1: Slight (low), 2: Moderate (medium) 3: Substantial (High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3												
CO3		3												
CO4				3									3	3
Overall course	3	3		3									3	3

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**Introduction to Tensor Flow: Computational** Graph, Key highlights, Creating a Graph, Regression example, Gradient Descent, Tensor Board, Modularity, Sharing Variables, Keras Perceptrons: What is a Perceptron, XOR Gate	**CO1**
II	**Activation Functions:** Sigmoid, ReLU, Hyperbolic Fns, Softmax Artificial Neural Networks: Introduction, Perceptron Training Rule, Gradient Descent Rule	**CO1, CO2**
III	**Gradient Descent and Back propagation:** Gradient Descent, Stochastic Gradient Descent, Back propagation, Some problems in ANN Optimization and Regularization: Overfitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyper parameters	**CO1, CO2**
IV	**Introduction to Convolutional Neural Networks**: Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications Introduction to Recurrent Neural Networks: Introduction to RNNs, Unfolded RNNs, Seq2Seq RNNs, LSTM, RNN applications	**CO1, CO2, CO3**
V	**Deep Learning applications:** Image Processing, Natural Language Processing, Speech Recognition, Video Analytics	**CO1, CO2, CO4**

Learning Resources

Text Books

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

References

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

e-Resources and other Digital Material

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf
4) https://github.com/lisa-lab/DeepLearningTutorials