DEEP LEARNING

Course Code	20EC4703D	Year	IV	Semester	I
Course Category	Program Elective-V	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Explain the basics and architecture of deep neural networks L2
CO2	Apply Convolution Neural Network for Vision applicationsL3
CO3	Apply deep learning algorithms for Natural Language processing L3
CO4	Analyse the various components of Deep Neural networks. L4

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				2							2		
CO2	2				2								3	
CO3	2				2								2	
CO4		2			2								2	
Average* (Rounded to nearest integer)	2	2			2							2	2	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Thresholding Logic, Perceptron, Perceptron Learning Algorithm Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feedforward Neural Networks, Representation Power of Feedforward Neural Networks	CO1, CO4
II	Feed Forward Neural Networks, Backpropagation Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Ada Grad, RMS Prop, Adam, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Basis	CO1- CO3
III	Principal Component Analysis and its interpretations, Singular Value Decomposition, Auto encoders and relation to PCA, Regularization in auto-encoders, Denoising auto encoders, Sparse auto encoders, Contractive auto-encoders Regularization: Bias Variance Trade-off, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout	CO1-CO4

IV	Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Batch Normalization Learning Vectorial Representations Of Words Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks	CO1- CO4
V	Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs Encoder Decoder Models, Attention Mechanism, Attention over images	CO1-CO3

Learning Resources
Text Books
1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016. 2. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.
Reference Books
1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015. 2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
e- Resources & other digital material
1. https://onlinecourses.nptel.ac.in/noc21_cs35/course