SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
CE703(ii)T	Deep Learning (PE-V)	4	-	-	4	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To Learn the foundations of Deep Learning and its applications in real world ● To Learn how to implement, train and evaluate deep neural networks ● To Learn various deep neural networks architectures such as CNNs, RNNs, LSTM, and their applications	**Students will be able to** ● Understand basics of deep learning. ● Analysis neural networks for different technique. ● Apply appropriate deep learning algorithm to realize various learning problems. ● Apply the Convolution Neural Network and Recurrent Neural networks in context with real world problem solving. ● Understand deep learning algorithms to solve real world problems.

Unit I **[9 Hrs]**

Basics of Deep Learning - Human Brain and Fundamentals of Biological Neural Network, Model of an artificial Neuron, Basic concepts of Neural Networks, Evolution of Neural Networks, Characteristics of Neural Networks, Learning Methods–Supervised, unsupervised and reinforcement, Taxonomy of Neural Network Architectures, Terminologies – weights, bias, threshold, learning rate, Activation Functions-Liner, Sigmoidal, Signum, Tanh, ReLu, SoftMax, Applications of Neural Networks.

Unit II **[9 Hrs]**

Training of feed forward Neural Network - Hebb Network theory and training algorithm, Perceptron Networks architecture and training algorithm, Delta Learning Rule, Backpropagation Network architecture and training algorithm, Associative Memory Network architecture and training algorithm, Adaptive Resonance Theory Network architecture and training algorithm,

Unit III **[9 Hrs]**

Convolution Neural Network (CNN) - Convolution neural networks (CNNs): Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet, training a CNNs: weights initialization, batch normalization, hyperparameter optimization, Understanding and visualizing.

Unit IV **[9 Hrs]**

Recurrent Neural Network (RNN) - Recurrent neural networks (RNNs): Sequence modeling using RNNs, Back propagation through time, Long Short-Term Memory (LSTM), Bidirectional LSTMs, Bidirectional RNNs, Gated RNN Architecture.

Unit V **[8 Hrs]**

Applications: Case studies on applications of Deep Learning in Predictions and Classification applications, Computer vision, speech recognition and natural language processing.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Deep Learning	Ian Goodfellow, Yoshua Bengio and Aaron Courville	2016	MIT Press
2	Neural Networks and Deep Learning	Charu C. Aggarwal	2018	Springer
3	Deep Learning	M. Gopal	2022	Pearson education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Deep Learning- From Logical Calculus to AI	Sandro Skansi	2018	Springer
2	Artificial Neural Networks	Yegnanarayana, B.	2009	PHI Learning Pvt. Ltd
3	Deep Learning	A.Das,S.Goswami,P. Mitra,A, Chakrabarti	2022	Pearson education
4	Introduction of Artificial neural networks.	Jecek Zurada	1992	PHI