PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)
Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)

III B. Tech – II Semester CSE (AI&ML)

Deep Learning

Course Code	20AM3602	**Year**	III	**Semester**	II
Course Category	PCC	**Branch**	CSE(AI&ML)	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Machine Learning
Continuous Internal Evaluation	30	**Semester End Examination**	70	**Total Marks**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Describe the fundamental concepts, architectures, and applications of deep learning.	**L2**
CO2	Apply convolutional neural networks (CNNs) and deep convolutional neural network architectures to solve computer vision tasks.	**L3**
CO3	Apply recurrent neural networks (RNNs) and Generative Adversarial Networks (GANs) to solve natural language processing and image-to-image translation tasks.	**L3**
CO4	Analyze the performance of deep learning architectures, including CNNs, RNNs and GANs for various tasks in computer vision, natural language processing and generative modeling.	**L4**

Contribution of Course Outcomes towards achievement of Program Outcomes& Strength of correlations (3: High,2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2													
CO2	3											1	3	
CO3	3											1	3	
CO4		3										3		

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to Deep Learning**: Overview of artificial neural networks, Deep neural networks, Differences between machine learning and deep learning, Deep Learning Architectures, Activation Functions, Loss Functions, Optimization Techniques, Overfitting, Underfitting, Regularization, Normalization, Applications of Deep Learning.	CO1
II	**Convolutional Neural Networks (CNNs):** Introduction to CNNs, Convolution Operation, Basic Convolution Function, Convolutional Layers, Filters, Pooling Operation, Pooling Layers, Padding, Stride, Sparse Connectivity and Weight Sharing, Fully Connected Layers, Training CNNs, Normalization and Dropout, Hyperparameter Tuning, understanding LeNet Architecture, Training, Parameters, Applications of CNN.	CO1, CO2, CO4
III	**Pre-trained Deep Convolutional Neural Networks:** AlexNet, VGGNet, GoogLeNet, ResNet, Inception, MobileNet Architectures.	CO1, CO2, CO4
IV	**Transfer Learning:** Introduction, What is Transfer Learning, advantages of Pre-trained Models, different ways to Fine Tune the Model **Recurrent Neural Networks (RNNs):** Overview of RNNs, Gated Recurrent Units (GRUs), Bidirectional RNNs, Encoder-Decoder Architecture, Attention Mechanisms, Applications.	CO1, CO3, CO4
V	**Generative Adversarial Networks (GANs):** Introduction to GANs, Generative Models, GAN Architecture (Generator and Discriminator), GAN Training and Optimization, Conditional GANs, Deep Convolutional GANs (DCGANs), Cycle- Consistent GANs (CycleGANs), Applications.	CO1, CO3, CO4

Learning Resources
Text Books
1. Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, 2016, MIT Press 2. Dive into Deep Learning, By Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola, 2024, Cambridge University Press
Reference Books
1. Machine Learning, Tom M. Mitchell, First Edition, 2017, McGraw Hill Education 2. Machine Learning for Absolute Beginners, Oliver Theobald, Third Edition, 2024, Sanage Publishing House LLP 3. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2012, MIT Press
e- Resources & other digital material
1. Deep Learning: https://deeplearning.mit.edu/ 2. Deep Learning: https://nptel.ac.in/courses/106106184 3. Deep Learning https://nptel.ac.in/courses/106105215