GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology					Branch/Spec.	Computer Engineering (Artificial Intelligence)		
Semester	II					Version	1.0.1.1		
Effective from Academic Year			2025-26			Effective for the Batch admitted in			July 2025
Course Code	3CEAI202		Course Name			Applied Deep Neural Network			
Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	-	1	-	4	Theory	50	50	100
Hours	3	-	2	-	5	Practical	30	20	50

Pre-requisites

Linear Algebra, Probability and Information Theory and Machine Learning

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	Comprehend and summarize the different deep neural network techniques.
CO2	Apply and implement the deep neural networks.
CO3	Identify various ways of selecting suitable model parameters for different deep neural network.
CO4	Evaluate deep learning model with performance parameters

Theory Syllabus

1	**Introduction to Deep Neural Networks:** History of Deep Neural Networks, Neural Networks Success Stories, McCulloch Pitts Neuron, Perceptron and Deep Neural Networks, Training Neural networks with Tensorflow, Common Tensorflow API's - KERAS, Estimator, Layers, Machine Learning vs Neural Networks.	03
2	**Deep Neural Networks:** Basics of Machine Learning: features, weights, loss function, cost function, Types of NN-CNN, RNN, Feedforward, Estimator, Layers, Datasets, training set, validation sets, testing set, evaluation measures: accuracy, precision, recall, f-measure.	05
3	**Convolutional Neural Networks (CNNs) Architectures:** Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Learning Vectorial Representations of Words.	08
4	**CNNs for Recognition, Verification, Detection:** CNNs for Detection: Background of Object Detection, R-CNN, Fast R-CNN, Faster R-CNN, YOLO.	07
5	**Model Improvement:** Overfitting vs underfitting, Bias vs Variance, hyper parameter tuning: random, coarse to fine; Regularization: L1, L2 regularization, Dropout, Early stopping, Data normalization, Augmentation; Convolutional Neural Networks: convolution, striding, padding, pooling, 1x1 convolution, famous CNN models; CNN Applications: Transfer Learning, Image classification, face detection, object detection.	07
6	**Generative Applications:** Understanding Generative Adversarial Networks, Image Inpainting, Image Super Resolution, Colorization of Black and White Images, Human Face Generation, Music Generation.	05
7	**Temporal data analysis:** Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs Encoder Decoder Models.	06
8	**Application of Deep Neural Network models:** Multitask Deep Learning, Multiview Deep Learning, automatic image captioning, TensorFlow, PowerAI.	04

Practical Content

Practicals, assignments and tutorials are based on syllabus.

Text Books

1	Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT Press (Latest Edition).

Reference Books

1	Modern Deep Learning and Advanced Computer Vision, A Perspective Approach by Dr. P.S.Jagadeesh Kumar, Prof. Thomas Binford, Dr.J. Ruby, J. Lepika (Latest Edition).
2	Neural Networks: A Classroom Approach by Satish Kumar, Tata McGraw-Hill Education (Latest Edition).
3	Advanced Deep Learning with TensorFlow 2 and Keras: Apply DL, GANs, VAEs, deep RL, unsupervised learning, object detection and segmentation, and more by Atienza, R. Packt Publishing Ltd., (Latest Edition).
ICT/MOOCs Reference	
1	Deep Learning for Computer Vision, IIT Hyderabad https://nptel.ac.in/courses/106/106/106106224/
2	https://www.coursera.org/learn/neural-networks-deep-learning
3	https://www.udacity.com/course/deep-learning-nanodegree--nd101
4	https://www.edx.org/learn/deep-learning

Mapping of CO with PO and PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	0	0	1	0	1	0	0	2	2	0
CO2	3	1	2	3	3	0	3	0	3	0	1	3	3	2
CO3	3	2	1	2	3	0	2	0	2	0	1	2	2	1
CO4	3	2	3	3	3	0	3	0	2	0	1	2	2	1