GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Electronics and Communication Engineering
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective for the Batch admitted in	July 2023
Course Code	2EC71PE10	Course Name	Deep Learning and Applications

Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites

Course Outcomes

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

CO1	Explain fundamental concepts of deep learning, machine learning basics, and neural network models including perceptron and backpropagation networks.
CO2	Apply optimization techniques and regularization methods to train deep neural networks effectively.
CO3	Design and analyze convolutional neural network (CNN) architectures for image and pattern recognition applications.
CO4	Implement and evaluate deep learning models for time-series data and special applications such as RNNs, LSTMs, GANs, and Transformers.

Theory Syllabus

Unit	Content	Hrs.
1	**Introduction to Deep Neural Networks**: History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Perceptron and Deep Neural Networks, Backpropagation Neural Network, Basics of Machine Learning: features, weights, loss function, cost function, Training Neural networks, Datasets, training set, validation sets, testing set, evaluation measures: accuracy, precision, recall, f-measure	10
2	**Optimization Techniques**: Gradient Descent and its Variants (SGD, Momentum, AdaGrad, Adam, RMSProp); Batch Normalization; Dropout, Regularization, L1 and L2 Regularization	7
3	**Convolutional Neural Networks** Introduction to Convolutional Neural Networks (CNN), Basic architecture, Convolutional Layers, Pooling Layers, Activation functions, Handling vanishing gradient problem, Dropout, Batch Normalization; Different CNN Models: LeNet, AlexNet, VGGNet, GoogleNet, ResNet, DenseNet, Training of Deep neural Networks, Hyper parameter tuning, transfer learning, Dataset augmentation	11
4	**Deep Learning Neural Networks for Time Series Data** Feedforward and Recurrent Neural Networks (RNN), Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Bidirectional RNNs, Deep RNN, Long Short-Term Memory Networks (LSTMs), Bidirectional LSTMs, Gated Recurrent Unit (GRU), Application of Deep Learning Networks in Various Forecasting Problems	11
5	**Neural Networks for Special Applications** Introduction to Encoder Decoder Models, Variational Autoencoders, GAN and Different Type of GAN‟s, Implementation on GAN‟s, Siamese network, Attention and Transformers, Types and Applications.	6

Practical Content

Practical assignments and tutorials are based on the above syllabus.

Text Books	
1	Deep learning by Goodfellow, MIT press.
2	Deep learning: Foundations and concepts by Bishop, C. M., & Bishop, H, Springer Nature
Reference Books	
1	Simon Haykin, Neural Networks and Learning Machines, Third Edition, Paper Back, Pearson India
2	Josh Patterson and Adam Gibson, Deep Learning A Practitioner‟s Approach, O‟Reilly Media, Inc
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106/106/106106224/
2	https://nptel.ac.in/courses/108103192

Mapping of CO with PO and PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	1	1	-	-
CO2	2	3	2	2	2	-	-	-	-	-	-	1	2	1	-
CO3	2	3	3	2	3	-	-	-	-	-	-	2	3	2	1
CO4	2	3	3	3	3	-	-	-	-	-	-	2	3	3	2