Lesson Plan

	DPG Institute of Technology and Management **Sector 34, Gurugram HR 122004**
	Lesson Plan
	Course Name: Neural Networks
	Faculty Name: Ms. Renu Vadhera

No. of Lecture Hours/Week	**3**	**Exam Hours**	**3**
Total No. of Lecture Hours	**32**	**Exam Marks**	**75**
Course Code	**PCC-CSE-401G**		

Course Objectives

1. To understand the different issues involved in the design and implementation of Neural Networks.
2. To study the basics of neural networks and its activation functions.
3. To understand and use of perceptron and its application in real world
4. To develop an understanding of essential NN concepts such as: learning, feed forward and feed backward
5. To design and build a simple NN model to solve a problem

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
SECTION A – Unit 1: Introduction to Neural Networks CO401.1				
1	Overview of biological neurons: structure of biological neuron	Chalk & Talk	Draw biological neuron structure	
2	Neurobiological analogy	Chalk & Talk	Comparison chart between biological and artificial neurons	
3	Biological neuron equivalence to artificial neuron model	Chalk & Talk	Diagram of artificial neuron model	
4	Evolution of neural networks	PPT	Discussion on historical development	
5	Activation functions – introduction and importance	Chalk & Talk	Brainstorming session	
6	Threshold and Signum functions	Chalk & Talk	Solve example threshold calculations	
7	Sigmoid and Tan-hyperbolic functions	PPT	Graph plotting in notebook	
8	Stochastic and Ramp functions	Chalk & Talk	Graph sketching activity	
9	Linear and Identity functions	Chalk & Talk	Example-based demonstration	
10	ANN Architecture: Introduction and types	Chalk & Talk	Classification diagram of ANN	
11	Feed forward and Feed backward networks	Chalk & Talk	Draw simple feedforward diagram	

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
12	Single and multi-layer networks	Chalk & Talk	Comparison activity	
13	Fully recurrent networks	PPT	Class discussion and sketch	
SECTION B – Unit 2: Basic Neural Network Models CO401.2				
14	McCulloch & Pitts (MCP) Neural Network: Architecture	Chalk & Talk	Step-by-step derivation	
15	Solution of AND function using MCP model	Chalk & Talk	Numerical example	
16	Solution of OR function using MCP model	Chalk & Talk	Problem-solving in notebook	
17	Hebb Model: Architecture, training and testing	Chalk & Talk	Write Hebbian learning equation	
18	Hebb network for AND function	Chalk & Talk	Practice AND example	
19	Perceptron Network: Architecture	Chalk & Talk	Block diagram of perceptron	
20	Perceptron: Training and Testing	PPT	Numerical exercise	
21	Single and multi-output models	Chalk & Talk	Case-based example	
22	Perceptron for AND function	Chalk & Talk	Class exercise	
23	Linear function and applications	Chalk & Talk	Discussion on regression analogy	
24	Linear separability concept	Chalk & Talk	Diagram of separable vs non-separable data	
25	Solution of OR function using linear separability model	Chalk & Talk	Numerical solution	
SECTION C – Unit 3: Learning in Neural Networks CO401.3				
26	Learning paradigms: Supervised and Unsupervised	Chalk & Talk	Comparison table activity	
27	Reinforcement learning	PPT	Real-world example discussion	
28	Gradient Descent algorithm	Chalk & Talk	Numerical illustration of weight update	
29	Generalized delta learning rule	Chalk & Talk	Derivation and example	
30	Hebbian and Competitive learning	Chalk & Talk	Comparison activity	
31	Backpropagation network: Architecture	Chalk & Talk	Draw BPN block diagram	
32	Training and Testing of BPN	PPT	Python demonstration or pseudocode	
SECTION D – Unit 4: Associative Memory Networks Co401.4				
33	Associative Memory: Concept and Types	Chalk & Talk	Discussion on memory analogy	
34	Auto & Hetero associative memory – architecture	Chalk & Talk	Diagram drawing	

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
35	Training and Testing using Hebb & Outer Product Rule, Storage capacity, Bidirectional memory	Chalk & Talk	Solved numerical and summary	

Suggested Text / Reference Books

Text books:

Reference Books:

1. “Neural Networks :A Comprehensive formulation”, Simon Haykin, 1998, AW
2. “Neural Networks”, Kosko, 1992, PHI.
3. “Neural Network Fundamentals” – N.K. Bose , P. Liang, 2002, T.M.H
4. Neural Network , T.N.Shankar, University Science Press
5. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

Signature of Staff In-charge Signature of HOD