	DPG Institute of Technology and Management **Sector 34, Gurugram HR 122004**
	Lesson Plan
	Course Name: Deep Learning (AIML 7th sem)
	Faculty Name: Ms. Renu Vadhera

No. of Lecture Hours/Week	**3**	**Exam Hours**	**3**
Total No. of Lecture Hours	**3**	**Exam Marks**	**75**
Course Code:	**PCC-AIML-451G**		

Course Objectives:

1. 1. Understand the concepts of Neural Networks and Deep Learning
2. Understand Deep neural network and layered learning approach
3. Study and understand CNN and RNN for deep learning
4. Learn and understand Auto Encoders and its applications
5. Understand concept of transfer learning and its applications with keras

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
SECTION A – Unit 1: Deep Learning Fundamentals (CO451.1)				
1	Fundamentals about Deep Learning	Chalk & Talk	Introductory discussion on concept and importance	
2	Deep Learning vs Machine Learning	Chalk & Talk	Comparison chart activity	
3	Historical context and motivation for Deep Learning	PPT	Timeline creation of DL evolution	
4	Importance of Deep Learning	Chalk & Talk	Case study on real-world DL applications	
5	Advantages and limitations of Deep Learning	Chalk & Talk	Group discussion	
6	Components of a Deep Learning System	Chalk & Talk	Diagram-based explanation	
7	Applications of Deep Learning in various domains	PPT	Presentation by students	
8	Recent trends and future of Deep Learning	Chalk & Talk	Short video analysis and reflection	
SECTION B – Unit 2: Deep Neural Networks (CO451.2)				
9	Common architectural principles of Deep Networks	Chalk & Talk	Sketch of DNN architecture	
10	Building blocks of Deep Networks	Chalk & Talk	Identify network components in examples	

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
11	Role and importance of activation functions	PPT	Compare ReLU, Sigmoid, Tanh graphs	
12	Types of activation functions	Chalk & Talk	Function graph plotting activity	
13	Loss functions and their types	Chalk & Talk	Solve sample loss calculation	
14	Overfitting and Underfitting	Chalk & Talk	Visualization using plotted curves	
15	Model exploration and optimization	Chalk & Talk	Brainstorm on improving model accuracy	
16	Hyperparameter tuning	Chalk & Talk	Demonstration using sample dataset	
SECTION C – Unit 3: Convolutional Neural Networks (CNNs) CO451.3				
17	Basics of Convolutional Neural Networks	Chalk & Talk	Introduction with simple image example	
18	Building a CNN: Input, Convolution, Pooling, Dense layers	PPT	Layer-by-layer visualization	
19	Padding, Stride, and Kernel operations in CNN	Chalk & Talk	Board demonstration with small matrices	
20	Activation functions and optimizers in CNN	Chalk & Talk	Compare ReLU vs Softmax	
21	Operations in CNN: Forward and backward pass	Chalk & Talk	Step-by-step example	
22	CNN Architectures: AlexNet	YouTube Video	https://youtu.be/L5jJIN8Z4lo	Watch and summarize architecture
23	VGGNet architecture	Chalk & Talk	Diagram and layer description	
24	YOLO (You Only Look Once) Object Detection model	PPT	Real-time demo using video clips	
SECTION D – Unit 4: Recurrent Neural Networks (RNNs) CO451.4				
25	Need of Recurrent Neural Networks	Chalk & Talk	Discussion on sequence data examples	
26	Bidirectional RNNs	Chalk & Talk	Diagram-based explanation	
27	Encoder-Decoder architecture	Chalk & Talk	Sketch translation model	
28	Backpropagation in RNN (BPTT)	Chalk & Talk	Numerical example walkthrough	

S. No	Topics to be covered	Teaching Methodology	Activity	Remarks
29	Problems in RNN: Vanishing and exploding gradient	PPT	Diagram explanation and solution discussion	
30	Long Short-Term Memory (LSTM)	YouTube Video	https://youtu.be/sx0UPzztC5o	Watch & summarize working of LSTM
31	Gated Recurrent Units (GRU)	Chalk & Talk	Comparison between LSTM & GRU	
32	Applications of RNNs in NLP and Time Series	Chalk & Talk	Case study on text prediction	
33	Introduction to Transformers and BERT models	Online Expert Talk	Discussion on attention-based models	
34	Latest trends in Deep Learning research	Seminar Discussion	Student presentations	

Suggested Text / Reference Books

1. I. Goodfellow, Y. Bengio and A. Courville *Deep Learning(1e),* MIT Press,2016.
2. T. Hastie, R. Tibshirani, and J. Friedman *The Elements of Statistical Learning(2e),* Springer,2013.
3. D. Koller, and N. Friedman *Probabilistic Graphical Models*, MIT Press,2010.

Course Outcomes:

At the end of the course, the student will be able:

CO 1	Apply basic mathematical concepts in Deep Learning, Work with powerful framework for supervised learning
CO 2	Apply various network models in deep learning
CO 3	Deal with Convolution Neural Networks
CO 4	Apply various network models in deep learning

Signature of Staff In-charge Signature of HOD