Semester: 6th			
Paper code: AIML308T	**L**	**T/P**	**Credits**
Subject: Advances in Deep Learning	**3**	**0**	**3**
Marking Scheme			
1. Teachers Continuous Evaluation: As per university examination norms from time to time			
2. End term Theory Examination: As per university examination norms from time to time			
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per university norms			
1. There should be 9 questions in the end term examination question paper.			
2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions.			
3. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit.			
4. The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.			
5. The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required.			
Course Objectives:			
1.	To learn advanced concepts in deep learning.		
2.	To understand different methods of optimization in deep learning.		
3.	To learn practical tips in training deep learning models.		
4.	To know research methods in the field of deep learning.		
Course Outcomes:			
CO1	Describe the advanced concepts in deep learning.		
CO2	Explain different methods of optimization in deep learning.		
CO3	Define practical tips in training deep learning models.		
CO4	State research methods in the field of deep learning.		

Course Outcomes (CO) to Programme Outcomes (PO) Mapping

(Scale 1: Low, 2: Medium, 3: High)

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	2	2	-	1	1							1
CO2	2	2	-	1	1							1
CO3	2	2	-	2	2					1	1	2
CO4	3	1	3	1	2	1				1	1	2

Course overview:

Deep Learning is the most popular branch of machine learning which uses neural network-based models for solving problems in a number of domains. Therefore, it is important that after understanding the fundamental concepts of deep learning in 'Deep Learning - I', more advanced concepts are taught so that students could apply them in problem solving to solve problems

effectively.

UNIT I [8]

Reviewing Deep Learning Concepts: Reviewing Deep Learning Concepts, NN, Regularization, Batch Normalization, Weight Initialization Strategies, Learning vs Optimization, Effective training in Deep Net ,Early Stopping, Normalization (Batch,Instance,Group), Batch Gradient Descent (GD), GD with momentum).

UNIT II [8]

Recent Trends in Deep Learning Architectures: Recent Trends in Deep Learning Architectures, Residual Network, Skip Connection Network, Image Denoising, Semantic Segmentation, Object Detection etc. Neural Attention Models, Neural Machine Translation. Performance Metrics, Baseline Methods, Data Requirements, Hyperparameter Tuning: Manual vs Automatic, Grid vs Random.

UNIT III [8]

Improved Optimization: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT IV [8]

Deep Generative Models: Generative Adversarial Networks (GANs). Generating Images with Various Auto Encoders, Generative Adversial Networks (GAN), The Generator, The Discriminator, The Adversial Network, Training GAN. Introduction to Natural Language Processing (NLP), Text Classification and Deep Learning. Case study: Action recognition, shape recognition, visual instance recognition, emotion recognition.

Text Books

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville,"Deep Learning" MIT Press, 2016.

Reference Books:

1. Duda, R.O. and Hart, P.E., 2006. Pattern classification. John Wiley & Sons.