SCHEME –I
SEMESTER 8

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-801(A)	Advanced Machine learning	PEC	3	3	0	0	50	100	150

Course Outcomes:

At the end of the course the students will be able to:	
CO1	Apply probabilistic learning techniques for optimizing AI models
CO2	Articulate the application of decision trees for solving classification and regression problems.
CO3	Develop understanding of optimization techniques for ANNs.
CO4	Apply Deep Learning Architectures for a specific class of applications.
CO5	Appreciate reinforcement learning technique and its applications to specific use-cases.

Detailed Syllabus

Section-A

Unit 1: Probabilistic Model: Probability theory: sample space, probability function, conditional probability, Bayesian Learning Probability theory and Bayes rule, Naive Bayes learning algorithm, Bayes nets. **(9 Hrs.)**

Unit 2: Representation of Decision Tree: Decision Trees concepts, Recursive induction of decision trees, best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity, Overfitting and underfitting, Noisy data, and Data pruning. Random Forest approach. **(10 Hrs.)**

Unit 3: Artificial Neural Network (ANN): Introduction to ANN, Perceptron, Cost Function, Gradient Checking, Multi-Layer Perceptron and Backpropagation Algorithm, Neural Network, Random Initialization. **(10 Hrs.)**

Section B

Unit 4: Introduction to Deep Learning Architectures: Overview of deep learning architectures and their advantage, Understanding the depth, width, and capacity of neural networks. Concept of autoencoders for unsupervised learning and dimensionality reduction. **(10 Hrs.)**

Unit 5: Reinforcement Learning: Introduction to Reinforcement Learning (RL), Markov Decision Process (MDP) formulation, Components of RL: Agent, Environment, State, Action, Reward, Policy, Value function, Function approximation. **(9 Hrs.)**

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Machine Learning	Tom Mitchell	McGraw Hill	1st (1997)
2	Machine Learning: a Probabilistic Perspective	Kevin P. Murphy	The MIT Press	1st (2012)

Reference Book

S.No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Machine Learning	Jeeva Jose	Khanna Book Publishing	1st (2020)
2	Introduction to Machine Learning,	Ethem Apaydin,	The MIT Press	2nd (2010)