1.	Title of the course	Artificial Neural Networks
2.	Course number	CS511L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CS5222/20
6.	To be offered by	Department of Computer Science and Engineering
7.	To take effect from	January 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To impart knowledge on design and development of Artificial Neural Networks (ANN). To impart knowledge on mathematical modeling in ANNs for pattern recognition problems.	
10.	**Course Content:** Background to Artificial Neural Networks (ANN) and Parallel and Distributed Processing (PDP), PDP models, basics of ANN including terminology, topology and learning laws; Analysis of Feed-Forward Neural Networks (FFNN) including linear associative networks, perceptron network, multilayer perceptron, gradient descent methods and backpropagation learning; Analysis of Feed Back Neural Networks (FBNN) including Hopfield model, state transition diagram, stochastic networks, Boltzmann learning law; Analysis of Competitive Learning Neural Networks (CLNN) including networks for pattern clustering, feature mapping and self organization; Evolution of ANN architectures: Boltzmann Machine (BM), Restricted Boltzmann Machine (RBM), Deep Neural Networks (DNN).	
11.	**Textbook(s):** 1. Haykin S, *Neural Networks and Learning Machines*, 1st Edition, Pearson Education (2011). 2. Yegnanarayana B, *Artificial Neural Networks*, 1st Edition, Prentice-Hall India (1999).	
12.	**Reference(s):** 1. Goodfellow I, Bengio Y and Courville A, *Deep Learning*, MIT Press (2017). 2. Rumelhart D E and McClelland J L, *Parallel and Distributed Processing: Explorations in Microstructure of Cognition*, 1st Edition, Vol. 2, MIT Press (1986). 3. Rumelhart D E and McClelland J L, *Parallel and Distributed Processing: A Handbook of Models*, 1st Edition, MIT Press (1989). 4. Rumelhart D E, McClelland J L, Zachary C L,Mu L and Alexander J S, *Parallel and Distributed Processing: Explorations in Microstructure of Cognition*, 1st Edition, Vol. 1, MIT Press (1986).	