Branch: Computer Science and Engineering

Course Code	**CS 705B**
Course Title	**NEURAL NETWORKS**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Data Communication and Networks (CS 501), Web Technologies (CS 402), Database Systems (CS 302)
Course Objectives (CO)	1. To introduce concepts of artificial neural networks and principles of leaning and regression. 2. To learn various types of neural networks and their working principles 3. To understand role of neural network in various applications and apply it to multi-class classification etc.
Course Outcome	1. Understand basic concepts of neural networks. 2. Use neural networks to perform classification for single class and multiclass problems. 3. Learn and apply the concept of self organizing maps.

SYLLABUS

Note for Examiner*- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Neural Network Basics

Classical AI and Neural Networks, characteristics of neural networks, Historical perspective, The biological inspiration, models of artificial neuron & activation functions, Artificial Neuron Model and Linear Regression, Nonlinear Activation Units and Training of artificial neural networks.
(6 hours)

Learning Mechanisms: Gradient Descent Algorithm, Learning Mechanisms-Hebbian, Competitive, Boltzmann , Universal function approximation.

(6 hours)

Single Layer and Multi layerPerceptrons:

Representation of perceptron, Linear separability, Perceptron Learning, Single-Layer Perceptions , Unconstrained Optimization: Gauss-Newton's Method, Linear Least Squares Filters, Least Mean Squares Algorithm , Perceptron Convergence Theorem , Back Propagation Algorithm, Practical Consideration in Back Propagation Algorithm Training of single layer and multi-layer, back propagation training algorithm, Applications of back propagation,

Solution of Non-Linearly Separable Problems Using MLP, Heuristics For Back-Propagation, Multi-Class Classification Using Multi-layered Perceptrons

(12 hours)

SECTION-B

Associative Memory Networks:- Associative Memory Model, Conditions for perfect Recall in Associative memory.

Radial Basis Function Networks: Introduction ,Separability and Interpolation, Learning Mechanisms in RBF, Comparison Between MLP and RBF

(5 hours)

Introduction to Principal Components and Analysis, Dimensionality reduction Using PCA, Hebbian-Based Principal Component Analysis

(5 hours)

Self OrganizingMaps : Introduction to Self Organizing Maps, Cooperative and Adaptive Processes in SOM, Vector-Quantization Using SOM, Competitive learning, Maxican Hat networks

(6 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Neural Networks, fuzzy Logic, and Genetic Algorithms	Rajasekaran&Vijayalakhmi Pai	Pearson, 2011
2	Principles of Soft Computing	Sivanandam, Deepa	Wiley, 2014
3	Neural Networks – A Classroom Approach	Satish Kumar	Tata Mcgraw, 2010

Branch: Computer Science and Engineering

Course Code	**CS 755B**
Course Title	**NEURAL NETWORKS (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical based on Neural Networks syllabus.