

| GANPAT UNIVERSITY | | | | | | | | | |
|---|---|------------------------|---------|-----------------|-------------------------------------|-------------------------------|------------------------|-----------|------|
| FACULTY OF ENGINEERING & TECHNOLOGY | | | | | | | | | |
| Programme | | Bachelor of Technology | | | Branch/Spec. | | Biomedical Engineering | | |
| Semester | | VIII | | | Version | | 2.0.0.0 | | |
| Effective from Academic Year | | | 2017-18 | | Effective for the batch Admitted in | | | July 2017 | |
| Subject code | | 2BM804 | | Subject Name | | Neural Networks & Fuzzy Logic | | | |
| Teaching scheme | | | | | Examination scheme (Marks) | | | | |
| (Per week) | | Lecture(DT) | | Practical(Lab.) | | Total | | Total | |
| | L | TU | P | TW | | CE | SEE | | |
| Credit | 4 | - | 1 | - | 5 | Theory | 40 | 60 | 100 |
| Hours | 4 | - | 2 | - | 6 | Practical | 25 | 25 | 50 |
| Pre-requisites: Good Knowledge of Human Nervous system and MATLAB. | | | | | | | | | |
| Learning Outcome: The educational objectives of the course are to educate students to attain the following: | | | | | | | | | |
| <ul style="list-style-type: none"> • Concepts of Artificial Intelligence and its application in Biomedical Engineering • Artificial Neural Network architecture, learning strategy and learning rule • Real time Implementation of Artificial Neural Network and Fuzzy Logic using Matlab. | | | | | | | | | |
| Theory syllabus | | | | | | | | | |
| Unit | Content | | | | | | | | Hrs. |
| 1 | INTRODUCTION TO NEURAL NETWORKS: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Types of medical and biological data, Objective of Neural networks, Biological, Characteristics of ANN, Historical Developments, Potential Applications of ANN. Classification of neural networks. | | | | | | | | 6 |
| 2 | FUNDAMENTAL OF ARTIFICIAL NEURAL NETWORKS: Artificial Neuron Model, McCulloch-Pitts Model, Types of Neuron Activation Function, ANN Architectures, Learning Strategy, Learning Rules. | | | | | | | | 8 |
| 3 | LEARNING TECHNIQUES: Types of learning-supervised and unsupervised learning, Error Correction learning, Hebbian learning, Competitive learning, Perceptron learning, Perceptron Convergence theorem and its applications. Adaptive Linear neuron with Applications, Back propagation Network. | | | | | | | | 8 |
| 4 | DESIGN ISSUES: Input data types, structure of networks, implication of network structures, choice of learning algorithms, Comparative Analysis: Input data considerations, Supervised learning algorithms, Unsupervised learning, Network structures, Interpretation of results, Data checking, validation of learning algorithm, Evaluation of performance. | | | | | | | | 8 |
| 5 | FUZZY SYSTEMS : Introduction, Partial truth & Fuzziness, Foundation of Fuzzy systems, Fuzzy systems at work, Fuzzy system design Membership Functions, Defuzzification. | | | | | | | | 7 |
| 6 | CLASSICAL SETS AND FUZZY SETS: Introduction, Classical Set; Operations on Classical Sets, Properties of Classical Sets, Mapping of Classical Sets to a Function, Fuzzy Sets; Fuzzy Set Operations, Properties of Fuzzy Sets, Fuzzy Arithmetic & Extension Principle. | | | | | | | | 8 |
| 7 | CLASSICAL AND FUZZY RELATIONS Introduction, Cartesian product of Relation, Classical Relations, Fuzzy Relations, Tolerance and Equivalence Relations. | | | | | | | | 8 |
| 8 | FUZZY RULE-BASED SYSTEM&FUZZY DECISION MAKING Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Fuzzy Inference System, Fuzzy c-Means Clustering, Introduction to Decision making, Fuzzy Ordering, Individual Decision Making, Multi-Person Decision Making, Type 1 and Type 2 Fuzzy system, Fuzzy control of biomedical instrumentation application. | | | | | | | | 4 |
| Practical content: Term Work and Practical shall be based on the above syllabus. | | | | | | | | | |
| Text Books: | | | | | | | | | |
| 1 | Neural Networks By: Simon Haykin Pub: Pearson Education NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS | | | | | | | | |
| 2 | Fuzzy Logic With Engineering Applications By: Timothy J. Ross. , Pub: A John Wiley and Sons, Ltd. | | | | | | | | |
| Reference Books | | | | | | | | | |
| 1 | Neural Networks and Artificial Intelligence for Biomedical Engineering. By: Donna L.Hudson and Maurice E. Cohen. Pub: Prentice Hall of India. Pvt. Ltd. New Delhi. | | | | | | | | |
| 2 | Fuzzy systems Design Principles By: Riza C. Berkan and Sheldon L. Trubateh. Pub: Standard Publishers and Distributors. | | | | | | | | |
| 3 | Neuro-Fuzzy and Soft computing By: J.S.R Jang, C.T.Sun and E.Mizutani. Pub: Prentice Hall of India. Pvt. Ltd; New Delhi | | | | | | | | |