**A screenshot of a cell phone

Description generated with very high confidenceCOURSE HANDOUT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Department :** | **Information Technology** | | |
| **Course Name & code :** | **Soft Computing Paradigms** | | **CSE\_4054** |
| **Semester & branch :** | **VII** | **CSE-Cyber Security** | |
| **Name of the faculty :** | **Dr. Ruhul Amin Hazarika** | | |
| |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | **3** | **0** | **0** | **3** |   **No of contact hours/week:** | | | |

**COURSE OUTCOMES (COS)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **At the end of this course, the student should be able to:** | | |  | | --- | | **No. of**  **Contact**  **Hours** | | |  | | --- | | **Marks** | | **Program Outcomes (POs)** | **PSO** | **BL (Recommended)** |
| **CO1** | To analyze and appreciate the applications which can use fuzzy logic | 5 | 14 | 1,2,3 | 1 | 3 |
| **CO2** | To design inference systems | 5 | 14 | 1,2,3 | 1 | 3,4 |
| **CO3** | To understand the difference between learning and programming and explore practical applications of Neural Networks (NN). | 10 | 27 | 1,2,3 | 1 | 3,4 |
| **CO4** | To appreciate the importance of optimizations and its use in computer engineering fields and other domains. | 10 | 27 | 1,2,3 | 1 | 3,4 |
| **CO5** | Students would understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy/ Neuro-genetic network and its various applications. | 6 | 18 | 1,2,3 | 1 | 3,4 |
|  | **Total** | **36** | **100** | **1,2,3** | **1** |  |

**Assessment Plan**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***IN – SEMESTER ASSESSMENTS*** | | | | | | | | | |
| **S. No.** | **Assessment Mode** | | **Assessment Method** | **Time Duration** | **Marks** | **Weightage** | **Typology of Questions (Recommended)** | **Schedule** | **\*\*Topics Covered** |
|  |  | **1** | **Quiz** | **30 Mins** | **10** | 10 MCQs × 1 = 10 | Bloom’s taxonomy (BT) level of the question should be L3 and above. | Aug. 12 -30 2024 | Module 1 |
| **2.** | **In-semester Exam 1** | **60 Mins** | **30** | **Objective:** 5M  10MCQs ×1 marks= 10marks  **Descriptive:** 20 M  (4 Questions of 2 marks +4 Questions of 3 marks) | Bloom’s taxonomy (BT) level of the question should be L3 and above. | Sep. 23-30, 2024 | Module 1, Module 2 & Module 3 |
| **3** | **Assignment** | **-** | **10** | 5questions × 2marks= 10 marks  (Minimum 5 questions to be given) | Bloom’s taxonomy (BT) level of the question should be L3 and above. | Oct. 7-23, 2024 | Module 1, Module 2, Module 3, & Module 4 |
| ***END – SEMESTER ASSESSMENT*** | | | | | | | | | |
| 1 | **Regular/Make–Up Exam** | | | 180 Mins | 50 | Answer all 5 full questions of 10 marks each. Each question can have 3 parts of 2/3/4/5/6 marks. | Bloom’s taxonomy (BT) level of the question should be L3 and above. | 19th Nov 2024 | Comprehensive examination covering full syllabus. |

***\*\* Individual faculty will be entering the topics***

***\*\*\* Individual faculty must identify the assessment method from table 3 and fill in the details.***

***NOTE: Information provided in the table is as per the In-semester assessment plan and schedule of V and VII semester B. Tech provided from Academic Section.***

**LESSON PLAN**

|  |  |  |  |
| --- | --- | --- | --- |
| **L No** | **TOPICS** | |  | | --- | | **Course Outcome Addressed** | |
| 1 | Introduction to Soft Computing, Artificial Intelligence | CO2 |
| 2 | Soft-Computing Techniques, Expert Systems Types of Problems | CO2 |
| 3 | Modeling the Problem, Machine Learning | CO2 |
| 4 | Handling Impreciseness, Clustering | CO2 |
| 5 | Hazards of Soft Computing, Road Map for the Future | CO2 |
| 6 | Artificial Neural Networks, The Biological Neuron, The Artificial Neuron | CO3 |
| 7 | Multilayer Perceptron | CO3 |
| 8 | Modeling the Problem | CO3 |
| 9 | Types of Data Involved, Training | CO3 |
| 10 | Issues in ANN, Example of Time Series Forecasting | CO3 |
| 11 | Types of Artificial Neural Networks, Radial Basis Function Network | CO3 |
| 12 | Learning Vector Quantization, Self-Organizing Maps | CO3 |
| 13 | Recurrent Neural Network, Hopfield Neural Network | CO3 |
| 14 | Adaptive Resonance Theory | CO3 |
| 15 | Character Recognition by Commonly Used ANNs | CO3 |
| 16 | Fuzzy Systems, Fuzzy Logic, Membership Functions, Fuzzy Logical Operators | CO1 |
| 17 | More Operations, Fuzzy Inference Systems, Type-2 Fuzzy systems | CO1 |
| 18 | Other Sets, Sugeno Fuzzy Systems | CO1 |
| 19 | Example: Fuzzy Controller Evolutionary Algorithms | CO1 |
| 20 | Evolutionary Algorithms, Biological Inspiration | CO1 |
| 21 | Evolutionary Algorithms, , , , , , , , | CO4 |
| 22 | Genetic Algorithms | CO4 |
| 23 | Fitness Scaling, Selection | CO4 |
| 24 | Mutation, Crossover | CO4 |
| 25 | Other Genetic Operators, Algorithm Working | CO4 |
| 26 | Diversity | CO4 |
| 27 | Grammatical Evolution | CO4 |
| 28 | Other Optimization Techniques | CO4 |
| 29 | Meta heuristic Search | CO4 |
| 30 | Traveling Salesman Problem | CO4 |
| 31 | Introduction, Key Takeaways from Individual Systems | CO5 |
| 32 | Adaptive Neuro-Fuzzy Inference Systems | CO5 |
| 33 | Evolutionary Neural Networks, Evolving Fuzzy Logic | CO5 |
| 34 | Fuzzy Artificial Neural Networks with Fuzzy Inputs | CO5 |
| 35 | Rule Extraction from ANN | CO5 |
| 36 | Modular Neural Network, Neuro-genetic systems. | CO5 |

**Course Articulation Matrix**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO1** |
| **CO1** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **2** |
| **CO2** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **2** |
| **CO3** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **2** |
| **CO4** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **-** |
| **Articulation Level** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **2** |

Text Books:

1. Anupam Shukla, Ritu Tiwari, Rahul Kala, Real Life Applications of Soft Computing , CRC Press,   
 Taylor and Francis Group, London 2010

Reference Books:

1. Timothy J.Ross, Fuzzy Logic With Engineering Applications, Wiley publication, 2010

2. S.N.Sivanandam, S.N.Deepa, Principles of Soft Computing, (2e), Wiley Publication, 2010

3. S.Rajasekaran and G.A.Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms,   
 PHI Learning, 2010.

4. J. S. R.Jang , Neuro-Fuzzy and Soft Computing, PHI 2003.

**Submitted by:**

**(Signature of the faculty)**

**Date:**

**Approved by:**

**(Signature of HOD)**