**Pandit Deendayal Energy University**

**School of Technology**

**Department of Computer Science and Engineering**

**Even Semester 2023-2024**

**Course student handout file**

**INDEX**

| **Name of the course: Artificial Intelligence LAB** | | **Course Code:** **20CP313P** |
| --- | --- | --- |
| **Program: B. Tech.**  **Branch: CE** | | **Semester: 6th**  **Academic Year: 2023-24** |
| **Name of Course Coordinator: Dr. Pooja Shah** | | |
| **Subject Teachers (Division wise/Batch wise):**   1. **Dr. Rajeev Kumar Gupta** 2. **Dr. Chintan Bhatt** 3. **Dr. Rahul Dubey** 4. **Dr. Davinder Singh** 5. **Dr. Abhinav Sharma** | | |
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| **12** | **Copy of Mid and End semester Examination Question Papers (Old and Current), solution of current examination with stage-wise marking scheme** | |
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| **17** | **Justification for Course Outcome mapping with Exams and Assessments** | |
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| **19** | **Direct Attainment of COs and POs and interpretation (Result analysis)** | |
| **20** | **Indirect Attainment of POs through Course Exit Survey (Just before end sem. exam)** | |
| **21** | **Final Attainment of COs and POs and interpretation (Result analysis), Actions to be taken if COs and POs are not achieved** | |
| **22** | **Sample answer scripts of mid sem., end sem. exam and assignments** of **Good, Better and Best performing students (at least five copies of each assessment tool)** | |
| **23** | **Class notes (Lecture PPT & Lab manual etc.) in Soft/ Hard copy** | |

**Date:**

| **Signature of Subject Teachers** | **Signature of Department Coordinator (IQAC)** | **Signature of Head of the Department** |
| --- | --- | --- |

**Departmental Vision & Mission**

**Vision**

“To contribute to the society by imparting transformative education and producing globally competent professionals having multidisciplinary skills and core values to do futuristic research & innovations.”

**Mission**

* To accord high quality education in the continually evolving domain of Computer Engineering by offering state-of-the-art undergraduate, postgraduate, doctoral programmes.
* To address the problems of societal importance by contributing through the talent we nurture and research we do:
* To collaborate with industry and academia around the world to strengthen the education and multidisciplinary research ecosystem.
* To develop human talent to its fullest extent so that intellectually competent and imaginatively exceptional leaders can emerge in a range of computer professions.

**Program educational objectives (PEOs) of Department**

The Program Educational Objectives of B. Tech. (Computer Engineering) program are:

1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
2. To prepare graduates who will make technical contribution to the design, development and production of computing systems
3. To prepare graduates who will get engage in lifelong learning with leadership qualities, professional ethics and soft skills to fulfill their goals
4. To prepare graduates who will adapt state of the art development in the field of computer engineering

**Program Outcomes (POs)**

**Undergraduate engineering program are designed to prepare graduates to attain the following program outcomes:**

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Program Specific Outcomes (PSOs)**

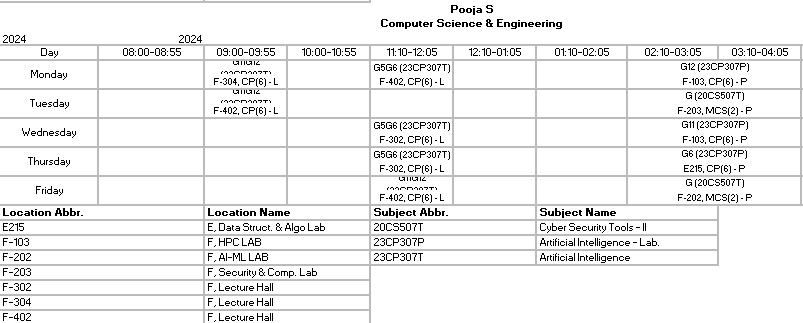
The graduates of CSE department will be able to:

1. Develop computer engineering solutions for specific needs in different domains applying the knowledge in the areas of programming, algorithms, hardware-interface, system software, computer graphics, web design, networking and advanced computing.
2. Analyze and test computer software designed for diverse needs.
3. Pursue higher education, entrepreneurial ventures and research.

**Academic Calendar**

**Will be updated soon**

**Class Time Table and Faculty Time Table with office hours**

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**Contact Hours: 4:15 to 5:15 Monday to Friday**

Pandit Deendayal Energy University School of Technology

| **20CP313P** | | | | | **Artificial Intelligence LAB** | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Teaching Scheme** | | | | | **Examination Scheme** | | | | | |
| **L** | **T** | **P** | **C** | **Hrs/Week** | **Theory** | | | **Practical** | | **Total Marks** |
| **MS** | **ES** | **IA** | **LW** | **LE/Viva** |
| **0** | **0** | **4** | **2** | **4** | **--** | **--** | **--** | **50** | **50** | **100** |

**Course Outcomes (COs), Course Syllabus, Pre requisites for the course**

**COURSE OBJECTIVES**

* To understand data structures and learning algorithms
* To understand Neural Networks
* To develop Expert systems

**LIST OF EXPERIMENTS:**

Practical list should be prepared based on the content of the subject and following guidelines should be useful. The following experiments are suggested:

| **Exp. No.** | **Experiment Title** |
| --- | --- |
| 1 | WAP to implement DFS and BFS for traversing a graph from source node (S) to goal node (G), where source node and goal node is given by the user as an input. |
| 2 | You are given two jugs with m liters and a n liter capacity. Both the jugs are initially empty. The jugs don’t have markings to allow measuring smaller quantities. You have to use the jugs to measure d liters of water where d is less than n. |
| 3 | Solve 8 puzzle problem using A\* algorithm where initial state and Goal state will be given by the users. |
| 4 | WAP to design Tic Tac Toe games from O (Opponent) and X (Player) by using minimax algorithm. |
| 5 | Study of Prolog programming and its function. |
| 6 | WAP to calculate the factorial of a number by using Prolog. |
| 7 | WAP to solve Box Solver problem. |
| 8 | WAP to find the length of the list using Prolog. |
| 9 | Write a program to solve the Monkey Banana problem. |
| 11 | Design Machine Learning model for the house price prediction. Apply genetic algorithm to optimize the performance of the model. To train model, download the dataset from Kaggle. |
| 12 | Design a Machine Learning model for the Heart Attack prediction.  Download the Dataset from <https://physionet.org/about/database/> along with the description |
| 13 | WAP to implement AND logic Gate using perceptron neural network. |
| 14 | Design a Convolutional Neural Network from Scratch for MNIST fashion dataset. Apply dropout technique to deal with the overfitting. Dataset can be downloaded from the Kaggle. |
| 15 | Final Project |

**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1- Apply search techniques like depth first search, A\*, AO\* etc.

CO2- Implement Tic Tac Toe game using alpha beta pruning.

CO3- Implement monkey banana problem using prolog.

CO4- Implement knowledge representation using prolog.

CO5- Developed Neural Network based model for classification and regression.

CO6- Develop AI based solutions to the real-world problem using AI.

**TEXT/REFERENCE BOOKS**

1. Russell, S.J. and Norvig, P., Artificial Intelligence: A Modern Approach, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill.
3. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education.
4. G.Luger, W.A. Sttubblefield, “Artificial Intelligence”, Addison-Wesley Longman.

**END SEMESTER EXAMINATION PATTERN**

| **Max. Marks: 100** | **Exam Duration: 2 Hrs** |
| --- | --- |

| Part A: Evaluation Based on the class performance and Laboratory book | 50 Marks |
| --- | --- |
| Part B: Viva Examination based conducted experiments 50 Marks | |

**Course Articulation Matrix**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PS01** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO 1** | 3 | 2 | 3 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 1 | 3 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 3 | 2 | 2 | 1 | 0 | 2 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| **CO 4** | 3 | 2 | 3 | 2 | 2 | 2 | 0 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 2 | 2 | 2 | 0 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 3 |
| **CO 6** | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |

**Program Articulation Matrix**

| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PS01** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3.00 | 2.33 | 3.00 | 1.83 | 2.00 | 1.67 | 0.2 | 1.50 | 2.00 | 1.00 | 2.00 | 3.00 | 3.00 | 3.00 | 3.00 |

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

**Evaluation Scheme and Rubrics**

**Course code:** 20CP313T **Course name: Artificial Intelligence**

**Course Outcomes (CO's):** On completion of the course, students will be able to

CO1- Apply search techniques like depth first search, A\*, AO\* etc.

CO2- Implement Tic Tac Toe game using alpha beta pruning.

CO3- Implement monkey banana problem using prolog.

CO4- Implement knowledge representation using prolog.

CO5- Developed Neural Network based model for classification and regression.

CO6- Develop AI based solutions to the real-world problem using AI.

**CO Assessment Tools (Direct Assessment):**

Various assessment tools used to evaluate CO’s (Rubrics) and the frequency with which the assessment processes are carried out are listed below.

| **Assessment Method** | **Assessment Tool** | **Description** | **Marks** | **Mapping with CO** | **Contribution to CO’s** |
| --- | --- | --- | --- | --- | --- |
| Continuous Assessment - 1 | Lab Assignments Evaluation | Expected to submits all assignments on time. | 25 |  | It contributes to 25% weightage of Direct Assessment to CO attainment. |
| Continuous Assessment - 2 | Project Evaluation – 1 | Expected to evaluate 40-50% work of the project work. | 10 |  | It contributes to 10% weightage of Direct Assessment to CO attainment. |
| Final Assessment | Project Evaluation – 2 | Expected to evaluate 100% work of the project work. | 15 |  | It contributes to 10% weightage of Direct Assessment to CO attainment |
| VIVA and Practical | VIVA and Practical Evaluation | Expected to check technical knowledge of the student with concept clarity | 50 |  | It contributes to 50% weightage of Direct Assessment to CO attainment |

**11. Tutorials, Assignments, Case Studies, Quiz, Presentations etc.**

**Available online on Teams Platform, PPT sent to students through Email and Teams.**