INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

AI FOUNDATIONS								
II Semester: CSE / IT / CSE (AI&ML) / CSE (DS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACSE06	Foundation	3	0	0	3	40	60	100
Contact Classes: 48	**Tutorial Classes: NIL**	**Practical Classes: NIL**				**Total Classes: 48**		
Prerequisite: Python Programming								

I. COURSE OVERVIEW:

Artificial intelligence (AI) is the simulation that examines to achieve intelligent human behaviors on machines especially on a computer system. This course provides the ideas, methods, and problem-solving paradigms that helps in providing solutions to real-world problems without human effort. Furthermore, it is a mathematical language that enables knowledge to be expressed precisely and unambiguously, making it perfect for usage in AI systems. AI applications are becoming increasingly common in a wide variety of applications including machine language, deep learning, natural language processing, computer vision, and robotics.

II. COURSES OBJECTIVES:

The students will try to learn:

I The fundamental concepts of Artificial Intelligence, including the characteristics of intelligent agents and how AI systems solve problems through state space search and production systems.

II The various problem-solving strategies such as heuristic search, optimization, and logic-based reasoning using predicate logic, along with effective knowledge representation techniques.

III the structure and functionality of software agents, their communication mechanisms, and explore real-world AI applications in natural language processing, robotics, machine learning, and expert systems.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Explain the ability to design a plan for the real-world problems and mapping it to the digital world.

CO2 Choose appropriate problem-solving methods and optimize the search results.

CO3 Develop agents through knowledge representation for any given AI based problem using logic programming.

CO4 Discover how planning helps to automate complicated tasks, manage complex procedures, and optimize them for better results.

CO5 Apply principles of negotiation, bargaining, argumentation, and trust management in multi-agent systems to develop cooperative and competitive software solutions

CO6 Apply artificial intelligence techniques to real-world domains by utilizing language models, information retrieval and extraction.

IV. COURSE SYLLABUS:

MODULE – 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Fundamentals of Artificial Intelligence: Definitions, Introduction, key concepts, Evolution, Terminology, Approaches and Goals. Ethical aspects of Artificial Intelligence. Relation between Artificial Intelligence, Machine Learning and Deep Learning. Intelligent Agents: Structure, Types, and interaction with the environment.

MODULE – 2: KNOWLEDGE REASONING (10)

Introduction to Knowledge representation, Building a Knowledge Base: propositional logic,first order predicate logic and inferencing, resolution, representing Knowledge using rules: Procedural versus Declarative Knowledge, Forward versus Backward reasoning. Uncertain Knowledge and Reasoning, Statistical Reasoning: Probability and Bayes theorem, Bayesian Networks and Dempster-Shafer Theory.

MODULE – 3: PROBLEM SOLVING (09)

State space search; production systems, search space control, Uninformed and Informed Search: depth first search, breadth-first search. Heuristic Search: Best First Search, Hill Climbing, AND/OR Heuristic Search. Game Playing: Minimax, alpha-beta pruning.

MODULE – 4: LEARNING IN ARTIFICIAL INTELLIGENCE (10)

Definition, process, types - unsupervised and supervised learning. Regression, Classification, Bias-Variance trade-off, Overfitting-Underfitting, loss function, cross-validation

MODULE – 5: CASE STUDIES, ISSUES, CHALLENGES AND APPLICATIONS (10)

Healthcare: Diagnosis, treatment, and medical imaging; Finance: Fraud detection, algorithmic trading, and risk assessment; Transportation: Autonomous vehicles and traffic optimization; Customer service and chatbots; Education: Personalized learning and intelligent tutoring systems.

V. TEXT BOOKS:

1. S. Russel, P. Norvig, "Artificial Intelligence – A Modern Approach," Third Edition, Pearson Education, 2015.
2. Patrick Henry Winston ,"Artificial Intelligence", Third Edition, Addison-Wesley Publishing Company, 2004
3. Nils J. Nilsson," Principles of Artificial Intelligence", Illustrated Reprint Edition, Springer Heidelberg, 2014

VI. REFERENCE BOOKS:

1. Kevin Night, Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Third Edition, McGraw Hill, 2017.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3. Khemani, Deepak,"A first course in artificial intelligence", McGraw-Hill Education, 2014

VII. ELECTRONICS RESOURCES:

1. Department of Computer Science, University of California, Berkeley, http://www.youtube.com/playlist?list=PLD52D2B739E4D1C5F
2. NPTEL: Artificial Intelligence, https://nptel.ac.in/courses/106105077/
3. http://www.udacity.com/ 4. http://www.library.thinkquest.org/2705/
4. http://www.ai.eecs.umich.edu/

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Assignments
5. Definitions and terminology
6. Open ended experiments
7. Model question paper-I
8. Model question paper-II
9. Lecture notes
10. Power point presentations
11. ELRV videos