Semester: VII						
AGENTIC ARTIFICIAL INTELLIGENE **Category: Professional Core Course** **(Theory)**						
Course Code	**:**	**AI373TA**		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	**3:1:0**		**SEE**	**:**	**100 Marks**
Total Hours	**:**	**45L + 28 T**		**SEE Duration**	**:**	**3 Hours**

Unit-I — **09 Hrs**

Introduction to Agents

Defining the Agents, understanding the Components of an Agent, Examining the rise of the Agent Era, peeling back the AI interface, Navigating the Agent landscape.

Principles of Agentic System

Understanding self-governance, agency, and autonomy: Self-governance, Agency, Autonomy, Example of agency and autonomy in agents.

Unit – II — **09 Hrs**

Principles of Agentic System

Reviewing intelligent agents and their characteristics, Exploring the architecture of agentic systems: Deliberative architectures, Reactive architectures, Hybrid architectures, Understanding multi-agent systems: Definition and characteristics of MASs, Interaction mechanisms in MASs.

Essential Components of Intelligent Agents

Knowledge representation in intelligent agents: Semantic networks, Frames, Logic-based representations, Reasoning in intelligent agents: Deductive reasoning, Inductive reasoning, Abductive reasoning, Learning mechanisms for adaptive agents.

Unit –III — **09 Hrs**

Essential Components of Intelligent Agents

Decision-making and planning in agentic systems, Utility function, Planning algorithms, enhancing agent capabilities with generative AI: Start building agentic AI.

Reflection and Introspection in Agents

The importance of reflection in agents, Enhanced decision-making, Adaptation, Ethical consideration, Human-computer interaction, Introspection in intelligent agents, implementing reflective capabilities: Traditional reasoning, Meta-reasoning, Self-explanation, Self-modeling, use cases and examples: Customer service chatbots, Personal marketing agents, Financial trading systems, Forecast agents, Price strategies in e-commerce.

Unit –IV — **09 Hrs**

Enabling Tool Use and Planning in Agents

Understanding the concept of tool use in agents: Tool and function calling, Defining tools for agents, Types of tools, The significance of tools in agentic systems, Planning algorithms for agents: Less practical planning algorithms, Moderately practical planning algorithm – FF, Most practical planning algorithms, Integrating tool use and planning: Reasoning about tools, Planning for tool use Exploring practical implementations: CrewAI example, AutoGen example, LangGraph example.

Unit –V — **09 Hrs**

Exploring the Coordinator, Worker, and Delegator Approach

Understanding the CWD model: Key principles of the CWD model, The CWD model for the intelligent travel agent, Designing agents with role assignments: Roles and responsibilities of each agent, Communication and collaboration between agents: Communication, Coordination mechanism, Negotiation and conflict resolution

Knowledge sharing, Implementing the CWD approach in generative AI systems: System prompts and agent behavior, Instruction formatting, Interaction patterns **Effective Agentic System Design Techniques** Agent memory architecture and context management, Short-term memory (working memory), Long-term memory (knowledge base), Episodic memory (interaction history), Context management, Integration with decision-making, Sequential and parallel processing in agentic workflows: Sequential processing, Parallel processing, Workflow optimization.

Course Outcomes	
CO1	Demonstrate a comprehensive understanding of agentic systems, including architectures, and essential components (Autonomy, Knowledge representation, and Reasoning)
CO2	Analyze and apply principles of decision-making, planning, reflection, and introspection in intelligent agents, including the use of generative AI for enhanced agent capabilities.
CO3	Implement agentic systems using practical frameworks, planning algorithms, tool integration, and coordination models such as the coordinator-Worker-Delegator (CWD) approach
CO4	Present the use of modern tools in solving day-to-day problems by exhibiting teamwork through oral presentations and reports

Reference Books	
1.	AI Agents in Action, Micheal Lanham, Manning Publications Co., 1st Edition, ISBN: 9781633436343, 2025.
2.	Building Agentic AI Systems, Anjanava Biswas and Wrick Talukdar, Packt Publishing Ltd., 1st Edition,ISBN: 978-1-80323-875-3, 2025.
3.	AI Agents with Python: Build Autonomous Systems That Think, Learn, and Act, Hayden Van Der Post, 1st Edition, Reactive Publishing, ISBN-13: 979-8315553311, 2025.
4.	A Beginner's Guide to AI Agents: Build Your Own AI Assistant, Elvis Browne, 1st Edition, ISBN-13: 979-8314025642, 2025.

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	**COMPONENTS**	**MARKS**
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. TWO QUIZZES will be conducted & Each Quiz will be evaluated for 10 Marks. **THE SUM OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**20**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 40 MARKS.**	**40**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning (10), Program specific requirements (10), Video based seminar/presentation/demonstration (20) **ADDING UPTO 40 MARKS**.	**40**
	MAXIMUM MARKS FOR THE CIE (THEORY AND PRACTICE)	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type questions covering entire syllabus	20
	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1 : (Compulsory)	16
3 & 4	Unit 2 : Question 3 or 4	16
5 & 6	Unit 3 : Question 5 or 6	16
7 & 8	Unit 4 : Question 7 or 8	16
9 & 10	Unit 5: Question 9 or 10	16
	TOTAL	**100**