

FACULTY OF COMPUTER APPLICATIONS

Programme	Master of Computer Applications					Branch/Spec.	Computer Application																																																				
Semester	II					Version	1.0.0.0																																																				
Effective from Academic Year			2026-27			Effective for the batch Admitted in		June 2026																																																			
Subject Code	P12E6AAR		Subject Name			AI Agents & Reinforcement Learning																																																					
Teaching scheme						Examination scheme (Marks)																																																					
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CIA	SEE	Total																																																		
	L	TU	P	TW																																																							
Credit	2	0	2	0	4	Theory	40	60	100																																																		
Hours	2	0	4	0	6	Practical	20	30	50																																																		
Objective:																																																											
To develop fundamental knowledge of intelligent agents, AI problem-solving, search strategies, multi-agent systems, and reinforcement learning for designing intelligent solutions.																																																											
Prerequisite:																																																											
Basic knowledge of programming, data structures, algorithms, and elementary mathematics.																																																											
Course Outcomes:																																																											
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CO3	2	2	3	3	3	1	2	2																																																			
CO4	3	3	3	3	2	1	2	3																																																			

Content:		
Unit	SECTION – I	Hrs
1	Foundations of Intelligent Agents: Intelligent Systems, Categorization of Intelligent Systems, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications, Development of AI Languages. Intelligent Agents: Rational Agents, Mapping from Sequences to Actions, Properties of Environments, Structure of Intelligent Agents, Types of Agents: Simple Reflex Agents, Goal Based Agents, Utility Based Agents. Agent architectures: deliberative, reactive, and hybrid, BDI (Belief–Desire–Intention) model, Introduction to Multi-Agent Systems (MAS): characteristics, taxonomy, and application domains.	08
2	Problem Solving Agents & Search Strategies: Problem-Solving Agents: problem formulation, state space, initial state, actions, goal test, path cost, Uninformed Search Strategies: Breadth-First Search (BFS), Depth-First Search (DFS), Uniform Cost Search (UCS), Informed Search Strategies: Heuristic Functions, Best-First Search, Greedy Search, A* Algorithm, Optimal Solution by A* Algorithm.	07
SECTION – II		
3	Reinforcement Learning : History of Reinforcement Learning, agent environment interaction, reward hypothesis, examples of RL applications, exploration vs. exploitation, Elements of Reinforcement Learning: Policy, reward signal, value function, model, Scope; Challenges in Reinforcement Learning,	07
4	Markov Models: Markov Property, Markov Chains, Transition Probability Matrix, Introduction to Markov Decision Process (MDP), components of MDP (States, Actions, Transition Function, Reward Function), Returns and Policies: Discount Factor (γ), Return, Episodic vs. Continuing Tasks, Deterministic and Stochastic Policies, Policy Representation Applications and Case Studies: Reinforcement Learning workflow, Grid World example, Game Playing, Robotics, Recommendation Systems, Autonomous Systems	08
Practical Content:		
List of programs specified by the subject teacher based on above mentioned topics		
Text/Reference Books:		
1	Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A Modern Approach</i> , 4th Edition, Pearson	
2	David L. Poole and Alan K. Mackworth, <i>Artificial Intelligence: Foundations of Computational Agents</i> , 3rd Edition, Cambridge University Press.	
3	Richard S. Sutton and Andrew G. Barto, <i>Reinforcement Learning: An Introduction</i> , 2nd Edition, MIT Pres	
4	Reinforcement Learning by Richard S. Sutton, Andrew G. Barto, Francis Bach, Kindle	
Web References / MOOC / Certification Course		
1	https://nptel.ac.in/courses/106106226	
2	https://nptel.ac.in/courses/112103280	
3	https://nptel.ac.in/courses/106106143	

Question Paper Scheme:**University Examination Duration: 3 Hours**

Note for Examiner: -

(I) Questions 1 and 4 are compulsory with no options.

(II) Internal options should be given in questions 2, 3, 5 and 6.

SECTION - I

Q.1 -8 Marks

Q.2 -11 Marks

Q.3 -11 Marks

SECTION - II

Q.4 -8 Marks

Q.5 -11 Marks

Q.6 -11 Marks