Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Third Semester

Artificial Intelligence and Data Science

UADT24301 / AL3391– Artificial Intelligence

Regulations – 2024 & 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	What is meant by the concept of rationality in AI?	L2	1	2
2.	Define the term "agent program."	L1	1	2
3.	Mention the main difference between uninformed and heuristic search strategies.	L2	2	2
4.	Give an example of an optimization problem solved by local search.	L2	2	2
5.	State the goal of game theory in AI.	L1	3	2
6.	How does local search apply to CSP?	L1	3	2
7.	Write the syntax of propositional logic.	L1	4	2
8.	Given a knowledge base, describe a scenario where forward chaining would be used to infer new facts.	L2	4	2
9.	Define Bayesian inference.	L1	5	2
10.	How does the causal networks help in understanding the cause-effect relationships in probabilistic models.	L2	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Describe the structure of an intelligent agent.	L2	1	8
		ii	How does the different types of environments in which agents operate (fully/partially observable, deterministic/stochastic, episodic/sequential, static/dynamic, discrete/continuous) affect the design of an intelligent agent.	L2	1	8
			Or			
	b	i	Given a maze navigation problem, design a problem-solving agent that uses uninformed search strategies.	L2	1	8
		ii	Compare how breadth-first search and depth-first search would perform in this environment in terms of time, space, and optimality for the maze navigation problem.	L2	1	8

12.	a	i	Consider a path finding problem on a grid where some cells may be blocked, and the agent only partially observes its surroundings. Design an agent that uses heuristic search combined with online learning to navigate.	L3	2	8
		ii	Discuss the algorithms you would use and how heuristics help the agent for the path finding problem.	L3	2	8
			Or			
	b	i	Explain how local search operates in continuous spaces and the challenges involved.	L3	2	8
		ii	What are the problems encountered during hill climbing and what are the ways available to deal with these problems?	L3	2	8
13.	a	i	Explain the concept of optimal decision making in games using game theory.	L2	3	8
		ii	Describe the minimax algorithm and how alpha-beta pruning optimizes it.	L2	3	8
			Or			
	b	i	Given a CSP with variables and constraints represented as a graph, analyze how tree decomposition can be used to simplify solving.	L2	3	8
		ii	Provide an example showing the decomposition process and its impact on efficiency for the map colouring problem.	L2	3	8
14.	a	i	Formulate the sentence “Every student who studies passes the exam” in first-order logic.	L3	4	8
		ii	For the sentence “Every student who studies passes the exam”, using forward chaining, show how an agent can infer that a particular student has passed the exam given facts about that student.	L3	4	8
			Or			
	b	i	Given a simple expert system, design an agent based on propositional logic that uses backward chaining to answer queries.	L3	4	8
		ii	Illustrate the process with sample rules and queries defined for a question answering system.	L3	4	8
15.	a	i	Given a simple Bayesian Network for a medical diagnosis consider the following scenario: Suppose you have a diagnostic test for a disease with a 95% sensitivity and 90% specificity. The disease prevalence in the population is 1%. If a person tests positive, what is the posterior probability that they actually have the disease?	L5	5	8
		ii	Explain a scenario where approximate inference in Bayesian Networks using Monte Carlo methods is preferred over exact inference.	L5	5	8
			Or			
	b	i	Given a causal network with variables Smoking → Tar Deposits → Lung Cancer, Describe how interventions (do-operator) differ from observations in probabilistic reasoning.	L5	5	8
		ii	Given a small network with three nodes A → B → C, compute P(C) using variable elimination. in Bayesian networks.	L5	5	8