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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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24AD43

Fourth Semester B.E. Degree Examination, May 2026
PRINCIPLES OF AI

TIME:3 hrs. Max.Marks:100

Note: 1. Answer **any FIVE** full questions, choosing **ONE** question from **each MODULE.**
2. M: Marks, L: Bloom's level,C: Course outcomes.
3. Assume missing data suitably

		Module-1	M	L	C
Q.1	a	Explain the significant contributions of various branches in the foundations of AI	6	L2	CO1
	b	Discuss the concept of rationality and its implications for designing intelligent agents. Provide examples	8	L2	CO1
	c	Describe the structure of intelligent agents and explain how they operate in different environments	6	L1	CO1
		OR			
Q.2	a	Define AI and discuss its significance in modern computing	6	L1	CO1
	b	Compare and contrast model-based reflex agents and goal-based agents with examples	8	L2	CO1
	c	Discuss the challenges of designing intelligent agents for complex, dynamic environments.	6	L2	CO1
		Module–2			
Q.3	a	Compare and contrast Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms provide a suitable example.	10	L2	CO2
	b	Describe the components of a problem-solving agent and explain how it uses search algorithms to achieve its goals. Provide a suitable example.	10	L2	CO2
		OR			
Q.4	a	A water jug problem involves two jugs of capacities 3 and 5 liters. The goal is to measure exactly 4 liters of water. Formulate the problem as a search problem and apply IDDFS to find a solution. Show the step-by-step solution	10	L3	CO2
	b	Consider a robot navigating a maze with obstacles. The robot can move up, down, left, or right. Formulate the problem as a search problem and apply BFS to find the shortest path from the start to the goal state. Show the step-by-step solution.	10	L3	CO2
		Module–3			
Q.5	a	List and explain the following Informed Search Strategies: Heuristic functions Greedy best first search and A* search	10	L1	CO3
	b	Describe the Wumpus World environment and explain how a Knowledge-Based Agent would use Propositional Logic to represent knowledge and reason about the environment.	10	L2	CO3
		OR			
Q.6	a	Consider a scenario where a robot needs to navigate a maze to reach a goal location. Compare and contrast Greedy Best-First Search and A* Search algorithms in terms of their approach, advantages, and disadvantages	10	L2	CO3
	b	Outline a generic knowledge-based agents' program. Write PEAS specification for Wumpus world.	10	L2	CO3

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		Module–4			
Q.7	**a**	Define First Order Logic (FOL) and explain its syntax and semantics. Provide examples of FOL representations.	**10**	**L1**	**CO4**
	b	Given the following FOL statements:∀x (Book(x) → ∃y (Author(y) ∧ Wrote(y,x)))Book(Java)Author(John) Apply Resolution to infer whether John wrote Java.	**10**	**L3**	**CO4**
		OR			
Q.8	**a**	Describe the Backward Chaining algorithm for inference in First Order Logic. Explain its advantages and disadvantages.	**10**	**L3**	**CO4**
	b	Define Universal and Existential Instantiation and give examples for both. Prove the following using **Backward and Forward chaining**: "As per the law, it is a crime for an American to sell weapons to hostile nations. Country E, an enemy of America, has some missiles, and all the missiles were sold to it by Solan, who is an American citizen."Prove that "Solan is criminal."	**10**	**L3**	**CO4**
		Module–5			
Q.9	**a**	Prove all Kolomogorovs axioms (Probability axioms).	**7**	**L2**	**CO5**
	b	Describe the components of an Expert System (ES) and explain how domain knowledge is represented and used.	**7**	**L2**	**CO5**
	c	Given that bus arriving late=0.3 and a student oversleeping probability is 0.4., find the probability that student gets late.	**6**	**L3**	**CO5**
		OR			
Q.10	**a**	Explain the concept of independence in probability theory and its significance in simplifying inference. Provide examples.	**10**	**L2**	**CO5**
	b	Consider a Wumpus World scenario where the agent has uncertain knowledge about the environment. Apply Bayes' Rule to update the probability of a pit in a given location based on sensor data.	**10**	**L2**	**CO5**

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