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MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

(A Unit of Rajalaxmi Education Trust®, Mangalore)
Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
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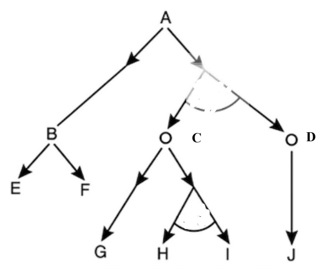
Model Question Paper

Sixth Semester BE Degree Examination

ARITIFICIAL INTELLIGENCE

Time: 3 Hours (180 Minutes) **Max. Marks: 100**

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: RBT (Revised Bloom's Taxonomy) level, C: Course outcomes.

		Module -1	M	L	C
Q1	a.	Outline the major sub-areas of Artificial Intelligence and illustrate each with suitable examples.	7	L2	CO1
	b.	Trace the historical development of Artificial Intelligence, highlighting important milestones.	7	L2	CO1
	c.	Explain the applications of Artificial Intelligence in various domains such as business, healthcare, and education.	6	L2	CO1
		OR			
Q2	a.	Describe the hill climbing algorithm and explain its limitations	6	L2	CO1
	b.	Apply Breadth-First Search (BFS) and Depth-First Search (DFS) to a given state-space graph of your choice and list the order of node expansion.	7	L2	CO1
	c.	Illustrate the production rules for the Missionaries and Cannibals problem, ensuring valid constraints are maintained.	7	L2	CO1
		Module- 2			
Q3	a.	For the AND–OR graph shown in Fig. 2.1, the heuristic values of the nodes are: B(8), C(12), D(10), E(6), F(8), G(2), H(0), I(0), J(0).  Fig. 2.1 AND-OR graph Using the AO* algorithm, determine the optimal solution graph and the minimum cost path starting from node A.	8	L3	CO2
	b.	Explain the AO* algorithm.	7	L2	CO2
	c.	Explain how an AND–OR graph can be used to represent problem solving. Illustrate with the following scenario: A student can complete a project individually or in a team. • Individually: select topic AND get approval • Team: form group AND divide tasks • Finally: submit report.	5	L2	CO2
		OR			
Q4	a.	Apply Alpha–Beta pruning algorithm to the game tree shown in Fig. 2.2 and identify the nodes that will be pruned during the search. Also discuss the steps in	8	L3	CO2

Alpha–Beta pruning algorithm.

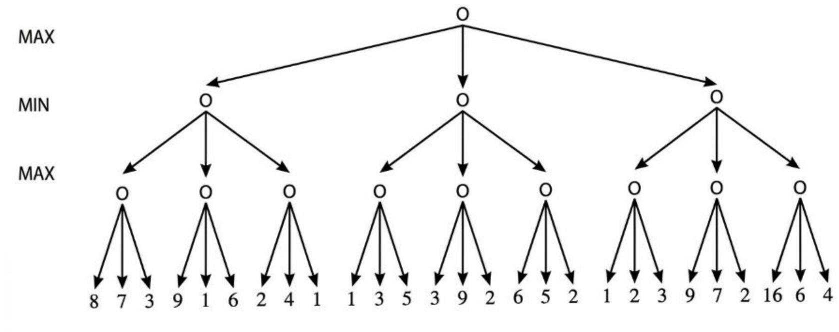


Fig. 2.2 Game tree of depth 3 and branching factor 3

	b.	Illustrate the MINIMAX algorithm.	7	L2	CO2
	c.	Explain the Hill Climbing search algorithm and discuss its limitations	5	L2	CO2
		Module - 3			
Q5	a.	Illustrate predicate logic representation with an example.	5	L3	CO3
	b.	Prove [(A→B) ∧ (B→C)] → (A→C) using Natural Deduction.	8	L3	CO3
	c.	Convert the following into Conjunctive Normal Form (CNF) and apply resolution: {A ∨ B, ¬A ∨ C, ¬C}	7	L3	CO3
		OR			
Q6	a.	Apply semantic tableau method to test satisfiability of {¬(A ∨ B), (A → C)}.	5	L3	CO3
	b.	Consider the following English sentence: "Anything anyone eats is called food. Mita likes all kinds of food. Burger is a food. Mango is a food. John eats pizza. John eats everything Mita eats." Translate these sentences into formulae in predicate logic and then to program clauses. Use resolution algorithm to answer the following goals i. What food does John eat? ii. Does Mita like pizza? iii. Which food does John like? iv. Who likes what foods? v. Prove the statement "Mita likes pizza and burger" using resolution.	8	L3	CO3
	c.	Using the resolution method, prove that C is a logical consequence of {A → B, B → C, A}.	7	L3	CO3
		Module - 4			
Q7	a.	Explain Block World problem with suitable example.	7	L2	CO3
	b.	Solve Block World using Goal Stack Planning.	8	L3	CO3
	c.	Explain Sussman anomaly with state transitions.	5	L2	CO3
		OR			
Q8	a.	Explain Means–Ends Analysis (MEA) using the problem: Transform Initial: (On(A,Table), On(B,Table)) to Goal: (On(A,B)).	7	L2	CO3
	b.	Compare linear and non-linear planning using a block world example.	5	L2	CO3
	c.	Apply the Goal Stack Planning method for the following: Initial: (On(A,Table), On(B,Table), Clear(A), Clear(B)) Goal: (On(B,A)). Show stack operations.	8	L3	CO3
		Module - 5			
Q9	a.	Explain the semantic network representation for the following statements: "A dog is a mammal. All mammals are animals. Dog has fur. Tommy is a dog."	5	L2	CO4
	b.	Explain inheritance in semantic networks.	8	L2	CO4
	c.	Design a frame-based system for a *student database* including slots and	7	L3	CO4

		demonstrate operations: insert, update, delete, and query.			
		OR			
Q10	a.	Explain forward and backward reasoning using the example: “If a patient has fever and cough → flu. Patient has fever and cough.”	5	L2	CO4
	b.	Explain architecture and development phases of Expert Systems.	8	L2	CO4
	c.	Design a frame-based system for a *hospital application* including patient details and illustrate inference/query.	7	L3	CO4

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