

USN

Course Code

22AI/CA42

Fourth Semester B.E. Degree Examinations, July 2026

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

Duration: 3 hrs

(AIML & CSE- AI)

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1. a.	Summarize the evolution/history of artificial intelligence starting from the origin to the current development.	06	(2 : 1 : 1.3.1)
b.	Show that the simple vacuum cleaner agent is indeed rational agent with suitable assumptions.	06	(2 : 4 : 2.1.3)
c.	Summarize the working principle of goal based and utility based AI agents.	08	(2 : 4 : 2.1.3)
(OR)			
2. a.	Summarize the various branches that contributed to the growth of AI.	10	(2 : 1 : 1.3.1)
b.	Explain different types of task environments.	10	(2 : 4 : 1.3.1)
<u>Module-2</u>			
3. a.	Explain the working principle of simple problem solving agent.	10	(2 : 2 : 1.3.1)
b.	Explain state space for N-Queens and 8-puzzle problem.	10	(3 : 2 : 1.3.1)
(OR)			
4. a.	Summarize and compare the working of Breadth First Search & Depth First Search.	10	(2 : 2 : 1.3.1)
b.	Identify the state space for the problem: There are two jugs, a 5-litre one & a 3-litre one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water, & the ground on which water may be poured. Neither jug has any measuring marks on it. How can you get exactly four litres of water into 5-litre jug?	10	(3 : 2 : 1.3.1)
<u>Module-3</u>			
5. a.	Explain the truth-table enumeration algorithm for deciding propositional entailment.	10	(2 : 3 : 1.3.1)
b.	Summarize with an example the five connectives used commonly in Propositional logic.	10	(2 : 3 : 1.3.1)
(OR)			
6. a.	Summarize the PEAS system for the Wumpus world problem.	10	(2 : 3 : 1.3.1)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

- b. Apply A* algorithm for the graph shown in Fig. Q6(b) & find the optimal path & cost. (Numbers on the node, indicate heuristic values) 10 (3 : 3 : 2.4.1)

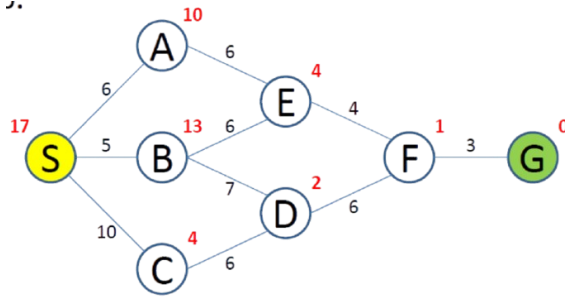


Fig. Q6(b)

Module-4

7. a. Summarize backward chaining with an example. 06 (2 : 3 : 1.3.1)
 b. Outline the steps involved in resolution. 06 (2 : 3 : 1.3.1)
 c. Explain unification algorithm with an example. 08 (2 : 3 : 1.3.1)

(OR)

8. a. Summarize Universal & Existential quantifiers with an example. 06 (2 : 3 : 1.3.1)
 b. Apply first order logic & convert the following sentences into logic: 06 (3 : 3 : 2.4.2)
 (i) All students are enrolled in at least one course
 (ii) Professors teach at least one course
 (iii) Students who attend classes pass the course
 (iv) No student who fails a course is happy
 (v) Arjun is a student who attends AI course
 c. Summarize forward chaining with an example. 08 (2 : 3 : 1.3.1)

Module-5

9. a. Explain the concept of conditional independence with an example. 06 (2 : 5 : 2.4.2)
 b. Explain the product rule and the chain rule of probability. 06 (2 : 5 : 1.3.1)
 c. Suppose 20 % of emails are spam. The word “free” appears in: 08 (3 : 5 : 2.3.1)
 - 50 % of spam emails
 - 5 % of non-spam emails

Given that an email contains the word “free,” what is the probability it is spam?

(OR)

10. a. Summarize how probabilistic reasoning can solve problems in Wumpus world. 06 (2 : 5 : 1.3.1)
 b. Explain how a decision-theoretic agent selects rational actions. 06 (2 : 5 : 1.3.1)
 c. A building has an alarm system, if there is a break-in, the alarm rings 90 % of the time. The probability of a break-in is 1 in 10,000. The probability that the alarm rings (for any reason) is 0.5 %. If the alarm rings, what is the probability that a break-in actually occurred? 08 (3 : 5 : 2.3.1)

** ** *