JHARKHAND Rai University
RANCHI

**PRACTICE SET**

**End Semester Examination, December, 2025**

**Program**: B. TECH

**Semester**: Seven

**Course**: Artificial Intelligence

**Course Code:** 3TECCS402

| Course Outcomes | Description |
|---|---|
| CO1 | To understand the basic idea of artificial intelligence and its application areas. |
| CO2 | To apply basic principles of AI in solutions that requires problem solving, inference, perception, knowledge representation, and learning. |
| CO3 | To demonstrate awareness and a fundamental understanding of various applications of AI techniques. |
| CO4 | To understand about Logic programming and about Reasoning related to AI. |
| CO5 | To know about the different representational techniques in AI. |

# Section -A (5*20=100)

**Question for Five (5) marks:**

1. Define Intelligence in AI and describe what all components make up the Intelligence in AI. [CO1] [UNIT-I] [REMEMBER] [LOT]
2. Define the term ‘AI winter’. Describe the History of AI. [CO1] [UNIT-I] [REMEMBER] [LOT]
3. Explain the structure of agents in AI. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
4. What are the types of environments in AI? Give examples. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
5. Define the following terminologies :- [CO1] [UNIT-I] [REMEMBER] [LOT]

    i. Turing Test ii. Agent iii. Environment

6. Differentiate between simple reflex and goal-based agents. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
7. What are heuristic functions and how are they used in informed search? [CO2] [UNIT-II] [UNDERSTAND] [LOT]
8. Why is searching important for problem solving? [CO2] [UNIT-II] [UNDERSTAND] [LOT]
9. What is the difference between generate-and-test and hill-climbing techniques? [CO2] [UNIT-II] [UNDERSTAND] [LOT]
10. Illustrate the concept of 8 puzzle problems. [CO3] [UNIT-II] [APPLY] [LOT]
11. Define constraint satisfaction problems with an example. [CO3] [UNIT-III] [REMEMBER] [LOT]
12. Explain knowledge representation.[CO2] [UNIT-III] [UNDERSTAND] [LOT]
13. Explain the role of Bayesian networks in statistical reasoning. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
14. Differentiate between propositional and first-order logic. [CO2] [UNIT-III] [UNDERSTAND] [LOT]
15. Write a short note on fuzzy logic. [CO3] [UNIT-III] [UNDERSTAND] [LOT]

16. Describe the concept of multi-agent planning. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
17. What is a planning graph? Briefly describe its role in planning algorithms. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
18. What is classical planning in AI? [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
19. Define hierarchical planning and its importance. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
20. What is ontological engineering in knowledge representation? [CO5] [UNIT-IV] [UNDERSTAND] [LOT]

## SECTION B (10*14=140)

**Question for Five (10) marks:**

21. Explain AI agents and environments, describing the different types of agents and environments with suitable examples. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
22. Examine the concept of robotics by analyzing the major components and functions of a robot. [CO1] [UNIT-I] [ANALYSE] [HOT
23. Describe the structure of agents and how they interact with their environments. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
24. Explain the concept of searching and describe why it is essential for problem-solving in Artificial Intelligence. [CO2] [UNIT-II] [UNDERSTAND] [LOT]
25. Differentiate between Breadth first search and Depth First search algorithm with an example. [CO2] [UNIT-II] [ANALYSE] [HOT]
26. Write a short note on Best First Search Algorithm with an example.[CO2] [UNIT-II] [UNDERSTAND] [LOT]

27. Examine the role of heuristic functions and analyze the differences between blind search and heuristic search strategies. [CO2] [UNIT-II] [ANALYSE] [HOT]

28. Define Conjunctive Normal Form and Disjunctive Normal Form. Convert ((A->B) ^A) ->B into CNF and DNF. [CO2] [UNIT-III] [APPLY] [LOT]

29. Explain the concept of propositional logic and illustrate various inference rules with suitable examples. [CO2] [UNIT-III] [UNDERSTAND] [LOT]

30. Compare a Baye's Network with a traditional rule-based expert system. Discuss how conditional probabilities give Bayes' Networks an advantage in uncertain situations. [CO4] [UNIT-III] [ANALYSE] [HOT]
31. Elaborate the concept of planning graphs and their role in classical planning. [CO4] [UNIT-IV] [ANALYSE] [HOT]
32. Explain the key components of knowledge representation in AI. [CO4] [UNIT-IV] [ANALYSE] [HOT]
33. Write a Prolog program to represent a family tree using appropriate facts and rules. Also perform 10 queries based on your family tree. [CO4] [UNIT-IV] [ANALYSE] [HOT]
34. Describe the algorithms used for planning in nondeterministic domains. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]

## SECTION C (20*7=140)

**Question for Five (20) marks:**

35. Critically evaluate the historical evolution of Artificial Intelligence, highlighting key milestones, paradigm shifts, and their influence on modern AI technologies. [CO1] [UNIT-I] [EVALUATE] [HOT]

36. Elaborate in detail the rationality of intelligent agents, their structure, and how they operate in different environments.[CO1] [UNIT-I] [ANALYSE] [HOT]
37. Explain uninformed and informed search. Evaluate some searching algorithm which comes under the category of uninformed and informed search. [CO2] [UNIT-II] [EVALUATE] [HOT]
38. Elaborate heuristic search techniques like generate and test, hill climbing, and best-first search with detailed examples. [CO2] [UNIT-II] [ANALYSE] [HOT]
39. Elaborate on the concepts of water jug problem and 8-Queens problem. Write the python code to implement a water jug problem. [CO3] [UNIT-II] [ANALYSE] [HOT]
40. A) State and prove Resolution rule. (8 marks)

    B) Apply resolution to determine if the conclusion is logically valid.

    **Premises:**

    i. If the AI agent explores the environment, then it will either learn new policies or gather more data.
    ii. If the agent learns new policies, then it will improve performance.
    iii. If the agent gathers more data, then training time will increase.
    iv. The agent explored the environment.
    v. Training time did not increase.
    vi. Performance did not improve.

    **Conclusion:** The agent neither learned new policies nor gathered more data (12 marks) [CO4] [UNIT-III] [EVALUATE] [HOT]

41. Elaborate on the concepts and algorithms for classical planning, focusing on hierarchical planning and multi-agent planning in detail. [CO5] [UNIT-IV] [ANALYSE] [HOT]

## Summary:

**CO Wise:**

| CO | Ques. No | Marks |
|---|---|---|
| CO1 | 1–6, 21–23, 35, 36 | 100 |
| CO2 | 7–9, 12, 14, 24–29, 37, 38 | 125 |
| CO3 | 10, 11, 13, 15, 39 | 40 |
| CO4 | 16–19, 30–34, 40 | 90 |
| CO5 | 20, 41 | 25 |
| | TOTAL | 380 |

**Unit Wise:**

| Unit | Ques No | Marks |
|---|---|---|
| I | 1-6,21-23,35,36 | 100 |
| II | 7-10,24-27,37-39 | 120 |
| III | 11-15, 28-30,40 | 75 |
| IV | 16-20,31-34,41 | 85 |
| | TOTAL | 380 |

## Blooms Taxonomy Level (BTL) Wise

| BTL | Ques No | Marks |
|---|---|---|
| LOT | 1-20,21,23,24,26,28,29,34 | 170 |
| HOT | 22,25,27,30-33 ,35-41 | 210 |
| | TOTAL | 390 |

**Prepared By: Sanjay Kumar Mahto** **Reviewed By:**

**Disclaimer: -**This is a Practice Set. The Question in End term examination will differ from the Practice Set. This Practice Set is meant for practice only.