Total No. of Questions: 22

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Engineering

End Semester Examination May 2025

RA3EL07 Artificial Intelligence

Programme	:	B.Tech.	**Branch/Specialisation**	:	RA
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

		Marks	CO	BL
Q1.	Which of the following search strategies is uninformed?	1	1	1

- ○ Best-First Search
- ○ A* Search
- ○ Hill Climbing
- ◉ Depth-First Search

Q2.	What is the primary goal of artificial intelligence?	1	1	1

- ○ To play games using computers
- ○ To solve complex arithmetic operations faster
- ◉ To create systems that think and act like humans
- ○ To replace all human workers

Q3.	Which of the following is an advantage of predicate logic over propositional logic?	1	2	1

- ○ Simpler syntax
- ○ Better for hardware representation
- ◉ Can represent objects and their relationships
- ○ Easier to evaluate with truth tables

Q4.	In knowledge representation, which of the following is a problem when representing knowledge?	1	2	1

- ○ Using natural language
- ◉ Ambiguity and incompleteness
- ○ High processing power
- ○ Fast access time

Q5.	What is the primary purpose of Bayes' Theorem in AI?	1	3	1

- ○ To organize data into frames
- ◉ To calculate the probability of a hypothesis given evidence
- ○ To create fuzzy rules
- ○ To generate semantic networks

Q6.	Which reasoning approach starts from known facts and applies rules to infer new facts until a goal is reached?	1	3	1

- ○ Backward reasoning
- ◉ Forward reasoning
- ○ Inductive reasoning
- ○ Abductive reasoning

Q7.	In AI planning, which of the following is a key component of a planning system?	1	4	1

- ○ Syntax analyzer
- ○ Knowledge base
- ◉ Goal stack
- ○ Game tree

Q8.	Which of the following is a major challenge in Natural Language Processing (NLP)?	1	4	1

- ○ High-speed computation
- ○ Understanding structured data
- ◉ Ambiguity in human language
- ○ Data compression

Q9.	Which type of learning has labeled data?	1	5	1

- ○ Forward chaining
- ○ Resolution
- ◉ Supervised learning
- ○ Semantic parsing

Q10. Which of the following is an example of an expert system? **1 5 1**

- ○ Google Translate
- ◉ MYCIN (for medical diagnosis)
- ○ Spotify
- ○ WhatsApp

Section 2 (Answer all question(s))

Marks CO BL

Q11. Give the significance of artificial intelligence with the help of real-world applications. **2 1 2**

Rubric	Marks
significance with example.	2

Q12. What are the potential issues in hill climbing search technique? How can they be resolved? **3 1 2**

Rubric	Marks
mention any 3 issues 1.5 marks and show how they are resolved 1.5 marks	3

Q13. (a) What are the various search techniques used in AI. Elaborate any one technique in detail with the help of example. **5 1 4**

Rubric	Marks
search techniques 2 marks. And 3 marks description with example	5

(OR)

(b) Explain the AO* algorithm. Provide an example to demonstrate its application.

Rubric	Marks
five points for explanation, explanation 3 marks example 2 marks	5

Section 3 (Answer all question(s))

Marks CO BL

Q14. What is resolution in logic-based AI? **2 2 2**

Rubric	Marks
definition	2

Q15. Explain knowledge representation using predicate logic. **3 2 2**

Rubric	Marks
2 marks explanation and example 1 marks	3

Q16. (a) Consider the following knowledge base **5 2 4**

- The humidity is high, or the sky is cloudy.
- If the sky is cloudy, then it will rain.
- If the humidity is high, then it is hot.
- It is not hot.

Goal: It will rain.

Use propositional logic and resolution method to prove that "It will rain" is logically derivable.

Rubric	Marks
Step 1: Represent the knowledge base using propositional symbols Step 2: Add all clauses to the KB including the negated goal Step 3: Apply resolution Step 4: Resolve Step 5 obtain null clause	5

(OR)

(b) Write the short note on:

- Refutation
- Inferencing

Rubric	Marks
2.5 marks each with examples.	5

Section 4 (Answer all question(s))

Marks CO BL

Q17. What are frames in AI? Explain how they represent knowledge and support reasoning with default values. **3 3 2**

Rubric	Marks
2 marks definition and 1 marks components	3

Q18. (a) State Bayes Theorem. A factory operates three machines—X, Y, and Z—which produce 1000, 2000, and 3000 bolts daily, respectively. Machine X produces defective bolts at a rate of 1%, Y at 1.5%, and Z at 2%. At the end of the day, if a randomly selected bolt is found to be defective, what is the probability that it was produced by one of these machines? **7 3 4**

Rubric	Marks
Bayes theorem 3 marks and solved example 4 marks Answer Probability is 0.1	7

(OR)

(b) Differentiate between forward chaining and backward chaining with suitable examples.

Rubric	Marks
3.5 marks each with 7 points of comparison and showing example	7

Section 5 (Answer all question(s))

Marks CO BL

Q19. What is NLP? How it works? **4 4 2**

Rubric	Marks
definition 2 marks working 2 marks	4

Q20. (a) Explain the minimax procedure of game playing techniques. What are the limitations of using minimax in real-world games like Chess or Go? **6 4 3**

Rubric	Marks
Minimax procedure explanation 4 marks and limitations 2 marks.	6

(OR)

(b) Explain the concept of alpha-beta pruning. How does it improve the efficiency of the algorithm? Give an example to show the pruning process.

Rubric	Marks
Alpha and Beta pruning method explanation 2 marks and the improving 2 marks example 2 marks	6

Section 6 (Answer all question(s))

Marks CO BL

Q21. Compare and contrast supervised and unsupervised learning. **4 5 2**

Rubric	Marks
definition 2 marks and techniques 2 marks	4

Q22. (a) Describe two real-world applications of neural networks and explain how they benefit from learning patterns in data. **6 5 3**

Rubric	Marks
2 marks definition 4 marks advantages, disadvantages and applications.	6

(OR)

(b) Discuss the concept of expert systems, highlighting their key features, benefits, drawbacks, and practical applications.

Rubric	Marks
2 marks expert system, and 4 marks advantages and disadvantages and applications.	6

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