Roll No……

Dr B R Ambedkar National Institute of Technology, Jalandhar

B Tech 7th Semester (Computer Science & Engineering)

CSPC–405, Artificial Intelligence

Mid-Semester Examination, October-2024

Duration: 02 Hours Max. Marks: 30 Date: 7th Oct. 2024

Question Number	1a	1b	2a	2b	3	4	5
Max. Marks	3	3	3	3	6	6	6
CO No.	1	3	4	2	1	3	3
*Cognitive Level	E	An	E	An	An	C	E
**Section/Chapter/Unit	1	2	2	4	1	2	4

*Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), and Create (C)

*Table 1 Exhibits a list of words for various cognitive levels.

Note:

1. **Attempt all the questions.**

1.

a) **Evaluate the potential ethical concerns associated with developing and deploying intelligent algorithms, particularly in areas such as decision-making and automation.**

b) **Distinguish between informed search and uninformed search strategies. Analyze the characteristics that define each approach, including how they utilize heuristics, their efficiency, completeness, and optimality. Provide suitable examples.**

2.

a) **What is state space search in artificial intelligence? Describe the water jug problem, where the objective is to measure a specific amount of water using two jugs with different capacities. Illustrate how the solution tree to this problem can be represented by combining breadth-first and depth-first search algorithms.**

b) Differentiate between propositional and predicate logic by examining their structures and applications. Give suitable examples.

3. Compare and contrast Simple Reflex Agents and Model-based Agents regarding their decision-making processes and adaptability. Then, describe how the PEAS (Performance measure, Environment, Actuators, Sensors) framework applies to a task environment, using the example of a medical diagnosis system.

4. Design and develop a method to solve the cryptarithmetic puzzle

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by modeling it as a Constraint Satisfaction Problem (CSP). Identify the relevant variables and constraints, select an appropriate search algorithm, and construct a step-by-step process to arrive at the solution. Justify your choice of algorithm and explain how your approach satisfies all constraints in the puzzle.

5. Consider the following axioms:

i. **Every child loves every candy.**
ii. **Anyone who loves some candy is not a nutrition fanatic.**
iii. **Anyone who eats any pumpkin is a nutrition fanatic.**
iv. **Anyone who buys any pumpkin either carves it or eats it.**
v. **John buys a pumpkin.**
vi. **Lifesaver is a candy.**

Use resolution in predicate logic to conclude that If John is a child, then John carves some pumpkin.