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Paper Code : PCC-AJ401/PCCAIDS401/PCCAIML 401/PCCAIML401 Artificial Intelligence

UPID : 004802

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :

[1 x 10 = 10]

- (i) What do you mean by knowledge representation?
- (ii) What is the negation of the statement "for all x , $P(x)$ " in predicate logic?
- (iii) Write the process of analyzing the structure of a sentence.
- (iv) Define rational agent?
- (v) In what type of problems are heuristic search strategies particularly useful?
- (vi) What is a frame in knowledge representation?
- (vii) What is the negation of the CNF $(p \text{ OR } q) \text{ AND } (r \text{ OR } s)$?
- (viii) What is the purpose of named entity recognition in NLP?
- (ix) What is perception in the context of AI agents?
- (x) Which heuristic search strategy is particularly useful for problems where the goal state is not well-defined?
- (xi) What is the goal of Alpha-Beta pruning?
- (xii) An event in the probability that will never be happened is called as _____

Group-B (Short Answer Type Question)

Answer any three of the following :

[5 x 3 = 15]

2. Differentiate between forward and backward reasoning [5]
3. Convert the following facts into First Order Logic. [5]
 - Fact: "All humans are mortal."
 - Fact: "Some birds can fly."
 - Fact: "Socrates is a philosopher."
 - Fact: "The sky is blue."
 - Fact: "John is taller than Mary."
 - Fact: "All dogs have four legs."
4. Write an example of a problem for which breadth-first search would work better than depth-first search. Give proper explanations. [5]
5. What are the different types of environments in AI? [5]
6. Explain the steepest hill climbing algorithm. [5]

Group-C (Long Answer Type Question)

Answer any three of the following :

[15 x 3 = 45]

7. (a) Explain each of the following with an example: [8]
 - (i) Constraint graph
 - (ii) Constraint satisfaction problem
- (b) Explain graph colouring in context of CSP. [7]
8. (a) What are fuzzy sets? List the properties of fuzzy sets. [5]
- (b) Write short note on Bayesian network [5]
- (c) Prove the following using either resolution or traditional logic, using these propositions: [5]
 - S : I study; G: I get good grades; E: I enjoy.
 - 1. If I study I make good grades.
 - 2. If I do not study I enjoy.
 - \therefore either I make good grades or I enjoy.
9. (a) Define an expert system. List the characteristics of an expert system. [5]
- (b) What is meta knowledge? How meta knowledge is represented in rule-based expert systems? [5]

- (c) List out the problem areas addressed by expert systems. [5]
10. Write the A* algorithm and explain it with a 8 puzzle problem [15]
11. (a) Explain Semantic nets and Frames. [5]
- (b) Brief frame problem [5]
- (c) Compare nonmonotonic reasoning and statistical reasoning. [5]

*** END OF PAPER ***

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