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Question Paper Code : 80453

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Sixth/Seventh/Eighth Semester

Computer Science and Engineering

CS 8691 – ARTIFICIAL INTELLIGENCE

(Common to: Mechatronics Engineering/Computer Science and Business Systems)

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define an Intelligent Agent. Provide a example for Intelligent agent in real time.

2. List the characteristics of Intelligent agents.

3. Differentiate informed and uninformed searches with brief explanation and example?

4. Define a constraint satisfaction problem. How can you relate CSP with a textile shopping?

5. A search with partial observation is possible or not? Justify with an example.

6. List the ways in which knowledge can be represented in Artificial Intelligence.

7. How agent communication language is helpful for group of homogeneous agents working in a car manufacturing sector for fixing driver side door?

8. How trust among the agents can be developed in case of multi–agent system in a football game played by bots?

9. What are the planning techniques involved by robots to do a specific task?

10. How does a robot perceive its environment and take actions?

PART B — (5 × 13 = 65 marks)

11. (a) Travelmate is an robotic luggage carrier. Essentially, it is an autonomous suitcase. Which is able to follow its owner on its own. It makes use of anti–collision, technology, has 360 degree turning capabilities and eliminates the need for carrying, pulling or pushing a suitcase around. List and justify about this agent's supporting environments, the sensor and the actuator for designing such a smart suitcase. Add other complexities/purposes for the suitcase to make it more AI compatible. (13)

Or

(b) Consider a modified version of the vacuum cleaner so that the sensors, actuators, and environment characteristics (size, shape, dirt placement, etc.) can be changed easily and in which the agent is penalized/awarded by one point for each movement based on cleaning.

(i) Is a simple reflex agent apt for this environment? Justify with the architecture diagram. (7)

(ii) What about a reflex agent with state? Design such an agent. (6)

12. (a) Consider a tic–tac–toe puzzle problem. Assume the goal state and the initial state, reach the goal state using the heuristic approach which always gives the best solution. Specify the techniques Formulas and explanation for solving the taken tic–tac–toe. (13)

Or

(b) What is a constraint satisfaction problem? Explain with an example how it can be applied for crypt–arithmetic problems. (13)

13. (a) Given the facts and rules, match the given the and the given rules by applying forward Chaining and prove "A lathe requires a power source" can he added in the facts database.

Facts:

Fact 1: A lathe is a machine tool

Rules:

R1 - If X is power driven Then X requires a power source

R2 - If X is a machine tool Then X has a tool holder

R3 - If X is a machine tool Then X is power driven. (13)

Or

(b) What does reasoning means in terms of categories and default information? Explain with real time examples for each type of reasoning. (13)

14. (a) Assume an automatic washing machine as an Intelligent agent. Design an architecture for intelligent agent with a neat diagram. (13)

Or

(b) Compare and contrast trust and reputation in multi–agent systems. Analyze them with a example. (13)

15. (a) Explain in detail about information extraction techniques. (13)

Or

(b) How Google identifies the speech recognition of the user in mobile phone and does the search? Explain the techniques involved. (13)

PART C — (1 × 15 = 15 marks)

16. (a) You have an 8 litre jug full of water and two smaller jugs, one that contains 5 litres and the other 3 litres. None of the jugs have markings on them, nor do you have any additional measuring device or jugs. You have to divide 8 litres of water equally between your two best friends, so that each gets 4 litres of water. You cannot waste the water or get additional water. Give the state space representation, production rules and solution for the above problem. (15)

Or

(b) Consider the following statements and represent in First order logic and prove that the statement: "Scrooge is not a child" using the resolution procedure.

(i) Every child loves Santa. (2)

(ii) Everyone who loves Santa loves any reindeer. (2)

(iii) Rudolph is a reindeer, and Rudolph has a red nose. (2)

(iv) Anything which has a red nose is weird or is a clown. (3)

(v) No reindeer is a clown. (3)

(vi) Scrooge does not love anything which is weird. (3)

(Conclusion) Scrooge is not a child.

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