R18

Time: 3 Hours   **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks
- - -

1.a)   "Surely computers cannot be intelligent—they can do only what their programmers tell them." Is the latter statement true, and does it imply the former? Is AI a science, or is it engineering? Or neither or both? Explain.

  b)   Examine the AI literature to discover whether the following tasks can currently be solved by computers:
i) Buying a week's worth of groceries at the market.
ii) Discovering and proving new mathematical theorems.
iii) Writing an intentionally funny story.
iv) Giving competent legal advice in a specialized area of law.
v) Translating spoken English into spoken Swedish in real time.
vi) Performing a complex surgical operation.
For the currently infeasible tasks, try to find out what the difficulties are and predict when, if ever, they will be overcome.   [8+7]

2.a)   Define in your own words the terms: agent, agent function, agent program, rationality, autonomy, reflex agent, model-based agent, goal-based agent, utility-based agent, learning agent.

  b)   Which of the following are true and which are false? Explain your answers.
i) Depth-first search always expands at least as many nodes as $A*$ search with an admissible heuristic. b.h(n) = 0 is an admissible heuristic for the 8-puzzle.
ii) $A*$ is of no use in robotics because percepts, states, and actions are continuous.
iii) Breadth-first search is complete even if zero step costs are allowed.   [10+5]

3.a)   What is Alpha Beta pruning with example? How does it differ from Max-Min algorithm?
  b)   Consider the following rule base knowledge base:
Facts: A, F
Rules:
i)   A and B and C → D
ii)   D and F → G
iii)   A and J → G
iv)   B → C
v)   F → B
vi)   L → J
vii)   G → H
If the goal is to show that H is true, demonstrate how it can be achieved with Data Driven Control.   [8+7]

4.a) Define in your own words the terms constraint, backtracking search.
b) Give precise formulations for any two of the following as constraint satisfaction problems:
i) Job shop scheduling problem
ii) Cryptarithmetic problem
iii) Class scheduling: There is a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach. [5+10]

5.a) Consider a vocabulary with the following symbols:
Occupation(p, o): Predicate. Person p has occupation o.
Customer (p1, p2): Predicate. Person p1 is a customer of person p2.
Boss(p1, p2): Predicate. Person p1 is a boss of person p2.
Doctor , Surgeon, Lawyer , Actor : Constants denoting occupations.
Emily, Joe: Constants denoting people.
Use these symbols to write the following assertions in first-order logic:
i) Emily is either a surgeon or a lawyer.
ii) Joe is an actor, but he also holds another job.
iii) All surgeons are doctors.
iv) Joe does not have a lawyer (i.e., is not a customer of any lawyer).
v) Emily has a boss who is a lawyer.
vi) There exists a lawyer all of whose customers are doctors.
vii) Every surgeon has a lawyer.
b) What is meant by Ontological engineering? [7+8]

6.a) Discuss with example Forward Vs. Backward Chaining.
b) What is meant by Resolution? [7+8]

7. Describe the differences and similarities between problem solving and planning. Discuss forward and backward state space search process in detail. [15]

8.a) Suppose we generate a training set from a decision tree and then apply decision-tree learning to that training set. Is it the case that the learning algorithm will eventually return the correct tree as the training-set size goes to infinity? Why or why not?
b) Discuss Dempster-Shafer Theory with example. [7+8]

--ooOoo--