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B.Tech Degree End Semester Examinations, Nov / Dec 2011
Information Technology
Sixth Semester – (Regulations 2008)

IT 9023 Artificial Intelligence

Time: 3 hr

Max Mark: 100

Answer ALL Questions

Part- A (10 X2 = 20)

1. Compare iterative deepening search and bidirectional search by means of computational complexity, time and optimality.
2. Differentiate simple reflex and goal based agents.
3. Give the initial state, goal test, successor function and the cost function for missionary and cannibals problem.
4. List a heuristic function for 8-puzzle problem.
5. What is the need for unification in predicate logic?
6. Differentiate forward and backward chaining in reasoning process.
7. Design a neuron-McCulloch Pitts model for logical AND and logical OR operations
8. How is Ockham Razor used in learning?
9. How do you maintain consistent hypothesis by generalization and specification.
10. Represent the sentence "There is a barber who shaves all men in town who do not shave themselves" in predicate logic.

Part – B (16 X 5 = 80)

11. i) For each of the following agents, develop a PEAS description of the task environment (8)
 - a) Robot-soccer player
 - b) Autonomous mars rover
 - c) Vacuum cleaner agent
 - d) Intelligent home
- ii) with an example explain the various dimensions of environment for an agent (8)
12. a) i) What is the advantage of using heuristics in search? What measures should be taken into account during the design of a heuristic formula ? (4)
 - ii) Consider the state space where the start state is number 1 and the successor function for state 'n' returns two states $2n$ and $2n+1$
 - a) Draw a portion of state space from 1 to 15 (4)
 - b) Assume the goal is 11. List the order in which the nodes will be visited for breadth first, depth first, depth limited with a limit 3 and iterative deepening search (8)
- (or)
- b) i) With an example, explain the hill climbing algorithm (8)
 - ii) With an example, explain how optimization is done using Genetic Algorithm (8)
13. a) i) Which is more expressive - Predicate or propositional logic. Why? Give reasons to substantiate your answer (6)
 - ii) Consider the following axioms and prove by resolution (10)
 - Every child loves every candy
 - Anyone who loves some candy is not a nutrition fanatic
 - Anyone who eats any pumpkin is a nutrition fanatic

- Anyone who buys any pumpkin either carves it or eats it
- John buys a pumpkin
- Lifesavers is a candy
- (Conclusion) If John is a child, then John carves some pumpkin

(or)

b) i) Differentiate monotonic and non-monotonic logic. Draw the dependency graph for the following equations. What happens when 'p' and 'z' is retracted one after the other? (8)

(a) $\{((p \wedge q) \rightarrow r) \wedge (s \rightarrow t)\} \rightarrow u$

(b) $\{(x \wedge y) \rightarrow z\}$

(ii) With an example, explain the integration of first order logic to ontological engineering (8)

14. a) i) With an example explain ID3 algorithm in detail (10)

ii) Which type of learning tools is suited for textbook-categorization in a library. Why? (6)

(or)

b) i) With an example, explain the current-best hypothesis search (8)

ii) List atleast two methods of induction learning. How is this different from deduction? Explain the learning process through ensemble learning (8)

15. a) i) Describe a step by step procedure of how an agent communicates to another agent (8)

ii) For the sentence "Jack saw stars with eyes through the telescope in India at around 8.30 P.M." give a step by step procedure of bottom-up parsing (8)

(or)

b)i) Imagine that you had been to an aquarium and seen a shark and an octopus. Using the concepts you have learnt in this course, how will you describe these to an artificial agent. The agent at the end, should be able to distinguish between a shark and an octopus. (10)

ii) With examples, list down the ambiguities present in English Language when used for communication purpose. (6)