

**CSPE611**

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**M S RAMAIAH INSTITUTE OF TECHNOLOGY**

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

**SEMESTER END EXAMINATIONS – JUNE 2015****Course & Branch : B.E.- Computer Science & Engg.****Semester : VI****Subject : Artificial Intelligence****Max. Marks : 100****Subject Code : CSPE611****Duration : 3 Hrs****Instructions to the Candidates:**

- Answer one full question from each unit.
- Support your answers with examples where ever necessary.

**UNIT – I**

- List and explain the properties of task environments. Apply the same for the crossword puzzle example. (10)
  - Compare the working and performance of the Tree search and graph search algorithms. (10)
- Draw the block diagram of a learning agent and explain the function of each of its components in detail. Also state how the agents can improve their performance through learning. (10)
  - Consider a state space where the start state is number 1 and the successor function for state  $n$  returns two states, numbers  $2n$  and  $2n + 1$ . (10)
    - Draw the portion of the state space for states 1 to 15.
    - Suppose the goal state is 11. List the order in which nodes will be visited for breadth first search, depth first search, depth-limited search with limit 3, and iterative deepening search.

Also compare the above uninformed search strategies in terms of four evaluation criteria.

**UNIT – II**

- For the simple knowledge base given, draw the corresponding AND-OR graph using forward chaining. (10)

$P \rightarrow Q$   
 $L \wedge M \Rightarrow P$   
 $B \wedge L \Rightarrow M$   
 $A \wedge P \Rightarrow L$   
 $A \wedge B \Rightarrow L$   
 $A$   
 $B$

Cite the improvements done by Davis-Putnam backtracking algorithm
  - Define Heuristic search technique. Apply the heuristics technique to solve the 8 puzzle problem and explain the same. Also comment on the performance of the heuristic techniques. (10)
- Justify how the standard reasoning patterns in propositional logic work. Write and explain the simple resolution algorithm for propositional logic. (10)
  - Explain in detail how online search agents provide opportunities for learning. (10)



## UNIT - III

5. a) Write the BNF of first Order Logic. Explain in details the semantics of the same. Also list connection between the universal and existential Qualifiers. (10)
- b) Explain in detail the steps involved in converting a given sentence into Conjunctive Normal Form (CNF) in First order logic. Covert the sentence: "Everyone who loves all animals is loved by someone" into CNF. (10)
6. a) List the steps involved in Knowledge engineering process. (05)
- b) Obtain a passport application for your country, identify the rules determining eligibility for a passport, and translate them into First Order Logic. (05)
- c) Write the Unification algorithm used in First order logic and explain the same using any suitable examples. (10)

## UNIT - IV

7. a) Compare the working mechanism and the performance of progression and regression planning techniques. Explain using blocks world planning domain. (10)
- b) State and explain the advantages of Truth Maintenance systems in Knowledge representations. (05)
- c) Write set of sentences that allows to calculate the price of an individual tomato, given the price per pound. Extend the theory to calculate the price of a bag of tomatoes. (05)
8. a) Draw a semantic network capturing the given data: Dogs are Mammals, Birds have Wings, Mammals are Animals, Bats have Wings, Birds are Animals, Bats are Mammals, Fish are Animals, Dogs chase Cats, Worms are Animals, Cats eat Fish, Cats are Mammals, Birds eat Worms, Cats have Fur, Fish eat Worms, Dogs have Fur. Devise at least two generic queries (using the advantage of semantic nets) for which you can get a solution from the representation of the given facts. (10)
- b) Define Partial Order Planner highlighting its advantages. Apply the partial order plan for putting on shoes and socks; also explain the concept of linearization for the same case study. (10)

## UNIT - V

9. a) State the Kolmogorov's Axioms. Explain with suitable example (Toothache and cavity), how you perform inference using Full Joint Distributions. (10)
- b) Write the Decision tree learning algorithm and explain using any suitable example. (10)
10. a) Define Uncertainty. State the reasons that lead to uncertainty. Explain how probability aids to solve uncertainty in AI. (10)
- b) List and explain the three major issues that affect the design of a learning element. Also explain the concept of computational learning theory. (10)

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