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CSPE611

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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – MAY / JUNE 2014

Course & Branch	: B.E.- Computer Science and Engineering	**Semester**	: VI
Subject	: Artificial Intelligence	**Max. Marks**	: 100
Subject Code	: CSPE611	**Duration**	: 3 Hrs

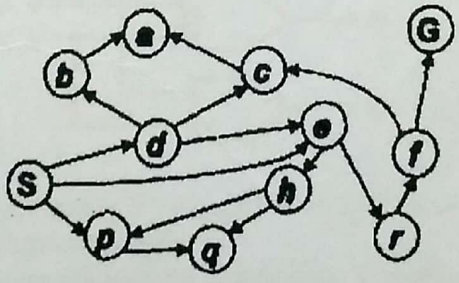
Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

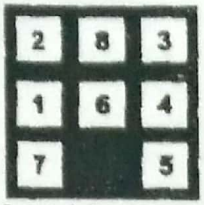
1. a) Develop a PEAS description, task environment and their characteristics for the Agent Medical Diagnosis System, Internet book shopping. (08)
   b) Draw and Outline a Model-based, utility-based agent program that embodies the principles of all Intelligent systems. (06)
   c) Define Rational Agent and its characteristics .How does a rational agent differ from Omniscient Agent? Give the difference between Performance Measure and Utility function. (06)

2 a) Formulate with the necessary components the Toy problem- Vacuum World and draw the state space tree for it. (08)
   b) Propose the idea given by Turing to build learning machines and to teach them. Draw the general model of the agent he devised and explain all of its conceptual components. (06)
   c) Examine the difference between State Space and a Search tree? Given graph of states (S- start node and G – goal node)with arrows pointing to successors. Draw State space graph and a search tree. (06)

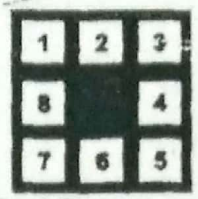


UNIT – II

3. a) Prove that A* using TREE-SEARCH is optimal if h (n) is admissible and GRAPH-SEARCH is optimal if h (n) is consistent. (08)
   b) For the given 8 Puzzle problem use appropriate method to reach the goal state. Perform Depth First Search to say which method is heuristic. (06)



Initial State



Goal State

c) Justify that Davis-Putnam algorithm is essentially a recursive Depth first enumeration with the improvements made over the simple scheme of TT-ENTAILS? (06)

4. a) In which environment Learning Real Time Algorithm finds the goal and when it is not complete. Write the algorithm and Justify with proper reason its worst case behavior. (08)

b) Given the following, can you prove that the unicorn is mythical? How about magical? Horned? (06)

" If the unicorn is mythical, then it is immortal, but if it is not mythical, then it is a mortal mammal. If the unicorn is either immortal or a mammal, then it is horned.

The unicorn is magical if it is horned."

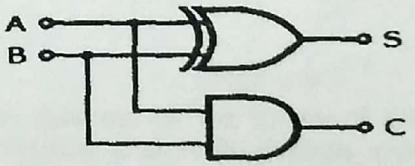
c) Define refutation completeness in Propositional Logic. Illustrate the procedure of converting the sentence $B_{1,1} \Leftrightarrow (P_{1,2} V P_{2,1})$ into Conjunctive Normal form. (06)

UNIT – III

5. a) Write out the axioms required for reasoning about the wumpus's location, using a constant symbol **Wumpus** and a binary predicate **In(Wumpus, Location).** List and justify the two synchronic rules that allow agent to make deductions. (06)

b) Write the syntax of First Order Logic and using the sentence "Everyone dislikes Parsnips" Show the connections between ∀ and ∃. (04)

c) Outline the Knowledge Engineering process steps for the half adder circuit given to answer the question " what combinations of inputs would cause the first output of S to be 1 and C to be 0 ? ". (10)



6. a) For the given clause ¬P(x,F(x,A)) V ¬Q(x,A) V R(x,B) Show that resolution is refutation complete with first order logic . (10)

b) Construct First Order definite clauses for the following problem and use forward chaining algorithm to prove West is a criminal. (10)

"The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American."

UNIT – IV

7. a) Define the predicates Before, After, During and Overlap, using the predicate Meet and the functions Start and End, but not the function Time or the predicate <. (05)

b) Perform inheritance reasoning with the following sentences and construct a semantic network with the identified objects. (09)

Tom is a cat.
Tom is owned by John.
Tom is ginger in colour.
Cats like cream.
Fido is a Dog
All mammals are animals.
Mammals have fur.

c) Write definitions for the following and represent it in First Order Logic: (06)

a. ExhaustivePartDecomposition
b. PartPartition
c. PartwiseDisjoint

8. a) The monkey-and-bananas problem is faced by a monkey in a laboratory with some (09)
bananas hanging out of reach from the ceiling. A box is available that will enable the monkey to reach the bananas if he climbs on it. Initially, the monkey is at A, the bananas at B, and the box at C. The monkey and box have height *Low*, but if the monkey climbs onto the box he will have height *High*, the same as the bananas. The actions available to the monkey include Go from one place to another, *Push* an object from one place to another, *Climb Up* onto or *ClimbDown* from an object, and *Grasp* or *Ungrasp* an object. Grasping results in holding the object if the monkey and object are in the same place at the same height.

a. Write down the initial state description.
b. Write down STRIPS-style definitions of the six actions.
c. Suppose the monkey wants to fool the scientists, who are off to tea, by grabbing the
bananas, but leaving the box in its original place. Write this as a general goal (i.e., not
assuming that the box is necessarily at C) in the language of situation calculus.

b) Write the differences that exist between STRIPS with ADL Languages for representing planning problems (06)

c) Write actions for putting on shoes, socks, coat and a hat. Draw the partial order plan for it. (05)

UNIT – V

9. a) Name the three main reasons, for the failure of a First Order Logic to cope up with a domain like Medical Diagnosis. Design a decision-theoretic agent that selects rational actions. (06)

b) List with examples some important properties of Atomic Events and state Kolmogorov's axioms that define the probability scale and its end points. (07)

c) Consider Weather and dental, Coin flips examples for Factoring a large joint distribution into smaller distribution using absolute independence. Write the equations and show the relationship. (07)

10. a) Compare Decision list with Decision tree. Create a decision list for the restaurant problem and represent the hypothesis. Find an efficient algorithm that returns a consistent decision list. (08)

b) Mention the idea of ensemble learning. Write the Boosting algorithm and show how it works. (08)

c) Prepare a Methodology for assessing the prediction quality after fact and performance of the learning algorithm. (04)

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