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CS607

Final Term Examination – Spring 2006

Time Allowed: 150 Minutes

Question No. 1

Marks : 1

At the end of a Candidate Elimination run, the sets G and S are given as:

$G = \{(? , X, ?, ?)\},$

$S = \{(? , X, ?, ?)\},$

Answer the following by giving arguments in support of your answers.

- a) Are these sets possible together?
- b) Which one of the following is the correct interpretation of the state of learning?
 - (i) All concepts between $(?, X, ?, ?)$ and $(P, X, M, ?)$ inclusive, in the generalization hierarchy of all concepts of the particular problem.
 - (ii) (P, X, M, T) is the final concept.
 - (iii) Learning has converged to the single concept $(?, X, ?, ?)$.
 - (iv) Candidate Elimination will not converge in learning i.e. would fail.
 - (v) G and S are empty.

Question No. 2

Marks : 3

- a) How many hypothesis (concepts) are possible if we have two attributes that can take 7 values each if we are using conjunctive (AND) logic.
- b) If we are using "?" and " Φ " (phi) as two values then reduce the number we will get in part "a" as much as possible.

Question No. 3**Marks : 3**

Suppose we have the following:

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We have to prove Z

- a) Solve the above Inference problem using the following inference rules: Modus Ponens, Modus Tollens, And-Introduction and And-Elimination.
- b) Solve the same Inference problem above using resolution refutation. Show all steps.

Question No. 4**Marks : 1**

Suppose we want to build some preliminary rules for "Robot Motion Guidance System"

Robot Motion Guidance System

- Rule I **If** Distance of object in front is less than 15 meters
Then look right or left
- Rule II **If** In right direction the distance of front object is less than 50 meters
Then move left
- Rule III **If** In left direction the distance of front object is less than 50 meters
Then move right
- Rule IV **If** In left direction the distance of front object is less than 50 meters
AND In right direction the distance of front object is less than 50 meters
AND Distance of object in front is less than 15 meters
Then move backward

Suppose we know the following facts,

- i. There is a wall in front of robot at the distance of 10 meters.
- ii. There are two big hurdles in left and right directions of robot at the distances less than 50 meters.

- a) Show that the robot will stop using forward and backward chaining.
- b) Implement this expert system using CLIPS code.