National Institute of Technology Silchar

End Semester (PG) Examination, May 2021

Subject Code: <u>CS5109</u>   Subject: <u>Artificial Intelligence</u>

Semester: <u>2nd</u>   Department: <u>Computer Science & Engineering</u>

Duration: <u>2 Hours</u>   Total Marks: <u>50</u>

Figure in the right hand margin indicates full marks for the question.

Attempt any Five questions.

1.   Consider the following facts: 10

Rajiv, Gopal and Madhu are people. Rajiv likes all kinds of food. Oranges are food. Dosa is food. Anything anyone eats and is not killed as a result is food. If you are killed you are not alive. Madhu eats everything Gopal eats. Gopal eats chicken and is still alive.

   a)   Translate the above into First Order Logic (FOL).

   b)   Express the formulas of part a) into clause form.

   c)   Using the resolution method shows that "*Rajiv likes chicken*".

   d)   Using the resolution method shows that "*Madhu eats something*" is true.

   e)   Show how a resolution method based theorem prover answers the question "*What does Madhu eat?*"

2.   Show how the algorithm AlphaBeta explores the game tree, searching from left to   10
right (answer the questions from a to c):

15 16 14 13 12 16 18 11 16 14 18 15 13 16 16 14 13 10 14 15 16 15 17 13 15
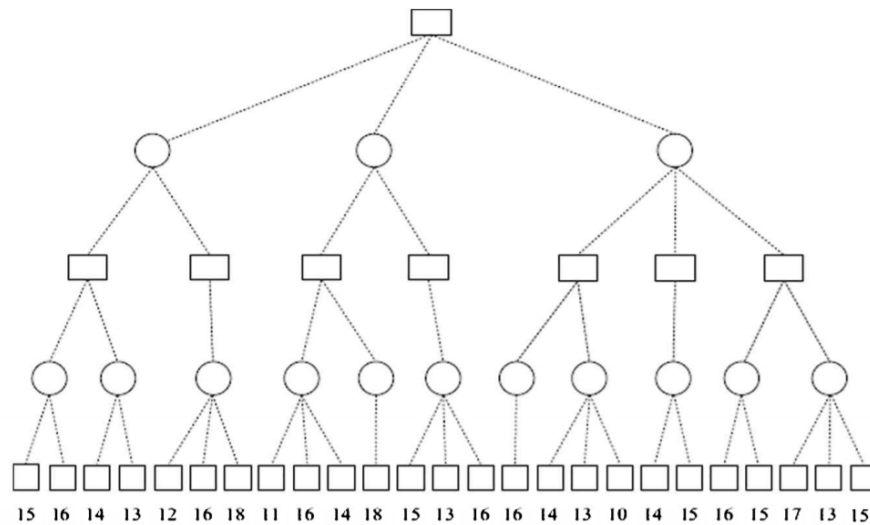
a) Fill in the leaves that are inspected by AlphaBeta.

b) Show the cutoffs and label them with their type.

c) Mark the move that AlphaBeta will choose for MAX at the root.

d) When would best-first search be worse than simple breadth-first search?

3. a) Why A* is optimal give an example.   3

    b) Write difference between A* and AO* algorithm.   2

    c) Write the heuristic function for greedy BFS and also explain.   2

    d) Use with suitable example how AO* algorithm is used for problem reduction?   2

    e) Write the difference between Forward and Backward reasoning   1

4. a) Explain various types of Intelligent Agent (IAs). State the limitation of each and   3
        how it is overcome in other types of agent.

    b) *We cannot represent the full world.*   3
        We cannot sense the full world.
        We cannot (always) act perfectly.
        We cannot predict the consequences of proposed actions perfectly.

        How then does intelligence arise?

    c) Explain with example Inductive and Deductive reasoning.   3

    d) How does a robot get various sensory information?   1

5. a) Discuss the expert system in the domain of medicine using suitable case study? Explain its architecture describing its components.   5

   b) Explain Dempster-Shafer Theory. Can it apply in Machine Learning Domain?   3

   c) Explain Non-monotonic reasoning with an example.   2

6. a) Where does the bayes rule can be applied and how?   2

   b) Specify the components that constitute the building of the expert system.   2

   c) Explain the concept of learning from an example.   2

   d) How is PROLOG useful to solve AI problems?   2

   e) Represent the following facts using Propositional Logic: 2

      It is raining.
      It is sunny.
      It is windy.
      If it is raining, then it is not sunny.

[End]