

**Indian Institute of Information Technology, Sri City, Chittoor**

IIITS/S2023/End Exam

Examination: Artificial Intelligence

Duration: 1.5 hours

Date: 19/04/2023  
Maximum Marks: 25

**Read the Instructions before proceeding:**

1. This is a **closed book exam**. You can use **a calculator** if necessary.
2. **Please Write/Draw legibly!** If we can't understand what you have written, we can't grade it.
3. **Don't use Pencils** for answering/drawing. The final answer **must** be in blue or black ink.
4. Clearly mention the question number before the answer.

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1. a) Write all rules to convert predicate logic into CNF. [3M]  
b) Convert the following sentences into predicate logic  
1. Ravi likes all kinds of food. 2. Apples and chicken are food 3. Anything anyone eats and is not killed is food 4. Ajay eats peanuts and is still alive 5. Rita eats everything that Ajay eats [5M]
  2. Consider the following sentences.
    - A. Jack owns a dog.
    - B. Every dog owner is an animal lover.
    - C. No animal lover kills an animal.
    - D. Either Jack or Curiosity killed the cat, who is named Tuna.Prove that Curiosity kills the cat. Write the following steps clearly. First write the sentences in First-order logic and create the knowledge base. Then convert the sentences into CNF. Finally, write the proof by resolution. [3M+2M+3M]
  3. a) Write the differences between supervised and unsupervised learning. [4M]  
b) A hospital developed a computer aided cancer detection (CACD) system for diagnosing the brain tumor from the Magnetic Resonance Imaging (MRI) scans. Let the classes of the CACD systems as  $c_1$  and  $c_2$ . Let  $c_1 \rightarrow$  Healthy or Benign  $c_2 \rightarrow$  cancerous tumor. The two actions the CACD system can be taken in this problem. Assume equal prior probabilities, and let likelihood of CACD system classifying a scan as benign or healthy as  $p(x | c_1) = 0.4$ , and system classifying a scan as cancerous tumor as  $p(x | c_2) = 0.2$ . Find the decision/classification CACD system is going to make for the new scan "x" using Bayes theorem? [5M]

**Note: For question 4a write appropriate points in a comparison table (stories will get a reward of zero). For question 4b write the Bayes theorem equation and necessary variables, values, and solve the problem step by step according to the Bayes Theorem. (Any other method of solving will get reward of zero)**