B. E. Seventh Semester (Computer Technology) / (New) Examination

Course Code : CT 1451 / CT 410   **Course Name : Artificial Intelligence (New)**

Time : 3 Hours]   [Max. Marks : 60

Instructions to Candidates :—
   (1)   All questions are compulsory.
   (2)   All questions carry marks as indicated.
   (3)   Due credit will be given to neatness and adequate dimensions.
   (4)   Retain the construction Lines.
   (5)   Illustrate your answers wherever necessary with the help of neat sketches.

1. Solve any **Two** :—

   (a)   What is the need of intelligent agents in artificially intelligent systems ? Discuss Reflex agent and Utility based agents in detail.

   (b)   Show Problem space for 8 puzzle problem. Goal state and initial states are mentioned :

1		4
2	5	6
3	7	8

Initial State

1	2	3
4	5	6
7	8	

Goal State

   (c)   Discuss the span of artificial intelligence "Task domains". $3\frac{1}{2} \times 2 = 7$

2. Solve any **Two** :—

   (a)   Write algorithms for the following :—

      (i)   Heuristic search.

      (ii)   Generate and Test.

(b) Write and explain the production rules for a three Water Jug problem where Capacity of Jug A is 8 liters, Jug B is 5 Liters, and that of water jug C is 3 liters. (without any measuring mark on the jug. Can I divide 8 lt. water in two equal parts.)

Goal State : (4, 4, 0)   Initial State : (0, 0, 0)

(c) Explain the terms :—

(i) Means end Analysis.

(ii) Constraint satisfaction. $4 \times 2 = 8$

3. Solve any **One** :—

(a) Consider the following axioms :

(1) All hounds howl at night.

(2) Anyone who has any cats will not have any mice.

(3) Light sleepers do not have anything which howls at night.

(4) John has either a cat or a hound.

Using Resolution theorem, prove the Conclusion : If John is a light sleeper, then John does not have any mice.

Note : You may use LS(x) for 'light sleeper'.   7

(b) State the limitations of Propositional Logic.
Consider the following Propositional logic statements :—

(1) $(P \rightarrow Q) \rightarrow Q$

(2) $(P \rightarrow P) \rightarrow R$

(3) $(R \rightarrow S) \rightarrow \neg (S \rightarrow Q)$

Prove the proposition R using resolution theorem.   7

4. Solve any **One** :—
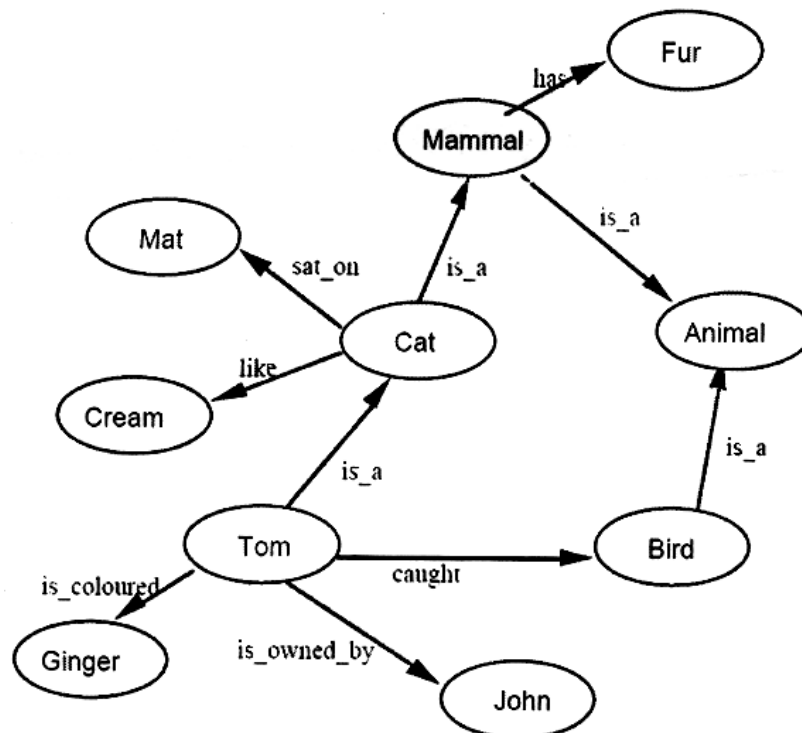
Refer Figure 1 shown below for questions a and b

Figure 1

(a) (i) State various knowledge representation methods.

(ii) Refer Figure 1 shown above. Derive Minimum 14 statements Natural Language – English Statements from the network representation.

$1 + 7 = 8$

(b) (i) Compare Forward versus Backward Reasoning.

(ii) Refer Figure 1 show above. Write Prolog statements (Minimum 14) to represent facts shown in Figure 1. $1 + 7 = 8$

5. Solve any **Two** :—

(a) What is non – monotonic reasoning ? Give suitable example of Discuss advantages of Non – monotonic reasoning in detail.

(b) Discuss : Certainty factor and its dominance in AI.

(c) Suppose we are building a classifier that says whether a text is about sports or not. Our training data has 5 sentences :

Text	Tag
"A great game"	Sports
"The election was over"	Not Sports
"Very clean match"	Sports
"A clean but forgettable game"	Sports
"It was a close election"	Not Sports

Use Naïve Bayes classifier to tag the sentence "A very close game".

$7 \cdot 5 \times 2 = 15$

6. Solve any **Two** :—

    (a) Define learning. Discuss how learning occurs in Artificial Neural Networks.

    (b) Write short notes on :—

        (i) Expert system shell.

        (ii) Rule based Expert system.

    (c) Explain Learning by taking advice and Learning by experience with suitable example. $7 \cdot 5 \times 2 = 15$