XIM University, Bhubaneswar

School of Computer Science and Engineering

Paper Name: Artificial Intelligence and Application

Program: B.Tech. 5th Sem.

Assignment-2

Points-80, Weightage – 20, Date of Submission: 31/10/2023

1. **Implement any one of the programming assignments using Python given below.**   **Point-20**
   a. Solving 8-puzzle
   b. Solving N-queen problem
   c. Tic-tac-toe game

   Note: Your document must contain the problem formulation, description about state, actions, transition models, and the goal state(s). Also write the code and describe. Give snapshots of the outputs.

2. **Representation and resolution using propositional logic.**   **Point-10**

   If we are in San Diego, then it is sunny. If it is sunny, then it is warm. If it is warm and sunny, then it is not winter. It is winter.

   Prove: We are not in San Diego

3. **Translate the following English sentences to predicate logic formulas. Choose your own constants, variables, and predicate symbols, providing the key. Use appropriate quantifiers.**   **Point-10**

   For example: Every cat is black or white.

   Key: C(x): x is a cat; B(x): x is black; W(x): x is white.

   Formula: $\forall x[C(x) \to [B(x) \lor W(x)]]$ or $\forall x: [cat(x)\text{->} (black(x) \lor white(x))]$

   (a) Any pet either loves itself or some person.

   (b) Dogs will eat anything.

   (c) Some sleepy students didn't answer any questions.

   (d) No dog except Fido barked.

   (e) Every student who takes AI loves it. (HINT: Treat 'AI' as a proper name.)

   Points-10

4. **Resolution using predicate/FOL logic.**   **Points- 10X4**

   Case-1:

   Consider the following axioms:

   1. John likes all kind of food.
   2. Apple and vegetable are food.
   3. Anything anyone eats and not killed is food.
   4. Anil eats peanuts and still alive.
   5. Harry eats everything that Anil eats.

6. (Conclusion) John likes peanuts.

Case-2:

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.
5. (Conclusion) If John is a light sleeper, then John does not have any mice.

Case-3:

Consider the following axioms:

1. Anyone whom Mary loves is a football star.
2. Any student who does not pass does not play.
3. John is a student.
4. Any student who does not study does not pass.
5. Anyone who does not play is not a football star.
6. (Conclusion) If John does not study, then Mary does not love John.

Case-4:

Consider the following axioms:

1. Every child loves every candy.
2. Anyone who loves some candy is not a nutrition fanatic.
3. Anyone who eats any pumpkin is a nutrition fanatic.
4. Anyone who buys any pumpkin either carves it or eats it.
5. John buys a pumpkin.
6. Lifesavers is a candy.
7. (Conclusion) If John is a child, then John carves some pumpkin.

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