ARTIFICIAL INTELLIGENCE (CS60045)
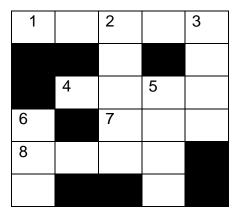## (Class Test – 2)

Answer ALL questions

1. Consider the following Crossword Puzzle Problem to be solved using Constraint Satisfaction (CSP) method and answer the questions associated with it:

   List of Words from which the Puzzle is to be Solved are {Style, Stain, Onset, Apple, Store, Stone, Entry, After, Otter, Other, Exit, Rare, Dart, Nerd, Stay, Star, Ante, Are, End, Art, Add, Rod}.

   (a) Draw the CSP Graph indicating the nodes for the variables, domains (after applying Node Consistency) and edges (for constraints)

   (b) Apply Arc Consistency on the problem and again draw the CSP graph as in (a) above with only the consistent values of every domain remaining.

   (c) List as many possible consistent solutions to the CSP you find

   (d) Add at most **two** more NEW words to the List of words to find at least **three additional** solutions

   (4+2+2+2 = 10 marks)

2. What is meant by a deduction system being sound and complete. Prove that Resolution Refutation for Propositional Logic is sound and complete.

[4+6 = 10 marks]

3. Consider the following problem Statements to be coded in first order predicate logic and solved using resolution refutation method:

Pritam played for BigTeam. Mahan was the captain of BigTeam. All those who played for BigTeam were either a friend of Mahan or disliked him. People who are friends of anyone do not betray their friends. People betray those whom they are not friends with. Pritam betrayed Mahan. Therefore, we can conclude that Pritam disliked a captain of a team he played for.

Answer the following questions:

(a) List all predicates that you will use for encoding the problem

(b) Code the sentences and goal in first order predicate logic using the predicates defined in (a)

(c) Convert each of them to Clausal Form and List the Clauses

(d) Use Resolution Refutation Method to show whether the goal can be logically concluded from the facts or not. Clearly show the method and all derived clauses

(3+7+4+6 = 20 marks)