1. What is 8-puzzle problem? By giving an example explain a stupid move in 8-puzzle problem. [16]

2. What is a depth first search of the search tree? Write an algorithm to conduct depth first search explain with example and also mention advantages and disadvantages. [16]

3. Explain each of the following with an example:
   (a) Constraint graph
   (b) Constraint satisfaction problem
   (c) Cryptarithmetic puzzle. [4+6+6]

4. Explain the minimax algorithm with an example and diagram. [16]

5. (a) Explain, the knowledge level, logical level, and implementation level in a knowledge-based agent.
    (b) What is a horn sentence. Does a polynomial time inference procedure exist for Horn sentence?
    (c) What ontological and epistemological commitments are made by propositional logic. [6+6+4]

6. Write down logical representations for the following sentences suitable to use with Generalized Modus Ponens:
   (a) Horses, cows and pigs are mammals
   (b) An offspring of a horse is a horse
   (c) Bluebeard is a horse
   (d) Offspring and parent are inverse relations
   (e) Every mammal has a parent.

   Draw the proof tree generated by an exhaustive back-ward chaining algorithm for the query \( \exists h \text{ Horse}(h) \). [16]

7. (a) Give an outline of a simple planning agent
    (b) Give partial-order planning algorithm. [8+8]

8. Explain instance based learning with an example. [16]