1. a) Mention disadvantages of Hill climbing as a search technique and possible solutions of each?
b) What is machine learning? Differentiate between Supervised Learning and Inductive Learning.
c) Narrate: Non monotonic Reasoning Systems.
d) Elaborate in brief: Hebb’s rule and Delta rule.
e) What is Hope-field Network? What do you mean by Hopfield Law? What are the major limitations of it?
f) Describe in brief various steps involved in NLP (Natural Language Processing).
g) Explain the architecture of knowledge based system.

2. a) Explain Back propagation Artificial Neural Network.
b) Explain learning rule of Back propagation ANN.

b) Justify the use of fuzzy logic in AI. What are the criticisms for fuzzy logic? Narrate Fuzzy Rule Based Systems.

4. a) Explain the three concepts Probability, Uncertainty and Belief. Explain Bayes’ theorem.
b) What is Perceptron? Explain Multilayer Perceptron in brief.

5. a) For each of the following statements, show a Parse Tree. For each of them, explain what knowledge in addition to the Grammar of the English, is necessary to produce the correct Parse Tree.

   **The chef cooks the soup.**

   b) Explain Conditional Probability in brief. How is it related with the concept of Event and Circumstances?

   c) Explain forward and backward chaining. Under what conditions would it make sense to use both forward and backward chaining? Give an example where both are used.
6. 
a) Write a PROLOG program to perform different operations like addition, subtraction, multiplication and division.
b) Write a PROLOG program to find factorial of given number.
c) Write a PROLOG program to display following patterns. (n -- n3) 

7. 
a) Explain: Intelligence and Artificial Intelligence. How do you distinguish between the two? Explain AI application areas.
b) How to classify a problem in AI? What are the seven problem characteristics?
c) Distinguish between Heuristic and Algorithm. Support your answer with the help of an example. Write down the steps of AO* algorithm as a heuristic search technique.