

**NOTE:**

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

**Time: 3 Hours****Total Marks: 100****1.**

- a) Write down advantages of Artificial Intelligence (AI). Also state disadvantages of AI. How should AI techniques be designed?
- b) Give an example of a problem for which Breadth-First Search would work better than Depth – First Search.
- c) Why Hill Climbing is also known as Greedy Local Search? Write down the terminating conditions for Hill Climbing algorithm.
- d) Convert following English sentence in to the predicate logic.
  1. *'Every student who loves Mary is happy.'*
  2. *'Every boy who loves Mary hates every boy who Mary loves.'*
- e) Write a PROLOG program for finding Factorial of given number.
- f) What is/are the role(s) of Knowledge Engineers? Also explain difficulties in knowledge acquisition.
- g) What do you mean by Chinese Room Test? Explain how it can be performed?

**(7x4)****2.**

- a) Explain Mix Max theorem.
- b) Explain A\* Algorithm for search.

**(9+9)****3.**

- a) Define and explain Semantic Grammar. What are principal advantages and disadvantages of Semantic Grammar? What is the purpose of Semantic Processing? What do you mean by Context Free Grammar? State its advantages and disadvantages.
- b) A 3-input neuron is trained to output a zero when the input is 110 and a one when the input is 111. After generalization, when the output will be zero? How many signals can be sent by a neuron at a particular time instant? Draw a simple Artificial Neuron and discuss the calculation of net input.
- c) Differentiate cut and fail predicate in PROLOG. Explain types of cut predicate with example. Give output of following PROLOG program.  
 p ( X ):- a ( X ).  
 p(X):- b(X), c ( X ) , ! , d ( X ) , e ( X ).  
 p(X):- f(X).  
 a(1).  
 b(1).  
 b(2).  
 c(1).  
 c(2).  
 d(2).  
 e(2).  
 f(3).  
 Goal: p(X)

**(6+6+6)**

**4.**

- a) What is Fuzzy membership function? How Fuzzy Logic is differing from Probability in terms of uncertainty? State example which differentiate Fuzzy Membership function and Probability. '*The room temperature is hot*'. Can the 'hot' (use of linguistic variable is used) be represented by fuzzy set?
- b) Draw and explain architecture of Artificial Neural Network (ANN). What is important of activation function in ANN? Explain different available activation function in detail.

**(9+9)**

**5.**

- a) Draw and explain Recurrent Neural Network? Differentiate Feed-Forward Network and Recurrent Neural Network. Write down characteristic of Recurrent Neural Network.
- b) Why learning is important in Neural Network? Explain Hebbian Learning Rule.

**(9+9)**

**6.**

- a) Define Augmented Transition Nets (ATNs). Write down its components. Explain ATNs with suitable example.
- b) What are issues for Knowledge Representation? Also explain limitations of it.
- c) Write a PROLOG program that prints Fibonacci series up to n number where n is user defined number.

**(6+6+6)**

**7.**

- a) Explain the difference between Supervised and Unsupervised Learning.
- b) Discuss Baye's Theorem.

**(9+9)**