C14-R3: AI AND NEURAL NETWORKS

NOTE:

1. **Answer question 1 and any FOUR questions from 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) List various ways in which knowledge can be represented. Give the Semantic Network representation for the sentence "John gave Marry the book".

b) Suggest a heuristic function for the following problems:
   i) Traveling salesman
   ii) Tic Tac Toe

c) Differentiate between supervised and unsupervised learning.

d) Explain the process of skolemisation with the help of a suitable example.

e) Elaborate Alpha-Beta cutoffs in Minimax Search.

f) Explain the use of cut ("!") to control the search with an example.

g) Distinguish between Backward Reasoning and Forward Reasoning. When you are reaching home from an unknown place which of the reasoning is applied? Justify your answer.

(7x4)

2.

a) Describe the conditions under which A* algorithm always provides good solution.

b) Draw Hamming network and explain how competitive learning is achieved in Hamming network.

c) Illustrate with examples Non-monotonic Reasoning and Monotonic Reasoning

(4+8+6)

3.

a) What is the role of Constraint Satisfaction in problem solving?

b) Trace the execution steps using Constraint Satisfaction technique for solving the following Crypt arithmetic problem.

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   CROSS
+ ROADS
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 DANGER
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(6+12)

4.

a) Describe the architecture of an Expert System? Explain various methods of Knowledge acquisition.

b) What is Conceptual Dependency? Give the conceptual dependency structures for the following sentences:
   i) Anil gave Mary a red colour book.
   ii) Dr. Niel gave a talk on "Future Trends in IT" in the auditorium to the final year students.

c) Define delta rule and give its uses in Back propagation algorithm.

(6+6+6)

5.

a) Write a PROLOG or LISP program for the following:
   i) To search a list of elements for a particular item.
   ii) To insert an element in the list after the element X.

b) Describe Unification algorithm and explain how it helps in Resolution.

(9+9)

6.

a) Explain linear separability. Discuss how a single layer perceptron model can not solve XOR problem of linear seperability and a multiplayer perceptron model can solve.

b) Discuss Hebbian Rule and explain how it can be applied to learning in Neural Networks?

(10+8)

7.

a) Describe planning with forward state space search.

b) Give structures of:
   i) Single layer Feed-forward Network
   ii) Multilayer Feed-forward Network
   iii) Recurrent Network

c) Give three situations where cut and fail might be useful.

(6+6+6)