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)   Compare and contrast declarative and procedural knowledge.
b)   Discuss various features of production system.
c)   What is associative mapping? State the different types of associative mapping.
d)   Elaborate Alpha-Beta Cutoffs in Minimax search.
e)   Explain various techniques of surpassing local minima in Back propagation technique?
f)   Give a model for a Neuron of a Radial Basis Function network.
g)   What is a most general unifier (mgu) and explain how it is useful in unification algorithm.

(7×4)

2.
a)   Give Depth First Search algorithm.
b)   Compare Depth First Search algorithm with A* algorithm.
c)   Suggest, how could one deal with infinite loops in Depth First Search. Give Iterative Deepening Depth first search.
d)   What are the conditions under which A* provides optimal solutions.

$(5+5+5+3)$

3.
a)   Give a procedure to convert Predicate Calculus Formulas into Clausal Form.
b)   Convert the following expression into clausal form
       $\exists x\ \forall y\ (\forall z\ P(f(x),\ y,\ z) \rightarrow (\exists u\ Q(x,\ u) \wedge \exists v\ R(y,\ v)))$
c)   Discuss Dempster-Shafer theory with suitable example.
d)   Discuss one application area of artificial intelligence.

$(5+5+5+3)$

4.
a)   What do you mean by automated reasoning?
b)   Explain the way to present a problem to an automated reasoning program. Discuss about the formation of problem domain and representation of language for an automated reasoning.
c)   Discuss about the deduction calculus that will be used by the program to perform its inferences.
d)   Elaborate Resolution Principle.

$(3+7+4+4)$

5.
a)   Why ambiguity is considered to be a central problem in NLP? Discuss different types of ambiguities exists.
b)   Discuss different methods for disambiguation with suitable examples.
c)   How does Definite Clause Grammars (DCGs) help in parsing?

$(5+9+4)$

6.
a)   What is McCulloch and Pitts model for an artificial neuron?
b)   What do you mean by Perceptron?
c)   Compare supervised learning and unsupervised learning.
d)   Discuss the Back-Propagation Algorithm along with its mathematical derivation.

(3+3+4+8)

7.
a)   What is an expert system?
b)   Discuss different problems solved by expert systems.
c)   Discuss architecture of a typical expert system.
d)   Discuss about the problems for which expert systems are designed.
e)   What do you mean by Expert System Shell? What are the problems associated with horn clause prover.

(3+3+5+3+4)