BE2-R4: ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

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)   What is Artificial Intelligence (AI)? List the various applications of AI?
b)   Explain Heuristic Search Technique.
c)   Define Fuzzy Logic.
d)   Explain Bayes' theorem.
e)   Explain architecture of ANN.
f)   Differentiate between supervised and unsupervised learning rule.
g)   Explain parsing technique.

                                                                    (7x4)

2.
a)   Determine whether each of the following sentence is:
      i)   Satisfiable
      ii)   Contradictory
      iii)   Valid

      S1: (PVQ&R)
      S2: (PVQ) $\rightarrow$ (PV~Q) VP
      S3: (P&Q)$\rightarrow$ R V~Q

b)   Write a Prolog program to find length for any assumed list.

                                                                    (14+4)

3.
a)   Give an example of each necessary and unnecessary backward propagation in AO* algorithm.
b)   What is Hill climbing searching technique? Discuss the various situations when Hill climbing might fail in finding a solution.

                                                                    (9+9)

4.
a)   Consider the following sentences:
      i)   Everyone who loves all animals is loved by someone.
      ii)   Anyone who kills an animal is loved by no one.
      iii)   Jack loves all animals.
      iv)   Either Jack or Jill killed the cat, which is named Tuna.
      v)   All cats are animals.

      Convert the sentences from **i)** to **iv)** into clausal form and find the answer of the following question through resolution:
      Did Jill kill the cat?
b)   Find the MGU of
      A (x, f(g(x)), a) and A(b,y,z)
c)   What are the advantages and disadvantages of Breadth First search over Depth First search? Explain.

                                                                    (9+4+5)

5.
a)   For P → Q, ~Q and ~P show that ~P is the logical consequences of the previous two.
b)   Give an example of non-monotonic reasoning.
c)   Consider the following grammar:

        S → NP VP
        NP → N
        NP → DET N
        VP → V NP
        DET → the
        V → loves
        N → Bill/frog

    i)   Draw a parse tree for Bill loves the frog.
    ii) Draw an Augmented transition Network (ATN) to implement the given grammar.

(4+4+[4+6])

6.
a)   Explain the Fuzzy Entropy theorem.
b)   Explain Recursive Transition nets.
c)   Explain Biological Neuron.

(6+6+6)

7.
a)   Explain Back propagation learning of an ANN.
b)   Explain Delta Rule of ANN.
c)   Define self organizing network. Explain Kohonen's Networks.

(6+6+6)