BE2-R3: ARTIFICIAL INTELLIGENCE AND APPLICATIONS

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) What are the possible reasons for using heuristics? Differentiate between heuristic search and heuristic function.

b) Give some characteristics that a central strategy should have, in order to be effective in applying rules of a production system.

c) List various applications of Neural Networks.

d) Let Y and R be two fuzzy sets of young and rich people. What is the member grade of person being young and rich if the member grade of a person being young is 0.8 and being rich is 0.7?

e) Can Branch and Bound search technique be used to improve the efficiency of DFS? Justify with reasons. What is the major disadvantage of DFS?

f) Show with the help of an example that the composition of substitution is not commutative.

g) Which are the stages in the development of an Expert System?

(7x4)

2.

a) What are the semantic properties of WFFs. Explain each of them by giving example?

b) Discuss how FOPL is powerful than propositional logic? What are the limitations of proposition logic?

c) Will the following literals Unify? If yes, then write the most general unifier.

$f(x,x)$

$f(g(x),g(x))$

d) A list is a palindrome if it reads the same in the forward and in backward direction, for example [k,a,n,a,k]. Write a prolog program to check if the given list is a palindrome or not.

(4+4+4+6)

3.

a) Trace the execution of the constraint satisfaction procedure in solving the crypt arithmetic problem:

> **DONALD**
>
> **+**
>
> <u>**GERALD**</u>
> <u>**ROBERT**</u>

b) Explain frame-based knowledge representation with the help of an example.

c) What are the components of planning system? Compare Nonhierarchical Planning with Hierarchical Planning.

4.

a) What is the Expert System? How do you distinguish between a knowledge based system and an expert system?

b) Explain the term pragmatics in context of NLP. Why is it the most difficult phase of NLP?

c) Derive the parse tree for the sentence using the appropriate rules:
   Fed raises interest rates 0.5% in order to control inflation.

d) Distinguish between state space search and constraint satisfaction technique. What are the termination conditions for constraint satisfaction technique?

(5+5+4+4)

5.

a) What do you mean by the term reasoning?   Differentiate between default reasoning and minimalist reasoning.

b) Which are the factors influencing Backpropagation Neural Network Training?

c) Justify the use of fuzzy logic in AI. What are the criticisms for fuzzy logic?

d) Convert these sentences to propositional logic. Using the logical rules, proof by resolution that "it is good to walk" is a logical consequence of the given information.
   i)   It is raining, it is snowing or it is dry.
   ii)   It is warm.
   iii)   It is not raining.
   iv)   It is not snowing.
   v)   If the weather is nice, then it is good to walk.
   vi)   If the weather is dry and warm, the weather is nice.

(5+3+3+7)

6.

a) Write compete prolog program for reversing elements in a list.

b) Write rule in prolog *getn (list, n, p)* where *p* returns the nth element from list.

c) Write a prolog program to calculate GCD (**G**reatest **C**ommon **D**ivisor) of two numbers.

(6+6+6)

7.

a) Why does the search in game-playing programs always proceed forward from the current position rather than backward from a goal state?

b) What is Hopfield Network? What are the applications of Hopfield network? What do you mean by Hopfield Law? What are the major limitations of it?

c) What is meant by generalization in feedward networks?

(6+8+4)