BE2-R3: ARTIFICIAL INTELLIGENCE AND APPLICATION

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 control strategies to solve a problem?
b) How can you represent a non-binary predicate using frame based approach?
c) When is a heuristic function said to be consistent?
d) What are the factors that influence the choice of forward or backward reasoning?
e) Write down the steps needed to convert a proportional statement in to its clause form.
f) Explain expert system shells and how they are useful in the development of expert systems.
g) What is the role of ATN grammar in Natural Language processing?

(7x4)

2.

a) What do you mean by hill climbing search technique? Explain the term local maxima and plateau associated with it.
b) i) Write down the steps of depth first search algorithm for state space search.
ii) Under what condition is A* algorithm admissible?

(10+8)

3.

a) What is a constraint satisfaction problem? Evaluate the variables x1, x2, x3 from the following set of constraints: (x1>=2; x2>=3; x1+x2<=6; x1, x2, x3 – I). Also draw the constraint tree.
b) Consider the following problem:
A farmer has a wolf, goat and a cabbage on the left side of a river. He has a boat that can carry at most one of the three with him and he must transport this trio to the right bank. The problem is that he dares not leave the wolf with the goat or the goat with the cabbage? How does he do the transportation? Draw the tree for the above problem, explaining how constraint satisfaction works.

(9+9)

4.

a) Write a Prolog/Lisp program to append and reverse a list array.
b) Write a Prolog/List program to find nth Fibonacci number in the sequence.

(9+9)

5.

a) What are the distinctive characteristics of multilayer perceptron?
b) What is the basis of back propagation algorithm? Mention the heuristics which will significantly improve the performance of back propagation algorithm.
c) Construct a semantic net representation of the following problem:
"Every dog in the town has beaten the ice cream vendor"

(4+6+8)

6.

a) What do you mean by learning? Mention and briefly explain different types of learning? Illustrate with examples.

b) Consider the following problem:

i) Ravi is a commentator.
ii) Ganguly is the captain.
iii) All cricket captains are cricketers.
iv) All commentators either like or dislike Ganguly.
v) Every commentator either likes or dislikes some captain.
vi) Commentators only criticize the captain they dislike.
vii) Ravi criticized Ganguly.

Now, using well-formed formula from the facts, answer the following questions:
"Does Ravi like Ganguly"

(9+9)

7.

a) For what purpose is Bayes' theorem used? Give the mathematical expression of Bayes' theorem.

b) Define certainty factors.

c) Briefly describe Bayesian belief nets and how are they used to classify items for a given problem.

(6+4+8)