BE2-R3: AI 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 is Turing Test? How is it useful to measure the intelligence of a machine?
b) Describe how production system can be used to convert decimal number into a binary number.
c) Discuss how a heuristic function helps in the search technique? Explain with a suitable heuristic function for 8-puzzle problems.
d) Explain the algorithm Depth First Search? State the conditions under which it gives good results?
e) Discuss how First Order Predicate Logic (FOPL) is powerful then proposition logic. What are the limitations of propositional logic?
f) Describe the advantages of Prolog as an artificial intelligence language?
g) Differentiate between Supervised and Unsupervised Learning. Illustrate with examples.

(7x4)

2.
a) What is Best First Search approach? How does it vary from Hill climbing method? When does this method fail to find the solution?
b) Can solution steps be ignored in 8 puzzle problem? Justify. For chess problem, is the solution state or a path? Justify.
c) Will the following literals Unify? If yes, then write the most general unifier.
 f(x; g(f(a); u)) = f(g(u; v); x)
d) Why backtracking (or depth-first-graph search) control strategies should be used when there are multiple paths between problem states. Explain your answer with the help of an example.

(6+4+4+4)

3.
a) Trace the execution of the constraint satisfaction procedure in solving the crypt arithmetic problem:

$$\begin{array}{r} EAT \\ + \quad THAT \\ \hline APPLE \end{array}$$

b) How can you represent non-binary predicates using frame based approach?
c) Distinguish between non-monotonic reasoning and monotonic reasoning. Illustrate with examples

(10+4+4)

4.
a)   What are the components of a Planning System? Compare and contrast non-hierarchical planning with hierarchical planning.
b)   "A game tree is basically AND, OR graph." Justify the statement.
c)   "The search in game-playing programs always proceeds in forward direction from the current position rather than backward direction from the goal state." Do you agree or disagree with the statement. Justify with an example.

(6+6+6)

5.
a)   "*The farmer, fox, goose and grain. A farmer has to cross a river with his fox, goose and grain. His boat can only carry himself and one of his possessions, though. An unguarded fox will eat the goose and an unguarded goose will eat the grain.*"
Find a good representation for the above problem. Perform breadth first search. Write down the search tree.
b)   Which are the factors influencing Backpropagation Neural Network Training?
c)   The following English sentences use 'and', 'or', and 'if' in a way that differs from first order logic. What are the intended logical connectives in these sentences?
   i)   One more outburst like that and you'll be in contempt of court.
   ii)   Either the Red Sox win or I'm out ten dollars.
   iii)   Maybe I'll come to the party and maybe I won't.

(8+4+6)

6.
a)   Write a prolog or LISP program to find the difference between two lists.
b)   Write a prolog or LISP program to concatenate two list.
c)   Write a prolog or LISP program to generate reverse list of a given list.

(6+6+6)

7.
a)   How Goal stack planning is different from the planning of a system?
b)   What is Hopfield Network? Can it be possible to use Hopfield Network for error correction? Justify
c)   Briefly describe Bayesian belief nets and how are they used to classify items for a given problem.

(6+8+4)