

C14-R3: AI 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.

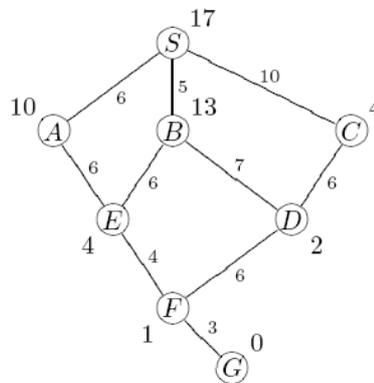
Time: 3 Hours

Total Marks: 100

1.
 - a) Define AI from your perspective. The goal of AI should be to build machines that help people in their intellectual tasks rather than to do those tasks. Justify.
 - b) Explain, how to find a heuristic function for any given problem.
 - c) Discuss how First Order Predicate Logic (FOPL) is powerful than proposition logic? What are the limitations of the proposition logic?
 - d) How Bayesian Belief Nets are used to classify patterns for a given problem?
 - e) What is ALPHA cutoff and BETA cutoff? Explain the benefits of it in searching.
 - f) Which are the factors influencing Backpropagation training? Mention the heuristics which will significantly improve the performance of Backpropagation algorithm.
 - g) Give a brief insight into the term "Pragmatics" in the context to Natural Language Processing. Illustrate with an example.

(7x4)

2.
 - a) Trace the operation of A* algorithm for the following example (figure).



- b) Decide if each of the following is true or false, and also provide a brief justification.
 - "Breadth first Search is complete even if zero step-costs are allowed."
 - "Depth-first iterative deepening always returns the same solution as breadth-first search if b is finite and the successor ordering is fixed."
- c) For the following sentence in English, decide if the associated first-order logic sentence is a good translation. If not, explain why not and correct it.
"John's social security number is the same as Mary's."

(9+6+3)

3.

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

$$\begin{array}{r} \text{NOON} \\ + \text{MOON} \\ + \text{SOON} \\ \hline \text{JUNE} \end{array}$$

- b) Construct a semantic net representation of the following problem:
"Every dog in the town has bitten the ice cream vendor".

(12+6)

4.

- a) Write Hopfield network algorithm to store and recall a pattern.
b) Discuss Natural Language Processing (NLP) and its phases.
c) How are the frames organized? What are the advantages and disadvantages of frames?
d) Distinguish between supervised and unsupervised Learning in Artificial Neural Networks (ANN).

(5+5+4+4)

5.

- a) 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?
b) What are the difficulties in developing an Expert System?
c) Explain: Expert System tools and languages.
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 a Prolog program to determine whether the list is palindrome or not.
b) Write a Prolog program to split a list into two lists such that one list contains negative numbers and one contains positive numbers.
c) Write a Prolog program to join two lists of integer excluding common elements.

(6+6+6)

7.

- a) What are the components of Planning System? Describe Planning with Forward State Space Search.
b) Justify the use of fuzzy logic in AI. What are the criticisms for fuzzy logic?
c) On which kind of logic Prolog is based? Why Prolog is called a logic programming language? What is a clausal form? How it is related to Horn Clause and Prolog?

(6+6+6)