MCSE-003

MCA (Revised)

Term-End Examination

February, 2021

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 hours *Maximum Marks : 100*

Note : *Question number* ***1*** *is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Write Chinese room test. Which limitations of Turing test are addressed by Chinese room test ? *5*

(b) Write steps to obtain the Prenex Normal form of the following formula : *5*

$\forall_x \exists_y \exists_x ((\sim P(x, y) \wedge Q(x, z)) \vee R(x, y, z))$

(c) Translate the following statements to First Order Predicate Logic (FOPL). *5*

(i) Every one who saves money earns interest.

(ii) If there is no interest then nobody saves money.

(d) Write recursive function in LISP that finds the factorial of a natural number (n). *5*

(e) What is a Semantic network ? Draw Semantic network for the representation of the following sentence. *5*

"Tom struck Jerry in the garden with a sharp knife last month."

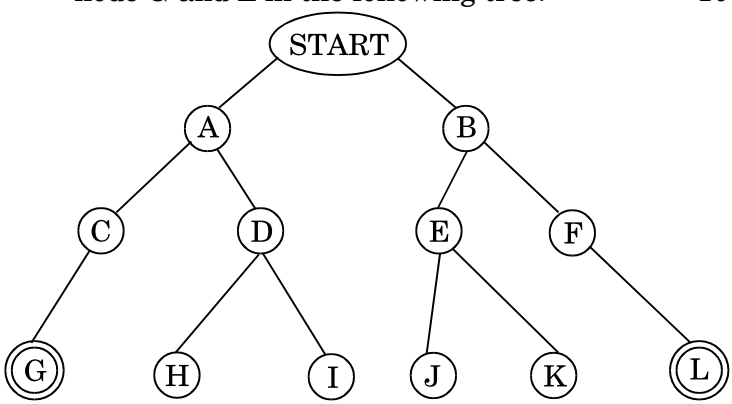
(f) What is an Expert System ? Briefly explain the shells of Expert System. *5*

(g) What are Fuzzy sets ? How do Fuzzy sets differ from Crisp sets ? What is the relevance of Fuzzy logic in Artificial Intelligence ? *5*

(h) What are Agents in Artificial Intelligence ? Briefly discuss the properties of Agents. *5*

2. (a) Write De Morgan's law for both predicate and propositional logic. Justify the statement "De Morgan's laws of predicate logic are generalized form of the laws for propositional logic." *5*

(b) Write Breadth First Search (BFS) algorithm. Use BFS to search the Goal node G and L in the following tree. *10*



(c) Write the importance of CUT and FAIL predicates in PROLOG. Give suitable example for each. *5*

3. (a) How are programming languages used to design expert systems different from general purpose programming languages ? Briefly discuss the components which make the difference. Give two examples of each language type. *7*

(b) What do you understand by "Knowledge Representation" in Artificial Intelligence ? Briefly discuss any two knowledge representation schemes. Also mention, how representation schemes have an edge over others. *8*

(c) What is the principle of resolution ? What is the resolution of $(\sim P \vee Q)$ and $(\sim Q \vee R)$? *5*

4. (a) How do we transform a conceptual graph into FOPL (First Order Predicate Logic) ? Can we transform FOPL into conceptual graph ? If yes, give the procedure to do so. *7*

(b) Write A* algorithm. How is A* algorithm different from AO* ? Out of the two algorithms, which one is better and why ? *8*

(c) Write Modus Tollens and Modus Ponens Prove Modus Tollens using Modus Ponens. *5*

5. Write short notes on any ***five*** of the following : *5×4=20*

(i) Inference Engine

(ii) Associative Networks

(iii) Frames

(iv) Scripts

(v) Mean-End Analysis

(vi) Depth First Search (DFS)