No. of Printed Pages : 5 **MCSE–003**

MASTER OF COMPUTER APPLICATIONS

(MCA)

Term-End Examination

December, 2025

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No.* ***1*** *is compulsory. Attempt any* ***three*** *questions from the rest.*

1. (a) What is the utility of conceptual dependency representation ? Generate the conceptual dependency of the sentence given below : 5

"Raj will eat Dosa from the plate with fork and knife."

(b) If the propositions are as follows : 5

P : He needs a doctor.

Q : He needs a lawyer.

R : He has an accident.

S : He is sick.

U : He is injured.

Represent the following formula in English :

(i) $(S \rightarrow P) \wedge (R \rightarrow Q)$

(ii) $P \rightarrow (S \vee U)$

(c) Evaluate and elaborate the following Lisp expressions : 10

(i) (lessp 18 151 76)

(ii) (Car (a b c d))

(iii) (cdr (x y z))

(iv) (member 'a' (a b c d)

(v) (List 'a' (bc))

(d) Translate the following statements into clausal form : 5

A1 : If X is on top of Y, Y support X.

A2 : If X is above Y, and they are touching each other, X is on the top of Y.

A3 : A cup is above a book.

A4 : A cup is touching a book.

(e) Discuss the 'Cut' and 'Fail' mechanism in Prolog. Give suitable example of each. 5

(f) How do languages for Artificial Intelligence (AI) differ from other programming languages ? Give names of programming languages, which are frequently used to develop expert system. 5

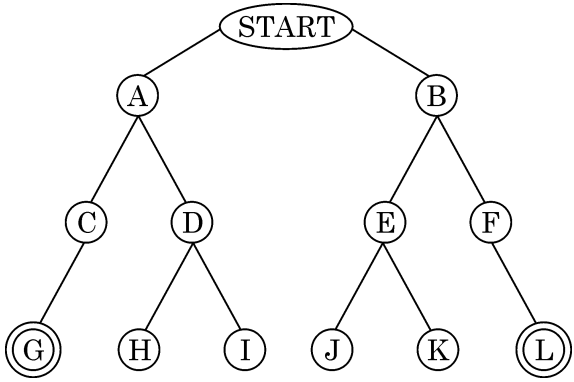
(g) Briefly discuss the 'Script' as a knowledge representation technique. 5

2. (a) Prove the following conjunctures using Fuzzy De Morgan's Law : 8

(i) $A \cap B = (A^C \cup B^C)^C$

(ii) $A \cup B = (A^C \cap B^C)^C$

(b) Write Breadth First Search (BFS) algorithm. Use BFS to search the goal node G and L in the following tree : 8



(c) What do you mean by local maxima with respect to search technique ? Explain with an example. 4

3. (a) Which of the following is Tautology or Contradiction ? 6

(i) $[(p \wedge q) \rightarrow (q \vee r)] \leftrightarrow [p \rightarrow \sim r]$

(ii) $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow [p \rightarrow r]$

(b) Discuss about Expert Shell. Explain the architecture and reasoning techniques used for Expert System COMPASS. 7

(c) What is a Turing test ? Do you know about any machine which passed the turing test ? 7

4. (a) Draw the Semantic Network of sentence "John gave lecture to his students". 7

   (b) Write a program in Prolog to find and print prime numbers between 1 to 100. 7

   (c) Discuss any *two* of the following : 6

   (i) Mapcar function

   (ii) Property List

   (iii) S-Expression

5. (a) What do you understand by a rule of 'Inference' ? Discuss any *four* rules of inference. 5

   (b) How is the concept of matching used in Artificial Intelligence for problem solving ? Explain the indexing technique used for rule matching. 10

   (c) Define your own function LEN in Lisp that returns the number of top-most elements in a given List say L. 5

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