No. of Printed Pages : 5 **MCSE–003**

MASTER OF COMPUTER APPLICATIONS (REVISED) (MCA)

Term-End Examination

June, 2025

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 Hours *Maximum Marks : 100*

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

1. (a) Write a LiSP program to convert the temperature from Fahrenheit to Centigrade. Also, evaluate the following LiSP expressions : 3+2

   (i) (+ 93)

   (ii) (even P(+ 9 6))

   (iii) (expt 2 5)

   (iv) (equal '(two one)' (one two))

(b) Differentiate between forward and backward chaining. What factors affect the decision to choose forward and backward chaining ? 5

(c) Write FOPL to represent the following statements and prove whether the conclusion follows from the premises or not : 5

(i) All dancers love to dance.

(ii) Everyone who sing and plays an instrument loves to dance.

Conclusion : All dancers love to sing and play an instrument.

(d) Write steps to obtain the Prenex normal form of the following formula : 5

$$\forall_X \exists_Y \exists_X ((\sim P(x, y) \wedge Q(x, z)) \vee R(x, y, z))$$

(e) What is an Expert System ? Briefly explain the shells of an expert system. 5

(f) Transform any *two* of the following to CNF : 5

(i) $\sim (X \rightarrow Y) \vee (x \wedge y)$

(ii) $\sim (A \rightarrow B) \rightarrow C$

(iii) $P \rightarrow (\sim (Q \rightarrow R))$

(g) Discuss application of propositional logic with the help of a suitable example. 5

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

2. (a) Write short notes on any *two* of the following : 8

(i) Turing Test

(ii) Chinese Room Test

(b) Skolomize the following : 6

$$(\exists_{X_1})(\exists_{X_2})(\forall_{Y_1})(\forall_{Y_2})(\exists_{X_3})(\exists_{Y_3})$$

$$P(X_1, X_2, X_3, Y_1, Y_2, Y_3)$$

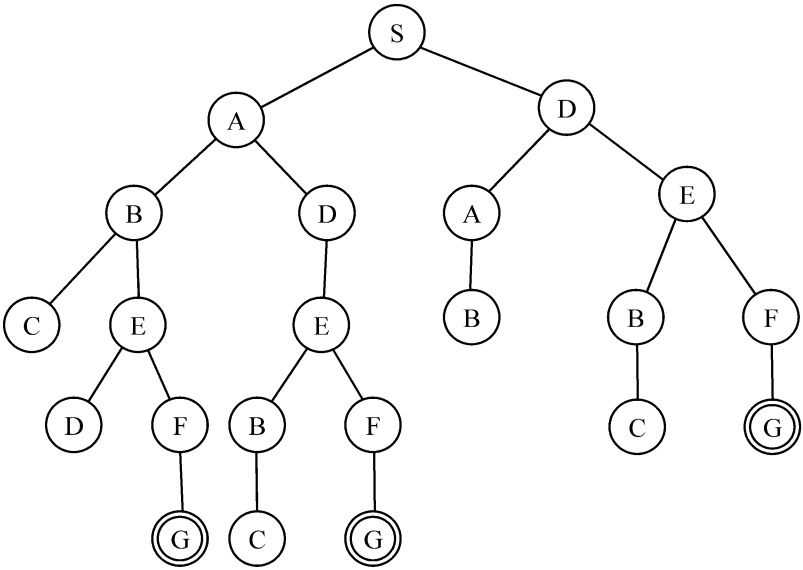
(c) Transform the following FOPL formula to Prenex Normal Form : 6

$$(\forall_X)(\forall_Y)(\exists_Z)Q(x, y, z) \wedge ((\exists_u)$$

$$R(x, u) \rightarrow (\exists_v)R(y, v)))$$

3. (a) Explain the importance of an Expert System. What are various knowledge techniques used in Expert System ? 10

   (b) Write BFS algorithm. Use the BFS to search the goal node (G). Show each step of the algorithm. 10



4. (a) Differentiate between any *two* of the following : 10

   (i) Supervised Learning and Unsupervised Learning

(ii) A^* and AO^* algorithm

(iii) Monotonic Reasoning and Non-Monotonic Reasoning

(b) Define fuzzy interface system. What are the main steps in fuzzy interface system ? Make an interface system for food management system. 10

5. (a) What is the difference between knowledge and intelligence ? Enumerate the various knowledge representation schemes. Give a brief description of each scheme. 7

(b) Write a program in Preolog to identify the following relation : 7

(i) Grandfather (X, Y)

(ii) Sister (X, Y)

Develop appropriate knowledge base and write the rule applicable to the knowledge base.

(c) Write a program in LiSP to find the factorial of a number, entered by the user. Give comments in the program to explain your logic. 6

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