

No. of Printed Pages : 6

MCSE-003

**MASTER OF COMPUTER
(REVISED) APPLICATIONS (MCA)
Term-End Examination**

June, 2026

**MCSE-003 : ARTIFICIAL INTELLIGENCE AND
KNOWLEDGE MANAGEMENT**

Time : 3 Hours

Maximum Marks : 100

Note : (i) *Question No. 1 is compulsory*

(ii) *Answer any 3 questions from the
rest.*

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1. (a) What is well-formed formula ? Write the well-formed formula (WFF) for the following statement : 5
- “There exist a woman and she is mother of Rahul.”

(b) Let 5

P : He needs a doctor,

Q : He needs a lawyer

R : He has an accident,

S : He is sick

U : He is injured

State the following formula in English

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

(ii) $(P \wedge Q) \leftrightarrow (S \wedge U)$

(c) Using the truth table, show that G is a logical consequence of E_1 and E_2 . Where
 $E_1 : (A \rightarrow B)$, $E_2 : \sim B$, $G : \sim A$. 5

(d) Define Hypothetical Syllogism (HS) and Disjunctive Syllogism (DS) 5

(e) Explain non-monotonic reasoning with the help of example. 5

(f) Define inference rule of propositional logic. Explain quantifier rule. 5

(g) Describe Backtracking and its importance in solving a problem in PROLOG. 5

- (h) Differentiate between forward chaining system and backward chaining system. 5
2. (a) Using resolution method, solve the following logic problem : 10
- (i) Some patients like all the doctors.
 - (ii) No patient like any quake.
 - (iii) Therefore, No doctor is a quake.
- (b) Explain the importance of expert system. List various knowledge representative techniques used in expert system ? 5
- (c) Discuss CUT and FAIL operations in PROLOG, with a suitable example. 5
3. (a) How do Language of AI differ from other programming languages ? Give names of programming languages those are used to develop expert systems. 5

- (b) Discuss equality and subset relationship for the following fuzzy sets defined on the universal set $X = \{a, b, c, d, e\}$ 5

$$A = \{a/0.3, b/0.6, c/0.4, d/0, e/0.7\}$$

$$B = \{a/0.4, b/0.8, c/0.9, d/0.4, e/0.7\}$$

$$C = \{a/0.3, b/0.7, c/0.3, d/0.2, e/0.6\}$$

- (c) Draw the Block diagram of Non-monotonic reasoning system and discuss the working of it. 5
- (d) What is Turing test ? Discuss the objection to the Turing test. 5
4. (a) What is Skolemization ? Skolemize the following expression : 5

$$\forall y_1 \forall y_2 \exists x_1 \forall y_3 \exists x_2 P(x_1, x_2, y_1, y_2, y_3)$$

- (b) What are fuzzy sets ? How do fuzzy sets differ from crisp sets ? What is relevance of fuzzy logic in Artificial Intelligence ? 5

- (c) Write a program in PROLOG for finding the greatest common divisor of two positive integers. Write proper comments to enhance readability of written code. 5
- (d) Write steps to transform an FOPL formula into prenex normal form. 5
5. (a) What is Semantic Network ? Draw a semantic network for the data given below : 9
- Mammal have fur,
 - All mammals are animals.
 - A bird is an animal,
 - A cat is a mammal.
 - Tom is a cat.
 - Tom is owned by John.
 - Tom is green in colour.
- (b) Write a program in LISP to calculate the area of the circle for user given radius. 5

- (c) Discuss the utility of the following LISP functions : 6

- (1) Lambda function
- (2) FUNCALL function
- (3) MAPCAR function

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