

**MASTER OF COMPUTER
APPLICATIONS (MCA) (REVISED)**

Term-End Examination

December, 2023

**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) How does Conjunctive Normal Form (CNF) differ from Disjunctive Normal Form (DNF) ? Transform the given well-form formula (WFF) into DNF : 5

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

- (b) Translate the following statements into well-form formula (WFF) : 5

(i) Every person has a father.

(ii) There is a man and he is father of Daisy.

- (c) Briefly discuss the following : 5

(i) Turing Test

(ii) Chinese Room Test

(d) Compare single agent and multi-agent environments. 5

(e) Discuss the term 'Fuzzification'. For the following fuzzy sets : 5

$$A = \{a/0.5, b/0.6, c/0.3, d/0, e/0.9\}$$

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

Find the fuzzy sets $(A \cup B)$, $(A \cap B)$ and $(A \cap B)'$.

(f) Evaluate the following expressions of LISP : 5

(i) $(\text{greater } p \ 18 \ 151 \ 76)$

(ii) $(\text{reverse } ((pq) \ r \ (st)))$

(iii) $(\text{list 'a' } (bc))$

(iv) $(\text{cadadr, } (x \ (yz) \ l))$

(v) $(\text{append 'a' } (bcd))$

(g) Briefly discuss the member function and append function in PROLOG. Give suitable example for each. 5

(h) Write steps for transforming an FOPL formula into Prevev Normal Form. 5

2. (a) Enumerate various knowledge representation schemes, along with brief description and a suitable example for each. 10

- (b) Write a recursive program in LISP to find the factorial of any number given by user. Support your code with suitable comments to improve the readability of your code. Also draw flow chart to represent your logic. 10
3. (a) Differentiate between the following : 10
- (i) Static environment and Dynamic environment
 - (ii) Deterministic environment and Stochastic environment
 - (iii) Episodic environment and Sequential environment
 - (iv) Discrete environment and Continuous environment
- (b) Briefly discuss the forward chaining systems and backward chaining system. Give suitable example for each. 10
4. (a) Describe the Non-Monotonic reasoning systems, with suitable example. What are the major components of a Non-Monotonic reasoning system ? Discuss the functionality of each component. 10
- (b) How do fuzzy sets differ from the crisp sets ? In context to fuzzy sets, discuss the

following operations (with suitable example for each) : 10

(i) Concentration

(ii) Dilation

(iii) Normalization

5. (a) Verify that the following set of clauses are satisfiable or unsatisfiable : 5

$$C_1 : R \vee S$$

$$C_2 : \sim R \vee S$$

$$C_3 : R \vee \sim S$$

$$C_4 : \sim R \vee \sim S$$

- (b) What is Skolemization ? Skolemize the following expression : 5

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

Also, write the steps to obtain the (SKOLEM) standard form of a formula of FOPL.

- (c) Briefly discuss the PEAS, a term to cover the standard set of parameters for specifying a task environment. 5
- (d) Discuss the concept of Backtracking in Prolog. Give suitable example in support of your discussion. 5