

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

Term-End Examination

June, 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) What are S-Expressions in LISP ?
Determine the output of the function
(given below), when $n = 5$. Provide the
stepwise calculation for finding the result :

5

```
(defun funcn(n)
  (cond
    (
      ((=n1)1)
      (t(*n funcn(-n1)))
    )
  )
)
```

(b) Transform the following expressions into DNF : 5

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

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

(c) What is the need of doing skolemization in predicate logic ? Skolemize the following Well Formed Formula (WFF) : 5

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

(d) What is Turing Test ? Discuss the objection to the Turing Test. 5

(e) Briefly discuss the term 'Agents' in Artificial Intelligence. Classify various types of agents. 5

(f) Draw the block diagram for Truth Maintenance System (TMS) and discuss the working of TMS. 5

- (g) Compare Monotonic Reasoning and Non-Monotonic Reasoning. Give suitable example for each. 5
- (h) Briefly discuss the functioning of CUT and FAIL operators in PROLOG, with suitable example code for each. 5
2. (a) Write short notes on the following with suitable example for each : 10
- (i) Prenex normal form
 - (ii) Resolution
 - (iii) Close world assumptions
 - (iv) Default reasoning systems
- (b) What is an Expert System ? Draw block diagram to explain the architecture of an expert system. 10

3. (a) Write a program in Lisp to find greatest of three numbers. Support your program with suitable comments, to understand the execution logic. Also, draw flow chart to exhibit your logic to find greatest of three numbers. 10
- (b) Differentiate between the following. Give examples for each : 10
- (i) Forward chaining and Backward chaining
 - (ii) Frames and Rule base systems
4. (a) What are semantic nets ? Briefly discuss the symbols/notations used in semantic nets. Discuss the utility of semantic nets in knowledge management with suitable example. 10

- (b) Explain the following with suitable examples for each : 10
- (i) Modus Ponens
 - (ii) Modus Tollens
 - (iii) Syllogism
 - (iv) Disjunctive Syllogism
5. (a) Write a program in PROLOG to find the factorial of a number given by the user. Support your code with suitable comments to improve the readability of your code. Also, draw flow chart to exhibit your logic to find the factorial of the number. 10
- (b) Discuss the utility of the following functions. Give suitable example for each : 10
- (i) Eval function
 - (ii) Lambda function
 - (iii) Cond function
 - (iv) Mapcar function