MCSE-003

MCA (Revised)
Term-End Examination
December, 2022

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 hours *Maximum Marks : 100*

Note : *Question number* ***1*** *is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Express the following statements in propositional logic : *5*

(i) Cancer will not be cured unless its cause is determined and a new drug for the cancer is found.

(ii) It requires courage and skills to climb a mountain.

(b) Describe about Skolem standard form, with an example. *5*

(c) Verify De Morgan's laws with the help of truth table. *5*

(d) Differentiate between 'Simplification' and 'Dilemma'. Give example for both. *5*

(e) Define normalization of a fuzzy set with a suitable example. *5*

(f) Write a function LEN in LISP that returns the number of top-most elements in a given list (L). *5*

(g) Define LAMBDA expression. Write a LAMBDA (x, y) to compute $(x^3 - y^3)^2$. *5*

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

2. (a) Define prenex normal form. Transform the following into prenex normal form : *10*

(i) $(\forall x)\,(Q(x) \rightarrow (\exists x)\,R(x, y))$

(ii) $(\exists x)\,(\sim(\exists y)\,Q(x, y) \rightarrow ((\exists z)\,R(z) \rightarrow S(x)))$

(iii) $(\forall x)\,(\forall y)\,((\exists z)\,Q(x, y, z) \wedge ((\exists v)\,R(x, v) \rightarrow (\exists v)\,R(y, v)))$

(b) Write short notes on the following : *10*

(i) Default Reasoning Systems

(ii) Closed World Assumption Systems

3. (a) Verify the satisfiability of the following clauses : *5*

C_1 : R

C_2 : ~RVS

C_3 : ~S

(b) Define inference rules of propositional logic. Explain quantifier rule. *5*

(c) Using propositional logic, show that, if the following statements are assumed to be true : *10*

(i) There is a moral law.

(ii) If there is a moral law, then someone gave it.

(iii) If someone gave the moral law, then there is a God.
Then the following statement is also true.

(iv) There is God.

4. (a) Briefly discuss 'append' and 'member' function of PROLOG, with suitable example. *5*

(b) Write recursive function in LISP to find factorial of a number n. *5*

(c) Discuss Concentration and Dilation operations of fuzzy sets, with suitable example for each. *10*

5. Differentiate between the following : *4×5=20*

(a) Predicate logic and Propositional logic

(b) Monotonic reasoning and Non-monotonic reasoning

(c) Forward chaining systems and Backward chaining systems

(d) Sensors and Actuators