MCA (Revised)
Term-End Examination
June, 2022

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 hours   *Maximum Marks : 100*

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

1. (a) Write the Well-Formed Formula (WFF) for the following statement :

   "There exists a woman and she is mother of Evi."   *5*

   (b) Express the following statement in Propositional logic :   *5*

   (i) If he campaigns hard, he will be elected.

   (ii) If the humidity is high, it will rain either today or tomorrow.

   (c) Write steps to transform an FOPL formula into prenex normal form.   *5*

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

(e) What is Skolem Standard Form ? Skolomize the following expression : *5*

$(\exists x_1) (\exists x_2) (\forall y_1) (\forall y_2) (\exists x_3) (\forall y_3) P(x_1, x_2,$
$x_3, y_1, y_2, y_3)$

(f) Write a function in LISP to calculate the factorial of a number. *5*

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

(h) Compare Forward chaining systems with Backward chaining systems. *5*

2. (a) Obtain the disjunctive and conjunctive normal form for the following expression : *5*

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

(b) Using resolution method, solve the following logic problem : *10*

(i) Some patients like all doctors.

(ii) No patient likes any quack.

(iii) Therefore, no doctor is a quack.

(c) Briefly discuss the Chinese Room Test. *5*

3. (a) Briefly discuss CUT and FAIL operations in PROLOG, with a suitable example. *5*

(b) What is a non-monotomic reasoning system ? What are the major components of a non-monotomic reasoning system ? *10*

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

A = {a/·3, b/·6, c/·4, d/0, e/·7}
B = {a/·4, b/·8, c/·9, d/·4, e/·7}
C = {a/·3, b/·7, c/·3, d/·2, e/·6}

4. (a) Explain the following : $4 \times 2\frac{1}{2} = 10$

    (i) LISP data types, with suitable diagram

    (ii) eval function

    (iii) Association list

    (iv) Property list

(b) Write a LISP code using cond function to find the maximum of three numbers (x, y, z). *10*

5. Write short notes on the following : *4×5=20*

(a) Propositional and Predicate Logic

(b) Frames

(c) Structure of Agents

(d) Semantic Networks

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