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MCSE-003

MASTER OF COMPUTER APPLICATIONS (MCA) (REVISED)

Term-End Examination

December, 2021

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) Write Chinese room test. How Chinese room test addressed the objections to the turing test ? 5

(b) Obtain Conjunctive Normal Form (CNF) for $D \rightarrow (A \rightarrow (B \wedge C))$. 5

(c) Let C (X) : X is a used car dealer; and H (X) : X is honest. Translate the following into English : 5

(i) $\forall_x (C(X) \rightarrow \sim H(X))$

(ii) $\exists_X (C(X) \wedge H(X))$

(d) Determine Prevex Normal form for the following : 5

(i) $\forall_x P(x) \rightarrow \exists_X Q(x)$

(ii) $\forall_x \forall_y (\exists_z (P(x, y) \wedge P(y, z)) \rightarrow \exists_u Q(x, y, u)$

(e) Write Modus Ponens and briefly discuss the meaning of inference rule "Modus Ponens". 5

(f) What are non-monotonic systems ? What is the utility of non-monotonic systems in artificial intelligence ? 5

(g) Write a recursive function in LISP to determine the factorial of a positive number (n). 5

(h) What is the role of agents in artificial intelligent systems ? What are learning agents ? 5

2. (a) Differentiate between Predicate logic and Propositional logic. Write De Morgan's law for predicate logic and propositional logic. Verify the statement "If a formula (wff) is valid, then it is consistent, but not vice versa." 10

(b) What do you understand by the process of Skolemisation ? Write the steps to obtain the standard form of any well form formula. Skolomize the following formula : 10

$$\exists_{x_1} \exists_{x_2} \forall_{y_1} \forall_{y_2} \exists_{x_3} \forall_{y_3} \mathrm{P}(x_1, x_2, x_3, y_1, y_2, y_3)$$

3. (a) Write the formulas for the following inference rules and explain their meaning : 10

(i) Modus Tollens

(ii) Disjunctive Syllogism

(iii) Conjunction

(iv) Dilemma

(b) Explain the following with suitable examples : 10

(i) Default Reasoning Systems

(ii) Closed World Assumption Systems

4. (a) Discuss the following concepts in prolog with suitable example : 5

(i) CUT and FAIL

(ii) Backtracking

(b) Write a program in Prolog, to identify the relation, SISTER (X, Y). Develop appropriate knowledge base and write rules applicable to the knowledge base. 5

(c) What is Association List ? How is it different from property list, in LISP ? 5

(d) What are rule based systems ? Give advantages and disadvantages of rule based systems. 5

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

(i) MYCIN

(ii) Task Environment of Agents

(iii) Structure of Agents

(iv) Knowledge Representation Schemes