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MCSE–003

MASTER OF COMPUTER APPLICATIONS (MCA) (REVISED)

Term-End Examination

June, 2024

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 is Turing test ? What are the objections to the Turing test ? 5

   (b) Obtain CNF for the following formula : 5

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

   (c) Write Well Formed Formula (WFF) for the following statements : 5

   (i) Every person has a father.

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

(d) What are agents in AI ? Briefly discuss the properties possessed by agents. 5

(e) Write a LISP program to find the maximum of 3 numbers. 5

(f) Briefly discuss the term 'Expert System Shell'. List the components of export system shell. 5

(g) What is the difference between predicate and proposition ? Write De-Morgan's law for both predicate logic and proposition logic. 5

(h) What are Fuzzy sets ? How do Fuzzy sets differ from Crisp sets ? What is the relevance of Fuzzy logic in AI ? 5

2. (a) Explain the term 'knowledge' with respect to a knowledge base system. How does 'knowledge' differ from 'Intelligence' ? 5

(b) Write the steps for transforming an FOPL formula into Prenex Normal Form.

Transform the following formulas into Prenex Normal Form : 10

(i) $(\exists_x)(\sim(\exists_y)\mathrm{Q}(x, y) \rightarrow ((\exists_z)\mathrm{R}(z) \rightarrow \mathrm{S}(x)))$

(ii) $(\forall_x)(\forall_y)(\mathrm{c}\exists_z)\mathrm{Q}(x, y, z) \wedge ((\exists u)\mathrm{R}(x, u) \rightarrow (\exists \mathrm{V})\mathrm{R}(y, \mathrm{V})))$

(c) What do you mean by non-monotonic reasoning system ? What are the constituent components of such system ? Describe the interpretation between the components of non-monotonic reasoning systems. 5

3. (a) Write short notes on the following : 8

(i) Default Reasoning System

(ii) Closed World Assumption System

(b) Explain the standard set of parameters under the head 'PEAS' used for specifying a task environment for agents. 8

(c) Write a LISP program to find GCD (Greatest Common Divisor) of two numbers. Write suitable comments to improve readability of your logic. 4

4. (a) Briefly discuss the CUT and FAIL mechanism used in PROLOG. Use the CUT mechanism to write a program to find the factorial of a number. 7

   (b) What is principle of resolution ? Apply the principle of resolution to prove the theorem 'some who are intelligent cannot read'. The given knowledge to the system is as follows : 7

   (i) Who ever can read is literate.

   (ii) Dolphins are not literate.

   (iii) Some Dolphins are intelligent.

   (c) What are rule based systems ? Briefly discuss the advantages and disadvantages of rule based systems. 6

5. Explain any *four* the following with suitable example : 5×4=20

   (i) Operations unique to Fuzzy sets

   (ii) Skolomization

   (iii) Data types and structures in PROLOG

   (iv) Recursion in LISP

   (v) SR (Simple Reflex) agents