04384

MCA (Revised)

Term-End Examination

June, 2010

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) Mention three areas in which computers are better than human beings. **3**

(b) Explain briefly the following definition of Artificial Intelligence (A.I) given by Eline Rich by explaining the underlined technical terms involved in the definition : **5**

Artificial Intelligence is the study of techniques for solving ***exponentially hard problems in polynomial time exploiting knowledge*** about the problem domain.

(c) In context of objections to Turning Test, briefly discuss Chinese Room Test. **3**

(d) For each of the following sentences, tell whether it is a proposition/statement or not : **2**

(i) The sun rises in the West

(ii) Please, give me a glass of water

(e) Define the following concepts, each with a suitable example : **10**

(i) Sound Argument

(ii) Interpretation of a formula

(iii) Consistent formula

(iv) Conjunctive Normal Form

(f) Enumerate five characteristics of the programming language LISP. **4**

(g) Define a function in LISP language that reads three numbers and returns the sum of the squares of these numbers. **4**

(h) Explain the sequence of steps in processing by a PROLOG system, of the following query : **4**

? – prefix ([c, d], [c, d, e])

(i) Draw a Semantic Network for the representation of the following sentence : **5**

Albert struck Lucy in the garden with a sharp knife last month.

2. (a) Construct Truth Table for the following formula : 7

$$(\sim (\sim P \wedge Q) \wedge (\sim Q \vee P)),$$

Where P and Q are statement symbols

(b) Transform the following into Disjunctive Normal Form : 7

$(P \rightarrow Q) \rightarrow R$, Where P, Q and R are statement symbols.

(c) Obtain a Prenex Normal form of the formula 6

$$(\forall x)\ (\exists y)\ (\exists z)\ \big((\sim P(x, y) \wedge Q(x, z)) \vee R(x, y, z)\big).$$

3. (a) Translate the following statements into First Order Predicate Logic (FOPL) : 9

(i) Everyone who saves money earns interest

(ii) If there is no interest then nobody saves money

(b) Using Resolution Method, deduce (ii) from (i) of Q. No. 3 (a). 11

4. (a) Explain the effect of execution of the following statements : 5

(i) $\left(* \left(+ \text{ (setq } x \text{ 8) } x \right) \left(+ \text{ (setq } y \text{ 11) } y \right) \right)$

(ii) $'\left(- \left(+ \text{ (setq p 12) (setq s 8)} \right) \text{ (* p s)} \right)$

(b) Evaluate the following LISP expressions : 5

(i) '(+ 9 3)

(ii) (expt 2 5)

(iii) (even p (+ 9 6))

(iv) (or 'Cat nil ( ))

(v) (equal '(two one) '(one two))

(c) Write a recursive function in LISP that finds the factorial of n for a natural number n. 5

(d) Represent the following statement in PROLOG : 5

Rita reads a book

5. (a) Discuss briefly the following components of an expert system shell : **5x2=10**

(i) Inference Engine

(ii) Explanation subsystem of MYCIN

(b) Briefly mention some characteristics of EMYCIN. 5

(c) Discuss any one of the following general categories of an agent : 5

(i) Simple Reflex Agents

(ii) Model Based Agents

(iii) Goal Based Agents

(iv) Utility Based Agents