MCSE-003

# MCA (Revised)

## Term-End Examination

## December, 2007

## 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) What is the purpose of Turing test ? Give a brief outline of the Turing test. *2+3=5*

(b) What do you mean by an argument ? Briefly describe concept of Valid, Invalid and Sound arguments. *2+3=5*

(c) Given the formulae

$E_1 : A \rightarrow B$; $E_2 : \sim B$; $G : \sim A$

prove that G is logical consequence of $E_1$ and $E_2$ without using truth table. *5*

(d) Transform the following well formed formula to Prenex normal form

$(\forall_x) (Q(x) \rightarrow (\exists_x) R(x, y))$ *5*

(e) Write well formed formulae of following statements : $2\frac{1}{2}+2\frac{1}{2}=5$

(i) Person respected by every other person is a king.

(ii) Some, who are intelligent, can't read.

(f) What do you mean by S-Expression in LISP ? Briefly describe the type of S-Expressions available in LISP. $1+4=5$

(g) What do you mean by Backtracking ? Briefly describe this concept with the help of an example prolog program. $2+3=5$

(h) What is an expert system ? With the help of a block diagram, describe the components of an expert system. 5

**2.** (a) Check that the rule q, $(p \rightarrow q) \vdash q$ is a fallacy (i.e. Invalid) ? 5

(b) Given knowledge consists of the facts : 10

(i) Whoever can read is literate.

(ii) Dolphins are not literate.

(iii) Some Dolphins are intelligent.

Use this available knowledge and the concept of resolution to prove the statement "Some, who are intelligent, cannot read".

(c) What are the systems available to handle the incompleteness of a knowledge base ? Briefly describe any one of them. $1+4=5$

**3.** (a) Write a program in LISP to find maximum of three numbers. 5

(b) Write a prolog program to identify the brother and sister relation. You can create a knowledge base of your choice. 5

(c) What will be the output for the following ? $5 \times 1 = 5$

(i) (list 'a '(bc))

(ii) (append '(a) '(bc))

(iii) (equal 'a (car '(ab)))

(iv) (+5 (read))

(v) (cdr car '((ab)cd))

(d) From the prolog program given below answer the given queries :

sister (sue, bob).

parent (annie, sam).

parent (john, annie).

male (john).

female (annie).

grandparent (X, Z) :– parent (X, Y), parent (Y, Z), male (X). Now give output for following queries : $5 \times 1 = 5$

(i) ? – parent (X, sam).

(ii) ? – grandparent (X, Y).

(iii) ? – grandparent (X, sam).

(iv) ? – grandparent (john, Z).

(v) ? – sister (annie, Y).

**4.** (a) Write short notes on (any ***two***) : *2×5=10*

(i) PEAS

(ii) Structure of Agents

(iii) Task environments of Agents

(b) Write short notes on (any ***two***) : *2×5=10*

(i) Semantic networks

(ii) Frames

(iii) Certainty factors

**5.** (a) Given a fuzzy set to describe the term tall

tall = {5′/0·0; 5′5″/0·2; 5′8″/0·5; 6′/0·7;
6′5″/0·8; 7′/1·0}

Discuss and describe membership function for the fuzzy sets for each of the terms : *2×3+2=8*

(i) Very tall

(ii) More or less tall

(iii) Not tall

(b) Draw cons-cell structure of the list ((XY) (AB)). *5*

(c) Determine CNF for the formula
$D \rightarrow (A \rightarrow (B \wedge C))$ *7*