

**MCA (III Year)**  
**Term-End Examination**  
**June, 2007**

**CS-14 (S) : INTELLIGENT SYSTEMS**

Time : 3 hours

Maximum Marks : 75

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

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1. (a) Define the following terms : 6
- (i) Intelligence
  - (ii) Artificial Intelligence
  - (iii) Agent
- (b) Does a finite state space always lead to a finite search tree ? Also mention what type of state space always leads to finite search tree. 4
- (c) Differentiate the following : 4
- (i) Depth first search
  - (ii) Iterative deepening search

- (d) Find out valid atoms of LISP out of the following : 3
- (i) ab cde
  - (ii) 123 abc
  - (iii) ( abc
  - (iv) 100043
  - (v) a12345
  - (vi) abcd'ef
- (e) Mention the difference between declarative and procedural knowledge. 4
- (f) Given the following information for a database : 9
- (A1) if x is on top of y, y supports x
  - (A2) if x is above y and they are touching each other, x is on top of y
  - (A3) A cup is above a book
  - (A4) A cup is touching a book
  - (i) Translate above statements into clausal form.
  - (ii) Show that the predicate supports (book, cup) is true using resolution.
2. (a) Find, whether following pairs of clauses can match by some substitutions. If yes, find the substitutions. 6
- (i)  $P(a, x) \vee Q(b, y, f(y)) \vee R(x, y)$  and  $P(x, a) \vee Q(f(y), y, b) \vee R(y, x)$
  - (ii)  $R(a, b, c) \vee Q(x, y, z) \vee P(f(a, x, b))$ , and  $P(z) \vee Q(x, y, b) \vee R(x, y, z)$

- (b) What is puzzle problem ? Draw partial search tree upto level 3 for this problem. Also suggest a good heuristic function for this problem. 9
3. (a) Define the following properties of propositional logic : 2
- (i) satisfiable
- (ii) contradiction
- (b) With the help of architectural diagram, explain the functioning of truth maintenance system. For what purpose are they used ? 5
- (c) Transform each of following sentences into disjunctive normal form : 4
- (i)  $P \rightarrow ((Q \ \& \ R) \leftrightarrow S)$
- (ii)  $\neg(P \vee \neg Q) \ \& \ (R \rightarrow S)$
- (d) What do you understand by logical consequences ? Find out whether the statement "P is a logical consequence of P&Q" is true or not. Give reason. 4
4. (a) Construct a script for going to a movie from the viewpoint of a person who goes for movie. 5
- (b) Show the conceptual dependency structure of the following : 6
- (i) While going home Milind saw a frog.
- (ii) Advait fertilized the field.
- (c) Differentiate frame and script knowledge representation techniques. 4

5. (a) Consider the following knowledge base : 10

$\forall x : \forall y : \text{cat}(x) \wedge \text{fish}(y) \rightarrow \text{likes\_to\_eat}(x, y)$

$\forall x : \text{calico}(x) \rightarrow \text{cat}(x)$

$\forall x : \text{tuna}(x) \rightarrow \text{fish}(x)$

tuna (Charlie)

tuna (Herb)

calico (Puss)

Convert these Wff's into Horn clauses.

- (b) Write the differences between knowledge organization and knowledge manipulation. 5