ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2008

INTELLIGENT SYSTEMS

SEMESTER – 3

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Which is not a heuristic search ?

a) Constraint satisfaction search

b) Depth first search

c) Simulated annealing

d) Hill-climbing. ☐

ii) Non-heuristic search algorithms are inferior to heuristic search algorithms for applications of

a) simple nature b) complex nature

c) NP-hard/NP-complete nature d) all of these. ☐

iii) According to Modus Ponens inference rule, from P and $P \rightarrow Q$ infer

a) P b) Q

c) $\overline{P}$ d) $\overline{Q}$. ☐

iv) The study of the nature of the knowledge is called

a) belief b) hypothesis

c) epistemology d) meta-knowledge. ☐

v) The process of adding new knowledge to a knowledge-base and refining or improving knowledge that was previously acquired is called

a) knowledge acquisition b) knowledge representation

c) hypothesis d) none of these. [ ]

vi) If in a problem the number of initial states is much more than the goal states, we should use

a) forward reasoning

b) backward reasoning

c) both forward and backward reasonings

d) none of these. [ ]

vii) Inheritable knowledge is best represented by

a) semantic net b) database

c) first order logic d) none of these. [ ]

viii) Decomposable problem can be represented by

a) OR-Graph b) AND-Graph

c) AND-OR Graph d) None of these. [ ]

ix) The space complexity of the Depth-First search (b-branching factor, d-depth) is

a) $O(b^d)$ b) $O(b)$

c) $O(d)$ d) $O(d^b)$. [ ]

x) Skolem function is used in

a) unification algorithm b) natural deduction

c) conversion to clause form d) none of these. [ ]

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is state space ? Discuss four properties of search algorithm. 1 + 4

3. What is predicate logic ? What is 'Skolem Function' ? 2 + 3

4. What is 'Modus Ponens' Rule ? "A game tree is basically an AND/OR graph." Justify the statement. 2 + 3

5. Compare between the heuristic and non-heuristic searching principles. Explain the pros and cons of any one of the commonly used heuristic search mechanisms. 2 + 3

6. Give physical interpretation with appropriate example of forward tracking and backtracking with reference to searching principle. Give example of a practical expert system that makes use of both these principles at different search points as the search progresses. 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. $3 \times 15 = 45$

7. a) Write down the computational steps of Best-first search. 6

   b) What is the difference between blind and informed search ? 5

   c) What is plateau ? How is it overcome ? 4

8. a) You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug ? Write down the production rules and control strategy. 10

   b) When will A^* give optimal solution ? 5

9. Consider the game tic-tac-toe. MAX gives cross (×) and MIN gives circle (O). Assume MAX will give first move.

a) Draw the game tree (considering the winning strategy of MAX). 10

b) How does $\alpha - \beta$ pruning procedure improve search space ? 5

10. a) What is Bayes' theorem ? 2

b) When one has a cold, one usually has a high temperature (80% of the time). At any one time around 1 in every 10,000 people has a cold and that 1 in every 1,000 people has a high temperature. Now suppose that you have a high temperature. What is the likelihood that you have a cold ? 9

c) Write a PROLOG or LISP program to search an element in a list. 4

11. a) Using the resolution principle, prove that all lecturers are determined. Any one who is determined and intelligent will give good service. Mary is an intelligent lecturer. Show that Mary will give good service. 6

b) What do mean by syntactic processing ? Why is it important in NLP ? 4

c) What are different forms of learning ? Briefly discuss about explanation-based learning. 2 + 3

END