



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (CSE)/SEM-7/CS-702/2010-11
2010-11
ARTIFICIAL INTELLIGENCE

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

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

i) An algorithm that gives optimal solution is

- | | |
|------------------|--------|
| a) Hill Climbing | b) BFS |
| c) Blind search | d) A*. |

ii) A formula with no free variables is

- | | |
|---------------|---------------|
| a) formula | b) clause |
| c) a sentence | d) paragraph. |

iii) In First Order logic, resolution condenses the
of logical inference down to a single rule.

- | | |
|--------------------------|---------------------|
| a) Traditional syllogism | b) Logical sequence |
| c) Logical reference | d) None of these. |



- iv) Uninformed search is also known as
 - a) Brute force search b) Hill climbing search
 - c) Worst case search d) Blind search.
- v) Horn clause is a clause with positive literals.
 - a) At most one b) At most two
 - c) At least one d) At most four.
- vi) Which of the following is a declarative knowledge ?
 - a) A set of production rules
 - b) Using LISP code to define a value
 - c) Describing the objects using a set of attributes and associated values
 - d) A knowledge about the order in which to pursue the subgoals.
- vii) Which of the following is *not* true about backward chaining ?
 - a) Backward chaining is a goal directed reasoning process
 - b) Backward chaining would be much better to use when trying to prove theorems
 - c) For arriving at a new fact, backward chaining is more natural
 - d) A medical diagnostic program is a query system that would probably use.



viii) "John is tall". This statement can be completely expressed in

- a) FOPL
 - b) Propositional logic
 - c) Fuzzy logic
 - d) Default logic.
- ix) Which is not heuristic search ?
- a) Constrained satisfaction search
 - b) Depth first search
 - c) Simulated annealing
 - d) Steepest ascent Hill climbing.
- x) Resolution can be used for
- a) question answering b) theorem proving
 - c) both (a) and (b) d) none of these.

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GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. A problem-solving search can proceed in either the forward or the backward direction. What factors determine the choice of direction for a particular problem ?
3. With suitable example explain the characteristics of monotonic and partially commutative production system.
4. Give one example of a problem in which solutions requiring minimum search are more appropriate than optimal solutions. Give reasons for your choices.
5. Discuss the benefits of production system.
6. Write a program in prolog to compute the factorial of a number using iteration/tail recursion.



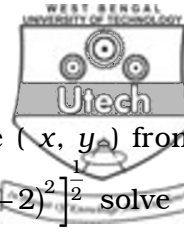
GROUP – C

(Long Answer Type Questions)

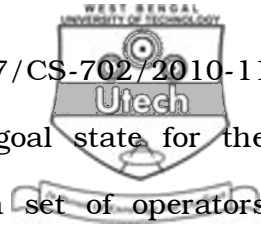
Answer any *three* of the following.

3 × 15 = 45

7. Prove each of the following statements :
- a) Breadth first search is a special case of uniform cost search. 5
 - b) Breadth first, depth first and uniform cost search are special cases of Best First Search. 5
 - c) Uniform cost search is a special case of A* search. 5
8. a) Represent the following sentences by default logic. Also mention the sets *D* and *W*.
- i) Typically molluscs are shell-bearers
 - ii) Cephalopods are molluscs
 - iii) Cephalopods are not shell-bearers. 6
- b) Draw a decision tree corresponding to the following expression :
- If (Weather = Hot \wedge Humidity = High) \vee
(Weather = Cool \wedge Humidity = Moderate) \vee
(Weather = Rainy \wedge Wind = Strong).
- Then start reading a story book. 9



9. a) Using the Euclidean distance of a node (x, y) from a fixed node $(2, 2)$, i.e., $h = \left[(x-2)^2 + (y-2)^2 \right]^{1/2}$ solve the water-jug problem by A* algorithm. Does this heuristic function return an optimal path ? Consequently, can you call it an admissible heuristic ? 8
- b) Show the computation for the first 3 ply moves in a tic-tac-toe game using the α - β cut-off algorithm. 7
10. Test whether the following production systems are commutative. Justify your answer.
- a) Knowledge base :
- If A & B then C
- If C then D
- If A & D then E.
- Initial Working Memory = { A, B }
- Knowledge base :
- If A & B then C
- If X & Y then C
- If A then E
- If B then F.
- Initial WM = { A, B, X, Y }. 8



- b) Give the following initial and the goal state for the Block's world problem. Construct a set of operators (rules) and hence generate a plan to reach the goal state from the initial state.

Initial State : On (C, A)

Clear (C),

On (B, Table),

Clear (B).

Goal State : On (B, A)

On (C, B).

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