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Paper Code : MCA-303

PUID : 03151 (To be mentioned in the main answer script)

INTELLIGENT SYSTEMS

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 any *ten* of the following : $10 \times 1 = 10$

   i) Which one is the blind search ?
   - a) DFS
   - b) Best first search
   - c) A*search
   - d) A*.

   ii) Which is not heuristic search ?
   - a) Constraint satisfaction search
   - b) Depth-first search
   - c) Simulated annealing
   - d) Hill-climbing.

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iii) Which of the following is tautology ?
- a) $p \vee q \rightarrow p$
- b) $p \wedge q \rightarrow p$
- c) $p \rightarrow q$
- d) none of these.

iv) The forward reasoning in problems are generally represented by
- a) OR graph
- b) AND graph
- c) AND-OR graph
- d) none of these.

v) Skolem function is used in
- a) unification algorithm
- b) natural deduction
- c) conversion to clausal form
- d) none of these.

vi) Which is not a pure AI game ?
- a) Ludo
- b) Sankes and Ladders
- c) Tic-tac-toe
- d) Chess.

vii) Which of the following is there in Prolog ?
- a) Existential quantifier
- b) Universal quantifier
- c) Conjunction
- d) Disjunction.

viii) The time complexity of breadth first search is (symbols have their usual meaning)
- a) O (bd)
- b) O (ed)
- c) O (eb)
- d) O (db).

ix) Frame is a collection of
- a) Slots
- b) Filler
- c) Resolution
- d) Knowledge.

x) There are no existential quantifiers in
- a) PCNF
- b) SSF
- c) WFF
- d) FOPL.

xi) Maximum number of neighbouring node (Child) of any node in 15 puzzles is

a) 4 b) 5

c) 15 d) 16.

xii) Which algorithm gives optimal solution ?

a) Hill climbing b) BFS

c) Blind Search d) A*.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What are the different knowledge representation mechanisms ?
3. Define Decision Tree. Describe common decision pruning algorithm. 2 + 3
4. Write a Prolog or Lisp program to find the product of first *n* natural numbers.
5. Prove Admissibility and Completeness of A*.
6. Compare A* and AO* with proper example. Define plan-space search. 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What do you mean by informed search and uniformed search ? Explain the various problems that a heuristic search may face. Write down AO* algorithm. Explain under which condition A* algorithm gives an optimal solution. Discuss Best First Search Algorithm in brief. 2 + 2 + 5 + 3 + 3

8. a) Does A* algorithm provide an optimal solution ? If yes, under which condition ? If not why not ?
   b) Justify the statement "A game tree is basically an AND/OR graph".
   c) Discuss the state space search. 5 + 5 + 5
9. a) Explain Bayesian network with example.
   b) Two boxes contain respectively 4 white and 2 black balls, 1 white and 3 black balls. One ball is transferred from the first box into the second and then one ball is drawn from the later. It turns out to be black. What is the probability that the transferred ball is white ?
   c) What are the advantages of Breadth-First-Search ? 4 + 7 + 4
10. a) What can AI systems do ? What can AI systems not do yet ?
    b) Define Plan-Space Search.
    c) Convert the following English statements to statements in first order logic :
       i) Students love books
       ii) Students have pets
       iii) Pets harm books
       iv) Prakash is a student
       v) Tomy is pet of Prakash. 5 + 5 + 5
11. Write short notes on any *three* of the following : 3 × 5
    a) N Queens' problem
    b) Tic-Tac-Toe
    c) Hill-climbing Algorithm
    d) Wolf Cabbage Goat Farmer problem
    e) 8 puzzle problem.