PG/IIIS/MCA/302/24

MCA 3rd Semester Examination, 2024

MCA

(*Artificial Intelligence*)

PAPER – MCA-302

Full Marks : 100

Time : 3 hours

Answer **all** questions

The figures in the right hand margin indicate marks

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

GROUP – A

Answer any **five** questions : 2 × 5

1. What do you mean by completeness and optimality of an algorithm ?

2. How uninformed search is different from blind search technique ?

3. What is effective branching factor of a graph ?

4. What are the drawbacks of Hill climbing ? How they can be overcome ?

5. Show the truth table of bi-implication connective.

6. Why Tabu search is so named ?

7. What do you mean by Universal quantifier ? Give example.

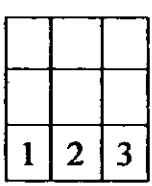
8. What is the drawback of local beam search ?

GROUP – B

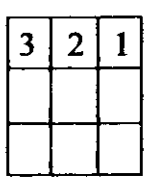
Answer any **four** questions : 15×4

9. Consider a nxn chess board. n pawns numbered 1,2,...,n are initially placed in the bottom row such that pawn i is at position (i,1). The goal is to move the pawns to the top row but in

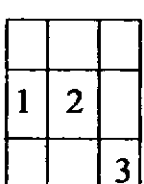
reverse order, so that pawn i ends up in position (n-i+1, n). On each time step, each of the n pawns can move one square left, right, up or stay put. But if a pawn stays put, an adjacent pawn may hop over it. Two pawns cannot occupy the same square. An example with n = 3 is illustreated below. Solve this problem and formulate the problem as state space search problem. Draw the implicit search graph. Apply Depth first search on your graph and show the result. 3 + 3 + 4 + 5



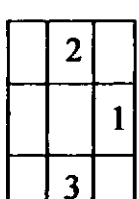
Initial State



Goal State

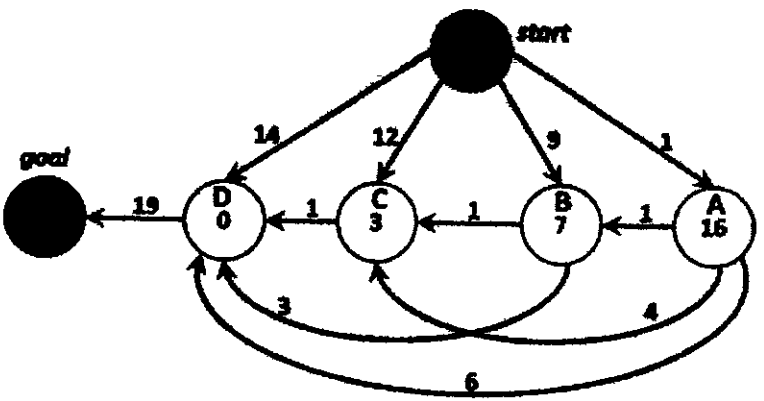


Example State



A possible next state

10. Apply A* on the following graph and show the sequence by which the nodes are get expanded.



11. What is heuristic ? What is city block distance heuristic ? Is this heuristic admissible ? Show proof against your answer.

2 + 3 + 10

12. How genetic algorithm works ? What are chromosome and genes ? What are their uses in genetic algorithm ? How selection operator works ? Why it is called local search algorithm ?

4 + 2 + 2 + 4 + 3

13. Translate the following English sentences into predicate logic : 3 × 5

(*a*) If something is honey, then it tastes sweet.

(*b*) Either everything is sweet, or everything is gross.

(*c*) Some people are neither honest nor truthful.

(*d*) It is not true that some people are honest.

(*e*) There is someone who is loved by everyone.

14. Write short notes on (any *five*) : 3 × 5

(*a*) Exhaustive search

(*b*) Simulated Annealing

(*c*) Alpha-beta pruning

(*d*) Turing Test

(*e*) Local Beam Search

(*f*) Crossover and Mutation

(*g*) Existential Quantifier.

[Internal Assessment – 30 Marks]
