Ref. No. REFNO058667

Roll No. 2141 9MCA 056

M.C.A. (Semester II) / M.Sc. (Semester II) Examination 2021-22

Subjects: Computer Applications /Computer Science

Paper No: CS-208 -*Artificial Intelligence*

Time: *Three Hours* **Full Marks**: 70

Note: *Attempt the five questions including Question No.1 which is compulsory.*

1. Consider the following problem:

A farmer wants to get a lion, a fox, a goose, and some corn across a river. There is a boat, but the farmer can only take one passenger in addition to himself on each trip, or else both the goose and the corn, or both the fox and corn. The corn cannot be left with the goose because the goose will eat the corn; the fox cannot be left with the goose because the fox will eat the goose; and the lion cannot be left with the fox because the lion will eat the fox. How does everything get across the river? Assume animals do not wander off when left alone.

(a) Design suitable state space representation. 4

(b) Write down all possible production rules. 6

(c) Draw the first three levels of the search graph. That's two besides the starting state 4

(d) What is the average branching factor for these three levels? Disregard branches back to previous states. 4

2. a) Explain why A* algorithm is not sufficient to search the AND-OR graph. 3

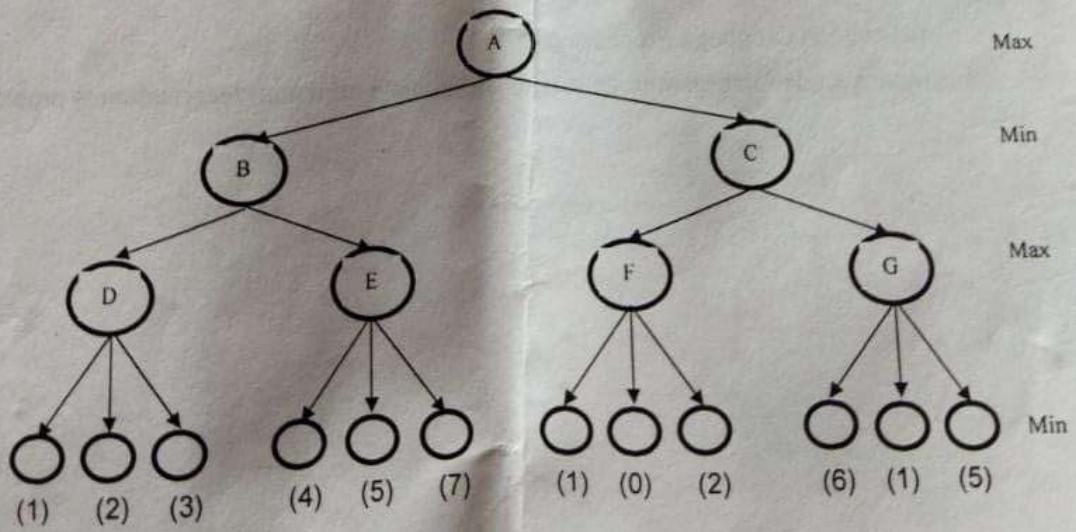
b) Explain the AO* algorithm 6

c) Generate search tree by applying A* algorithm using the most informed heuristic evaluation function of your choice for an eight-puzzle problem with the following initial state. 4

2	8	3
1	6	4
7		5

3. a) Explain how the problem reduction approach can be used to find the winning strategy for two players' game. 5

b) Explain the Alpha-Beta procedure with tracing of this **recursive procedure** for the game tree given below: 8

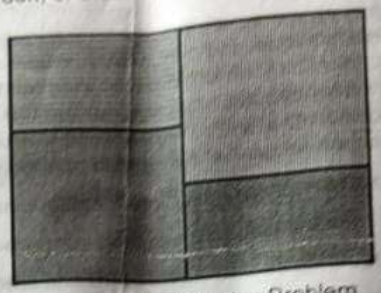


P.T.

4 a) Explain the Backtracking search algorithm for solving constraint satisfaction problem. 7

b) A map-coloring problem is an example of Constraint Satisfaction Problem In this problem, each region of the map is need to be colored with one of a given set of colors such that no two adjacent regions have the same color. 5

The map shown below is a simple map-coloring problem. The map has four regions that are to be colored red, green, or blue.



i. Encode this problem as a Constraint Satisfaction Problem.

ii. Generate search tree using Backtracking Algorithm up to three levels.

5 a) What do you mean by proof by refutation? Explain the steps involved in resolution proof. 3

b) What are all the rules for unifying two predicate literals? And explain the Unification Algorithm. 6

c) Consider the following set of statements: 4

i. Some children will eat any food

ii. No children will eat food that is green

iii. All children like food made by cadbury's

Prove the following by using the resolution procedure

"No food made by Cadbury's is green".

6

6 a) Attempt any one of the following:

(i) Conceptual Dependency and Scripts

OR

(ii) Expert System

OR

(iii) Natural Language Processing

b) Means-Ends Analysis with an illustrative example from non-decomposable problems 7

— o —