

National University of Computer and Emerging Sciences, Lahore Campus



Course: Artificial Intelligence
Program: BS(Computer Science)
Duration: 30 Minutes
Paper Date: 18-March-23
Section: D/F/F
Exam: Quiz 2B

Course Code: AI-2002
Semester: Spring 2024
Total Marks: 10
Weight: 3.33 %
Page(s): 2
Roll No.

Instruction/Notes:

- Provide your solution on this sheet. You may use an extra page for rough work.

Problem#1 (CLO-2)

3 Points

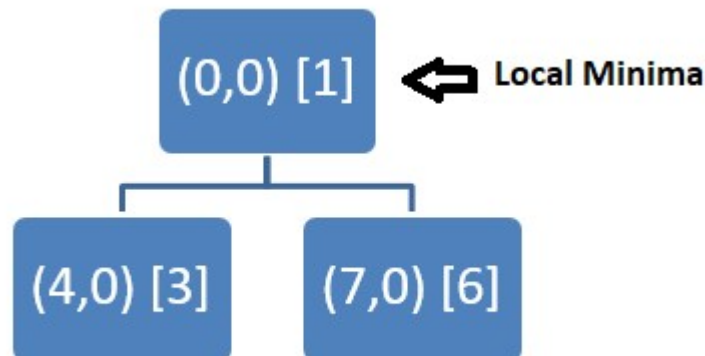
In this problem, the goal is to measure exactly 1 liter of water using jugs of capacities 4 liters (A) and 7 liters (B). The operations you can perform are filling a jug, emptying a jug, or pouring water from one jug to another until the receiving jug is full or the pouring jug is empty. if a jug already has some water and needs to be filled completely, it must be emptied first.

Initial State: (0, 0) # Jug A, Jug B

Goal: Measure 1 liter (0,1)

Apply hill climbing algorithm on this problem to minimize the heuristic function.

Heuristic value of a node = $|1 - (\text{Water in Jug A} + \text{Water in Jug B})|$



- a) For the 2 x 2 grid game state shown below, built the complete game tree that will be traversed by the minimax algorithm for deciding a move at this state.
- b) Assign 1 to the leaf nodes where Max wins and 0 where Min wins. Perform alpha beta pruning and clearly mention the values of alpha and beta for each node.

