# Midterm Exam

# ARTIFICIAL INTELLIGENCE

Class: CS Honour 2009
Questions: 3 – Total mark: 10 – Time: 60 minutes
Open book

## Question 1 (*4 marks*):

Hill Climbing can be applied to a traveling salesman-like problem as follows. Each path going through all the cities is viewed as a state and each state transition is performed by switching the order of two cities in a path. The heuristic function value of a path is defined as its total length.

Consider the city map with four cities A, B, C, and D, and their pairwise distances as in Figure 1. Apply Hill Climbing to look for a shortest possible path that visits each city exactly once (not required to go back to the start city), assuming that the initial path is A–B–C–D, whose total length is 1 + 4 + 3 = 8.
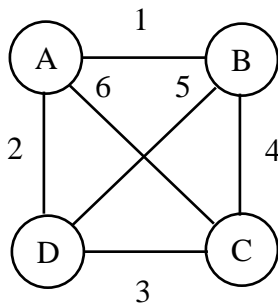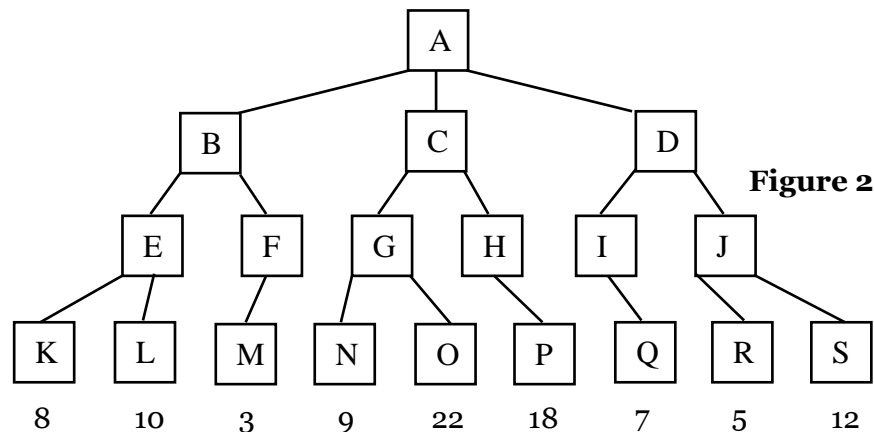


**Figure 1**



**Figure 2**

## Question 2 (*2 marks*):

Consider a 2-player game search tree of states with static evaluation values of the leaf nodes as shown in Figure 2. Suppose that, the smaller an evaluation value is, the better it is for the player who is going to make a move from the root node.
(a) According to the Minimax algorithm, which next state that player will choose?
(b) Using alpha-beta cut-off, which branches will be pruned in the search, assuming that the nodes are examined from left to right?

## Question 3 (*4 marks*):

Applying Goal Stack Planning, trace the steps followed to make a plan for the block world in Figure 3, showing the stack contents in each step. Assume that the only possible actions are STACK, UNSTACK, PICKUP, and PUTDOWN.
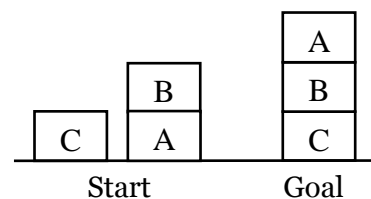


**Figure 3**

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