Artificial Intelligence and Expert Systems - Midterm Exam

1) **a)** We defined AI mainly in four categories in class. Name these categories. State which definition is prefered and explain why? (6)

b) Define what is an agent by giving a **detailed schematic view** and write the agent function by defining each term. (6)

2) Consider a SoftBot (software agent) on the WorldWideWeb which performs the functions of a travel agent for airline reservations. The SoftBot tries to find the best flights for a customer based on his requirements and the airline reservation databases at the lowest cost. Specify the following attributes for this SoftBot:

a) Write the PEAS description for such an agent. (8)
b) Describe the environment. Is it fully or partially observable? Deterministic or stochastic? Static or dynamic? Discrete or continuous? Single or multi-agent? If multi-agent, who are the other agents and are the agent interactions competitive or cooperative? (You should state **WHY** to get points) (10)
c) What in this problem makes a utility-based architecture a good choice? (5)
Show the internal structure of an utility-based agent. (6)

3) Consider the following problem as a state space search problem.

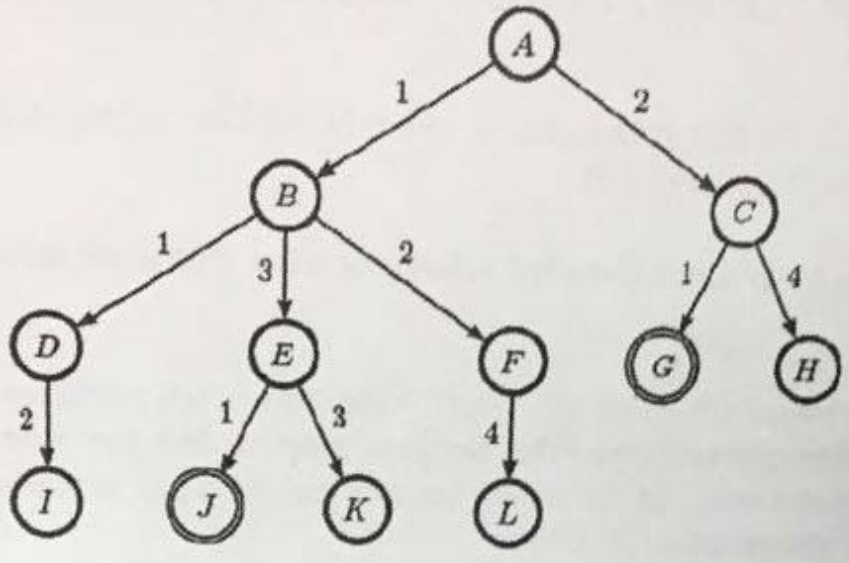
We are trying to solve the miniature of Tower of Hanoi problem. There are 3 towers (1, 2, 3), and 2 disks (small one and large one). The purpose of this problem is to move both disks from the tower 1 to tower 3 (as illustrated in the figure below), subject to following two conditions:

— You can move only one disk at a time
— You cannot put the large disk on top of the small disk.

The possible states can be denoted as follows:
a:(b c) where a is the state number, b is the tower number for the large disk, and c is the tower number for the small disk. For example 3:(1 3) implies that the large disk is on tower 1 and the small disk is on tower 3 in state 3.

a) By using this notation, write down the state space and show the possible states. (10)
b) According to your answer in (a), Which states are the initial state and goal state? (2)
c) By showing the state transitions give a solution path plan for this problem. (12)

4) The following tree is a search tree for some state space. Arc labels denote costs, double circles indicate goal nodes.



For each of the following search strategies, indicate the order in which nodes will be chosen up to the first found goal node and write the content of the fringe:

a) Breadth-first search; (10)
b) Depth-first search; (10)
c) Uniform-cost search;(10)
d) Has the cost associated with the arcs influenced the above expansions? Explain... (5)

DURATION: 75 min.
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