MDL Assignment: Search

Date: 24.2.2022 **Max Marks: [35]**
Deadline: To be submitted on **26th February 2022**.

Q1. Express the blocks world problem of starting at an initial configuration and reaching a goal configuration as a search problem (i.e. in terms of the 5 parameters of any search problem, as discussed in class: states, actions, initial state, goal test, path cost). **[5]**

Blocks World: "There are a set of cubic blocks on a table. The blocks can be stacked, but only one block can fit directly on top of another block. A robot arm can pick up a block and move it to another position, either on the table or on top of another block. The arm can only pick up one block at a time. It cannot pick up a block that has another one on it."

Q2. Given the following initial and goal states, show the open-list for breadth-first, depth-first and uniform cost search for 3 iterations each: **[15]**

Initial state: A and B are on the table and C is on top of A.
Goal state: C is on the table, B is on top of C and A is on top of B.

Use this **format** for showing the open-list:

```
[ C      ]     # C is on A; A and B are on table
  A   B

                        B
[ C                 C   C ]     # more states/nodes in the open-list.
  A  B,  A B C,  A B,  A
```

Note: The open-list must be shown sorted in the order that nodes will be expanded. The 1st entry must be the next node to be expanded.

Q3. Give 2 examples of admissible heuristics that can be used for this search problem.
[A heuristic is a function that estimates the cost/distance from a state to nearest goal.
An admissible heuristic is one which never over-estimates the cost. That is, estimated cost is always less than actual cost.]

[10]

Q4. Use one of the admissible heuristics you defined in Q3 and show the open-list for 3 iterations of A* search. **[5]**