# MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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## VII SEMESTER B.TECH. (COMPUTER SCIENCE ENGINEERING)

## END-SEMESTER-EXAMINATIONS_[Make Up] FEB 2022

SUBJECT: ARTIFICIAL INTELLIGENCE [PE-III_CSE 4053]

**PART B**

**(24/02/2022)**

Time: 85 Minutes (75+10 minutes to upload) MAX. MARKS: 20

**1A.** A YO- rover has to leave the lander, collect rock samples and return to the lander. It can go to three different places with actions go-to-lander, go-to-rock-1, go-to-rock-2, and go-to-rock-3. Consider time to traverse each location find a sequence of actions which can be performed in minimal amount of time. **5**

1. Formulate this problem as a search problem by specifying the state space, initial state, path-cost function, and goal test.

Try to be sure that the state space is detailed enough to support solving the problem, but not redundant.

**1B.** Can alpha-beta be generalized to do a breadth-first exploration of the game tree and still get the optimal answer? Explain how or why not. If it can be generalized, indicate any advantages or disadvantages of using breadth-first search in this application. **3**

**1C.** Explain the limitations of Simple Reflex Agents and Model based Agents. **2**

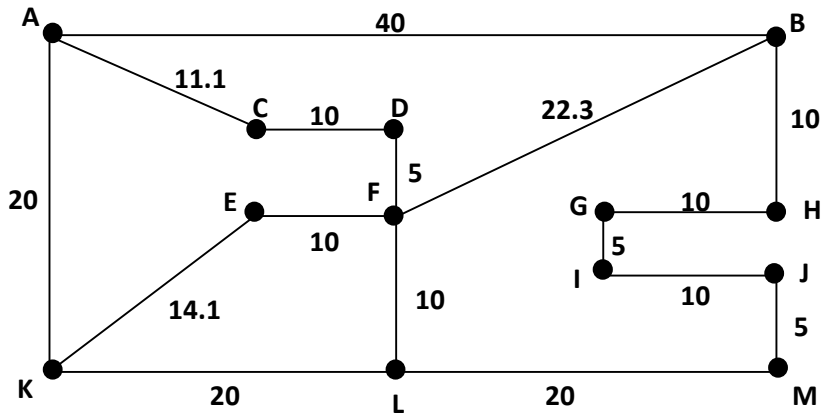
**2A.** Using the A* algorithm work out a route from town A to town M stating the route taken and cost of that route. The Straight Line Distance between any town and town M is shown in table. Provide the search tree clearly showing the order in which the nodes are expanded and the cost at each node. Comment on the quality of heuristic values based on available parameters. **5**

| | |
|---|---|
| A | 44.72 |
| B | 20.00 |
| C | 33.54 |
| D | 25.00 |

| | |
|---|---|
| E | 31.62 |
| F | 22.36 |
| G | 14.14 |
| H | 10.00 |

| | |
|---|---|
| I | 11.18 |
| J | 5.00 |
| K | 40.00 |
| L | 20.00 |

| | |
|---|---|
| M | 0.00 |




**2B.** Represent the following in First-Order Logic. **3**
Every mother loves her children.
Maya is a mother and Tushar is Maya's child.

**2C.** Prove whether the following is satisfiable, valid or neither. **2**

$$(A \vee B) \wedge \neg(A \Rightarrow B)$$