**Q1. Explain the agent's PEAS and task environment.**

**1.1 Performance Measure**

* The agent aims to help the rabbit travel from a start position to an end position within a cave represented by a grid.
* Each move from one cell to an adjacent cell (up, down, left, or right) incurs a base cost of +3.
* Moving onto a cell with fire adds an extra penalty of +5, and stepping onto a cell with a bush adds an extra cost of +1.
* The goal is to minimize total path cost from start to finish.

**1.2 Environment**

* The environment is a **2D grid** where each cell can be:
  + Passable terrain
  + A **wall** (impassable)
  + A **fire** cell (passable with penalty)
  + A **bush** cell (passable with a smaller penalty)

**1.3 Actuators**

* The agent can send commands to move the rabbit up, down, left, or right within the grid.

**1.4 Sensors**

* The agent’s sensors provide information on the type of each adjacent cell (whether it is free, a wall, fire, or a bush) and the goal cell's location.

**Q2. Define the heuristic and or fitness function for the given algorithms and the given problem.**

### **2.1 Heuristic for Informed Search**

For algorithms that rely on a heuristic (such as Greedy Best-First Search), we use the Manhattan distance to estimate how close a position (x1,y1) is to the goal (x2,y2).

h(x,y)=∣x1−x2∣+∣y1−y2|

This does not consider the additional penalties (fire or bush), but it helps guide the search toward the goal cell by measuring simple grid distance.

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### **2.2 Total Cost / Fitness**

When calculating the total cost of a path, we can define it as:

TotalCost(P)= Sum(3+ExtraPenalty)

Where the extra penalty is:

* **5** if moving into a fire cell,
* **1** if moving into a bush cell,
* **0** otherwise.