## Artificial & Computational Intelligence
Assignment 1 - Question 1

Problem statement

Consider a scenario where a rabbit is trapped on cave. Given below is the picture of a cave as a grid. The task of the rescue robot is to help the rabbit to find the optimal path to reach the finish position. It can move to the north, south, west and east direction. While navigating through the environment it has obstacles like walls, fire and Bush plant. For each transition, a path cost of +3 is added in search. Assume that the robot's vision sensors are sensitive to the exposure to the fire and whenever it tries to move towards the fire cell resulting in incurring an additional penalty of +5 cost. In addition, every time the rabbit attempts to move towards the bush plant cell, an extra transition cost of +1 is incurred. Use Euclidean distance as a heuristic wherever necessary.
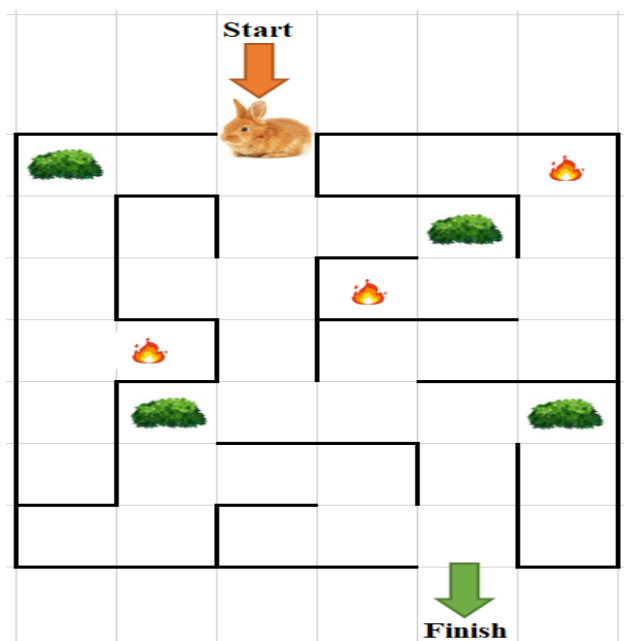
Use the following algorithms to find the optimal path.

    a. A* Algorithm

    b. Random Restart Hill Climbing Algorithm

Evaluations will be based on the following:

1. Explain the PEAS (Performance measure, Environment, Actuator, Sensor.) for your agent. (20% marks)
2. Use both the above mentioned algorithms and implement in PYTHON. (20% + 20% = 40% marks)
3. Print the optimal path sequence with costs. (20% marks)
4. Include code in your implementation to calculate the space complexity and time complexity for the informed search and print the same. For local search interpret the significance of the hyperparameters if any applicable . (20% marks)

Note 2:

- You are provided with the python notebook template which stipulates the structure of code and documentation. Use well intended python code.
- Use a separate MS word document for explaining the theory part. Do not include the theory part in the Python notebook except Python comments.
- The implementation code must be completely original and executable.
- Please keep your work (code, documentation) confidential. If your code is found to be plagiarized, you will be penalized severely. **Parties involved in the copy will be considered equal partners and will be penalized severely.**