Intelligent Robotics

Mid Sem - 1

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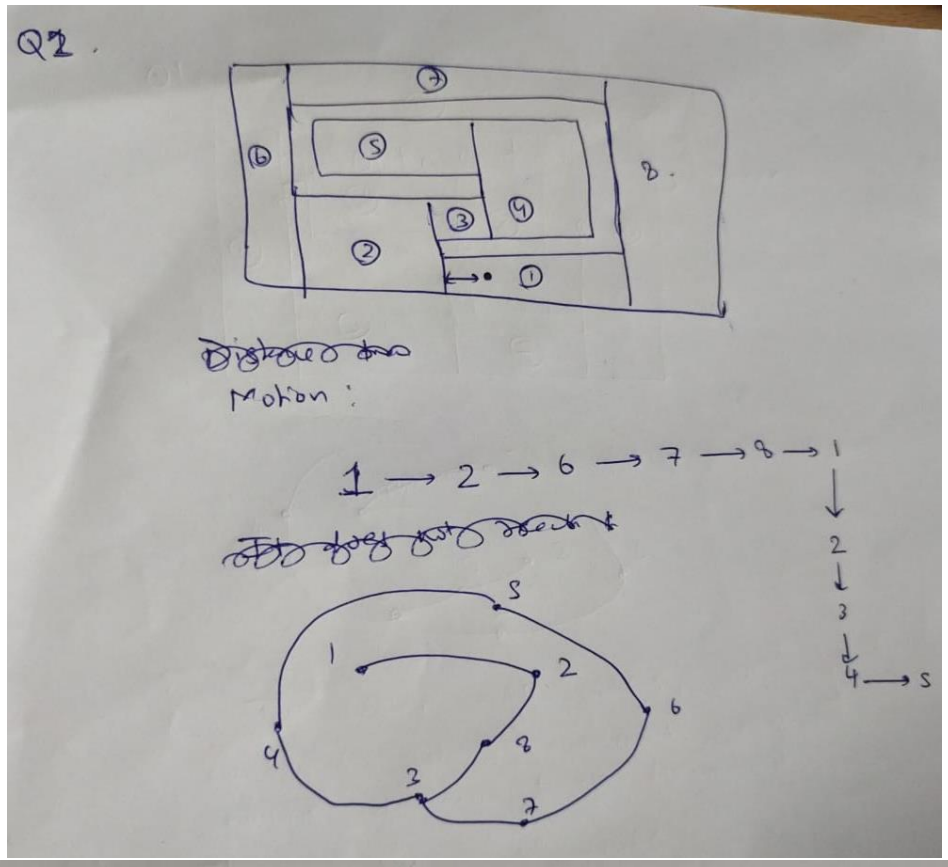
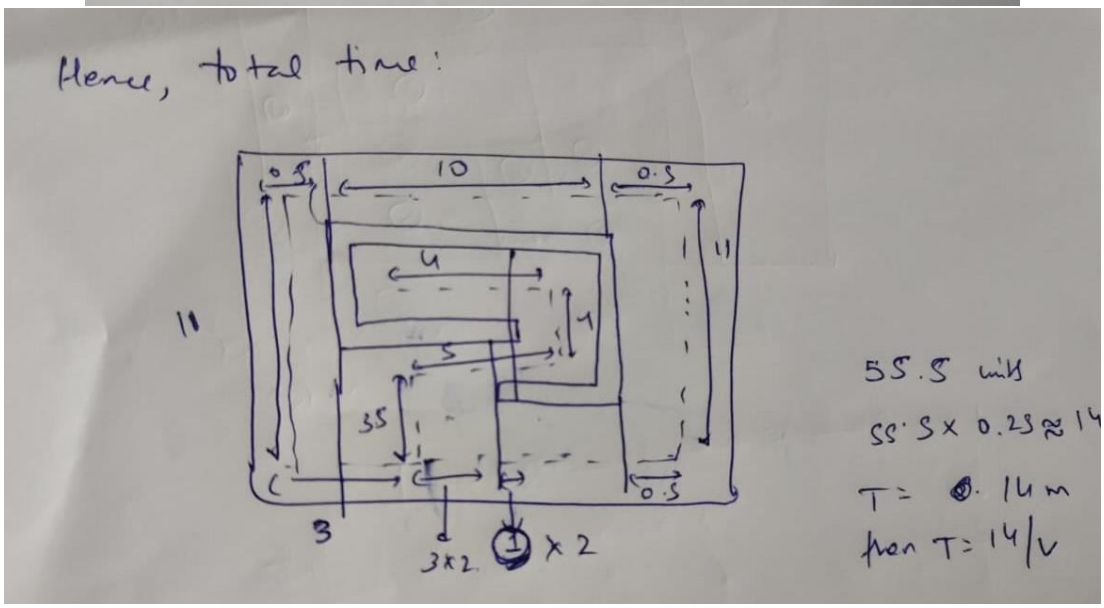
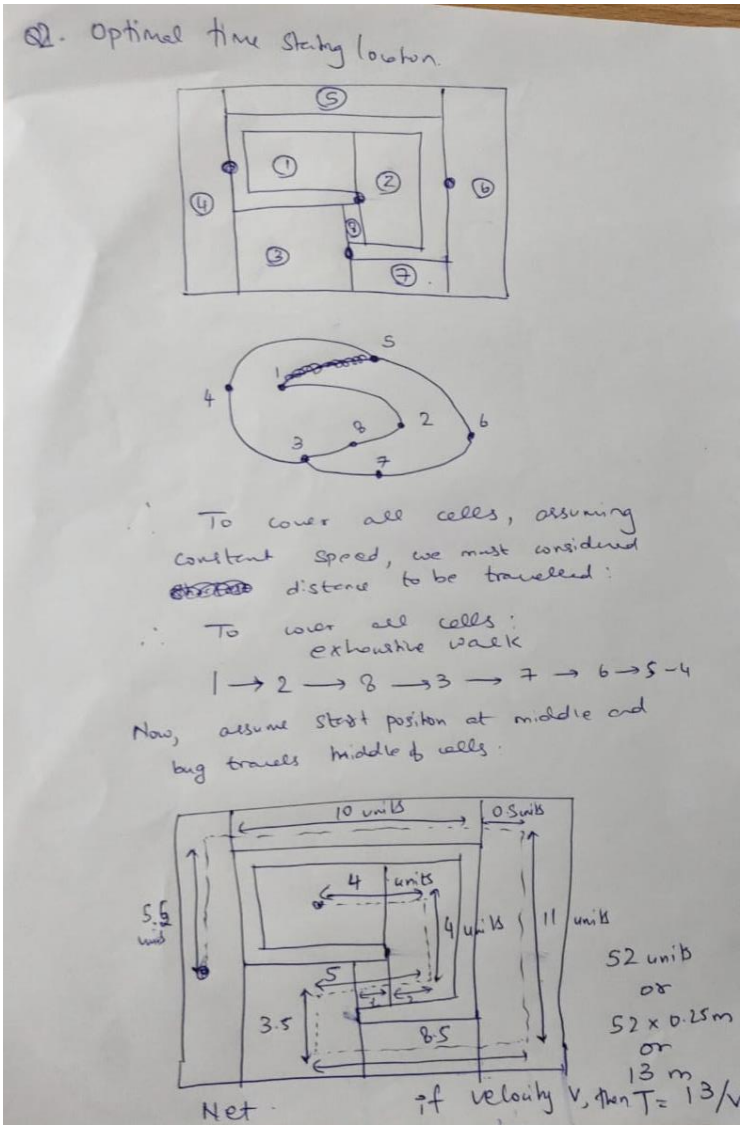
Roll No: 19315

Question 1

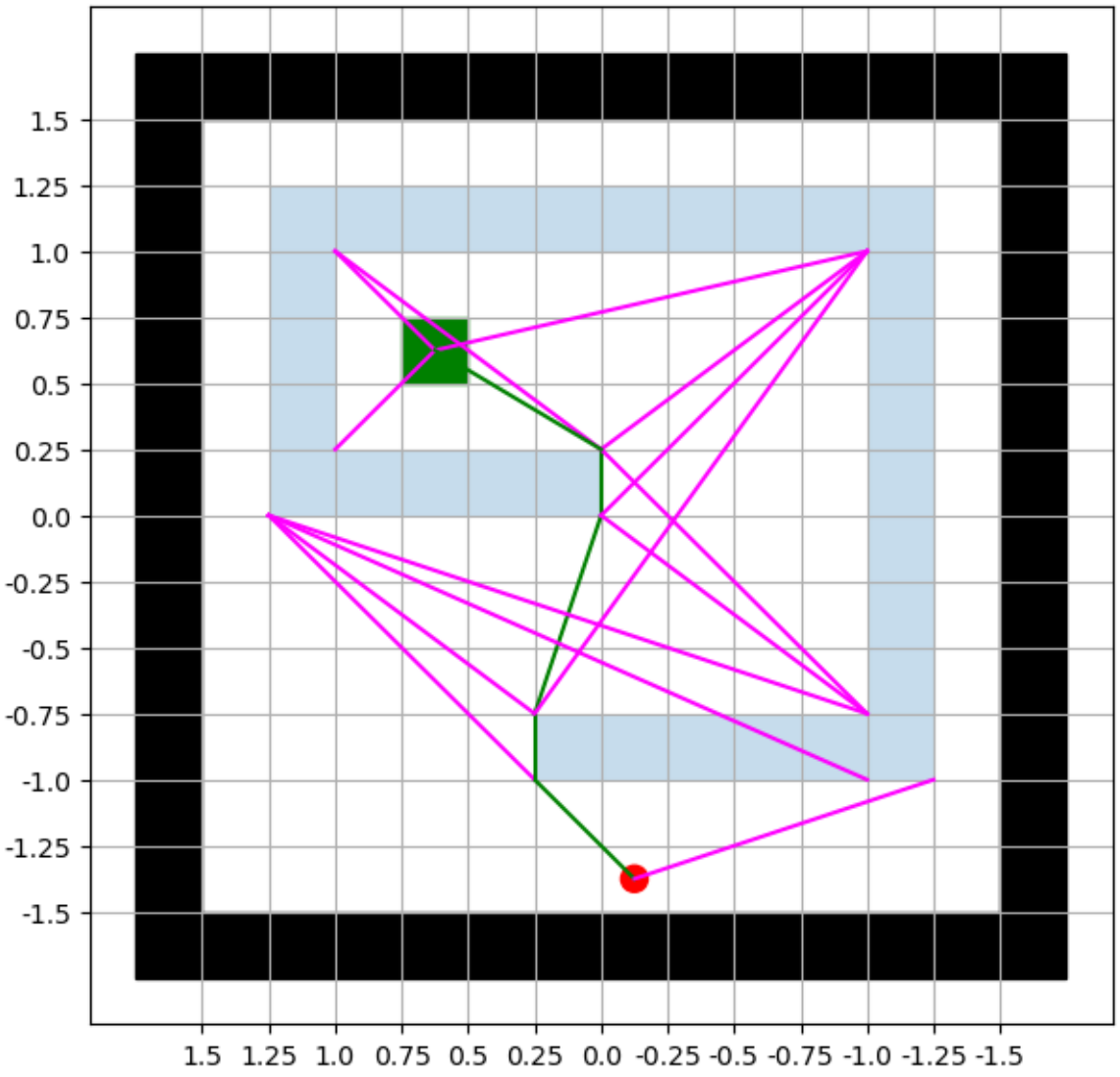




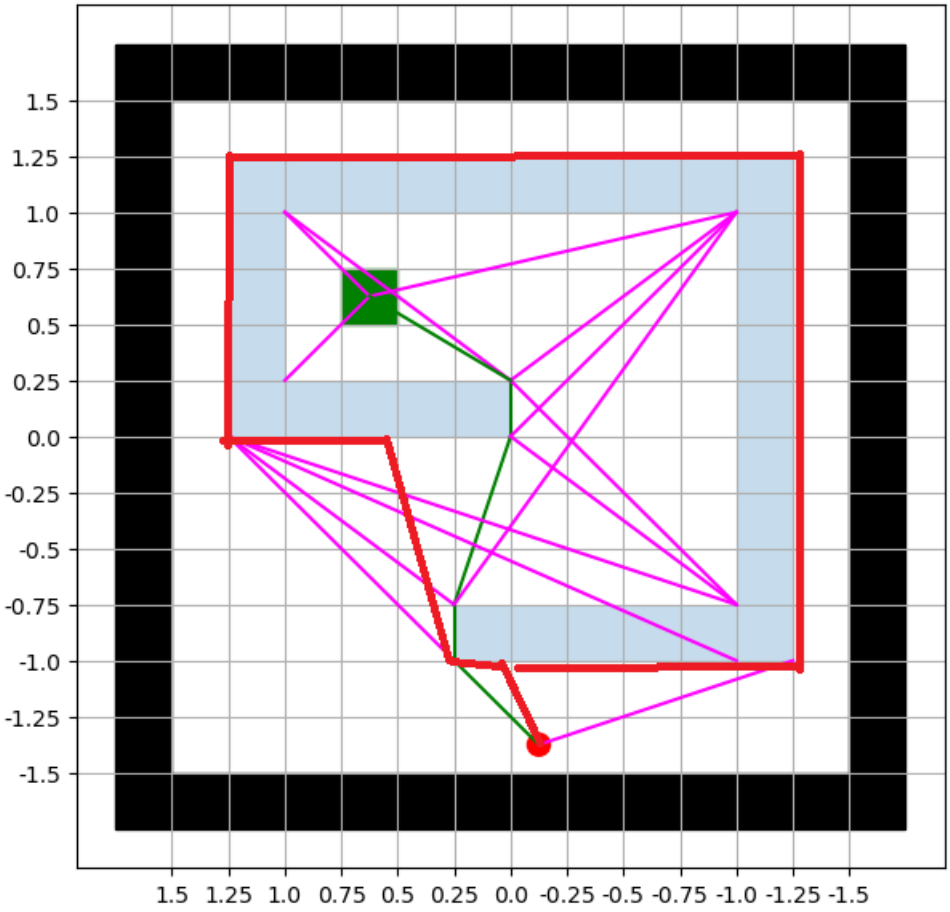
Question 2


Q2. Optimal time Starting location
To cover all cells, assuming constant speed, we must considered distance to be travelled:
To cover all cells:
exhaustive walk
1 → 2 → 8 → 3 → 7 → 6 → 5 → 4
Now, assume start position at middle and bug travels middle of cells:
10 units
0.5 units
4 units
5.5 units
4 units
11 units
5
3.5
8.5
52 units
or
52 x 0.25m
or
13 m
Net
if velocity V, then T = 13/V

Question 3

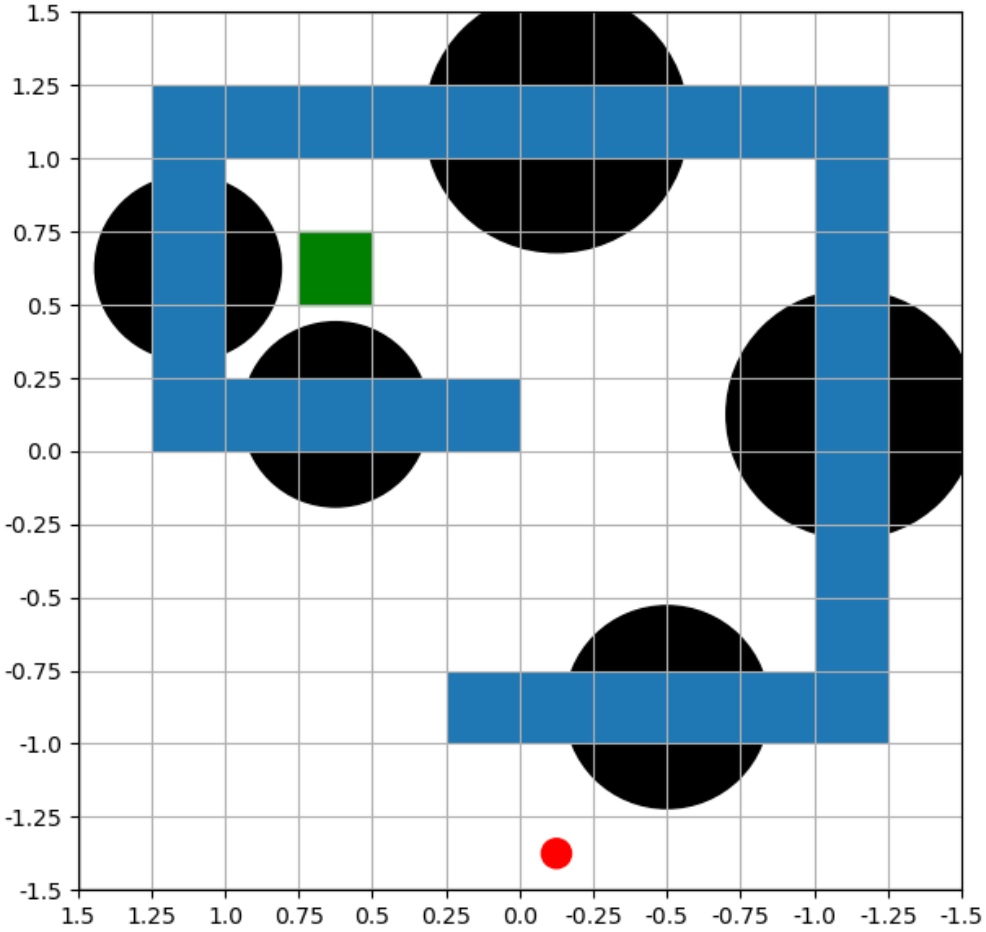


Visibility Graph and Shortest path

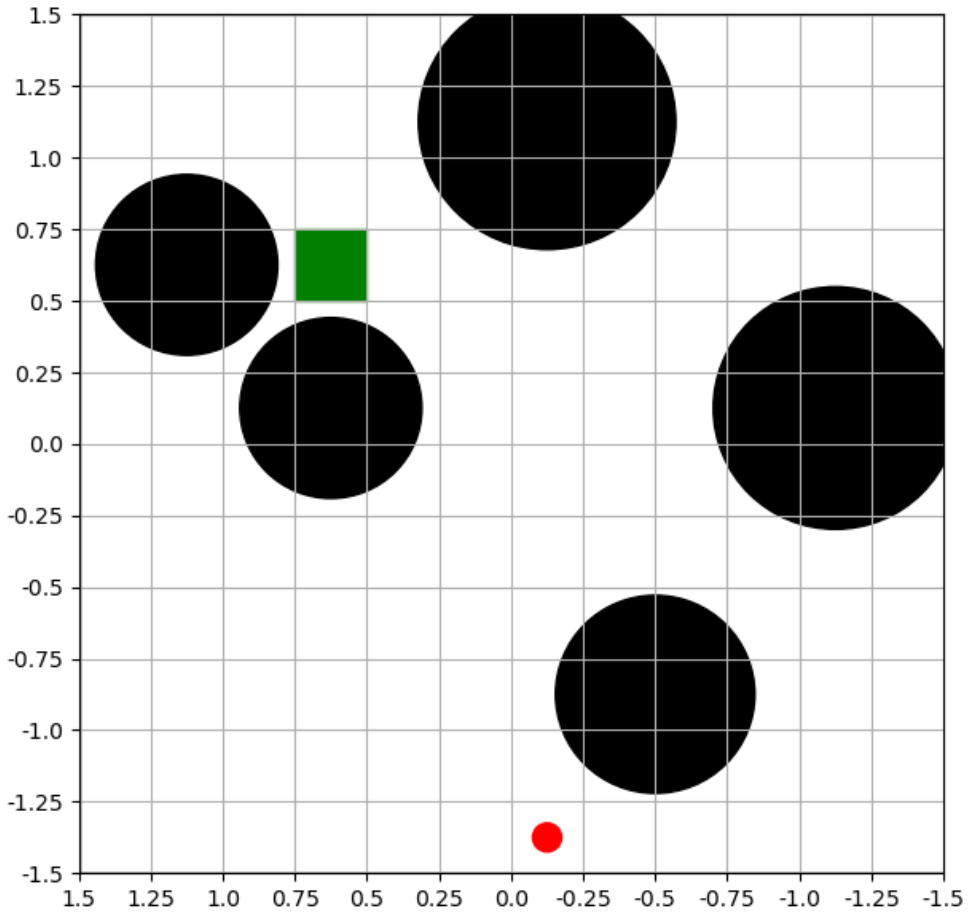


Along with bug-0 path

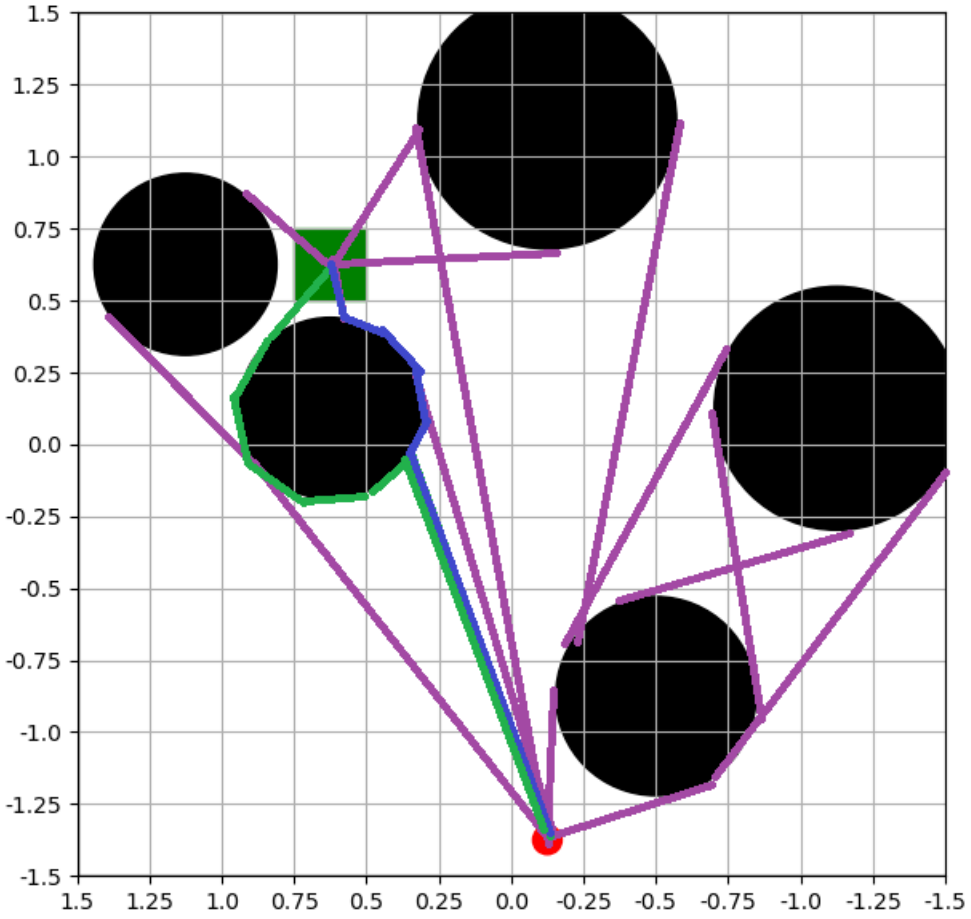
Question 4



Circles for Rectangles (same area)



Just circles



Green for left following bug-0, blue for shortest-path and the magenta for visibility graph

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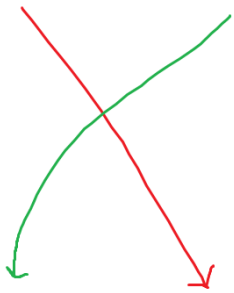
Question 5

NA

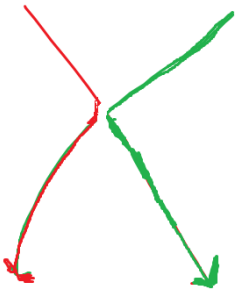
Question 6

To prevent them from colliding, we need to make sure that their paths do not intersect, or we can add restrict their motion.

Hence, if the path intersects then what we can do is change the path direction in such a way that they do not collide for example:



instead



Or we can restrict their movement by using proximity sensors which makes one of the robots wait before the other goes. If it doesn't move beyond some time, it can use some obstacle avoidance strategy like going around the other robot (either obstacle surface following or using an potential function)

Question 7

Code in astar.ipynb
