Problem 1

Population Representation:

In this case, a population represents a collection of potential paths from the start node to the goal node. Each individual (chromosome) in the population represents a candidate path solution. The chromosomes are sequences of nodes representing a path from the start node to the goal node.

Mutation Function:

In this case, the mutation function could randomly change some of the path nodes in search of potential new solutions. For example, the mutation will replace any random node in the picked path with the one connected by an edge with the currently connected node. All this, therefore, brings diversity to the population to explore the search space.

Crossover Operation:

Crossover can be considered, in this case, when two matching paths produce paths for the offspring among them. That is, from an initial configuration, one way is used to select crossover points among the parent paths and exchange respective sub-sequences of the parent paths starting from the crossover point to produce offspring paths. This could also mean that a random crossover point is selected, and after that, the paths beyond that point are swapped among the two parent paths.

Evaluation of Chromosome Quality:

The quality of a chromosome (path) can be evaluated based on its fitness, which in this context can be defined as the length of the path. Shorter paths are preferred as they represent more efficient routes from the start node to the goal node. Therefore, the evaluation function would calculate the

length of the path represented by the chromosome and assign a higher fitness to chromosomes with shorter paths.