**Specifications Document**

1. Introduction

The aim of this project is to generate an optimal delivery tour using operational research techniques. We will need to calculate a tour that connects a set of cities, minimizing the distance traveled while respecting the problem's constraints.

2. Functional specifications

2.1. Tour generation

We will propose a solution method for the VRP, which generates an optimal tour connecting the selected cities while minimizing the total distance traveled.

2.2. Addition of additional constraints

We will also propose additional constraints that make the problem more realistic. Constraints may include time frames, time limits, loading capacity restrictions, priority constraints for certain deliveries, etc.

2.3. Statistical study of the solution method's behavior

We will perform a statistical study of the proposed solution method's behavior, evaluating the performance of the generated solution. We will measure the solution's quality, convergence time, and method robustness. We will also provide predictive statistics to extrapolate the solution method's behavior on use cases that computers cannot process alone.

3. Technical specifications

3.1. Programming language

We will use a programming language suitable for the problem, such as **Python** and **R**.

3.2. Libraries

We may use libraries such as NumPy, Matplotlib, ggplot etc., to facilitate the implementation of the solution method and result analysis.

3.3. Input data

We will use input data representing the road network, cities to be delivered, and their constraints (loading capacity, delivery schedules, etc.). Input data can be provided in CSV, Excel, or JSON format.

4. Deliverables

Expected deliverables for this project are:

- A report detailing the proposed solution method, additional constraints, the statistical study of the solution method's behavior, and result analysis.

- A functional source code implementing the proposed solution method, with clear and concise comments on notebook jupyter

- Produce random generation of instances

- Test data allowing to validate the proposed solution method's proper functioning.

5. Planning

The project planning will be as follows:

- Day 1: Problem analysis, literature review, and detailed specifications.

- Day 2: Implementation of the proposed solution method, Mathematical and algorithmic modelling

- Day 3: Test and Statistical study of the solution method's behavior

- Day 4: Finalization of the report and deliverables and additional constraints

- Day 5: Preparation of the final presentation and Defense.