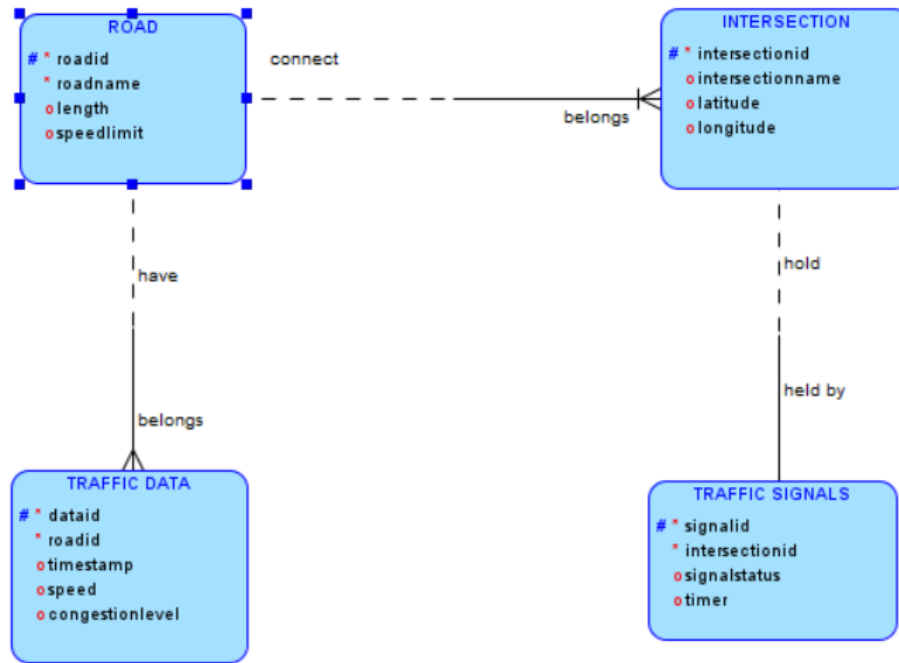# QUESTION 1:

Task 1 , Task 2,Task 3:

Task 4:

Justification

1)Scalability

The design allows for the addition of more roads, intersections, traffic signals, and traffic data without affecting existing data.

2)Real-time Data Processing

Real-time traffic data is linked to roads, enabling efficient route optimization and traffic signal control.

3)Efficient Traffic Management

The relationships between roads, intersections, and traffic signals allow the system to manage and control traffic flow dynamically.

Normalization

1)First Normal Form (1NF):

All attributes contain atomic values. Each entity is well-defined with unique identifiers (primary keys).

2)Second Normal Form (2NF):

All non-key attributes are fully functional and dependent on the primary key. For example, RoadName, Length, and SpeedLimit depend on RoadID.

3)Third Normal Form (3NF):

There are no transitive dependencies. For instance, Intersection attributes depend only on IntersectionID, and Traffic Signal attributes depend only on SignalID and IntersectionID.

Entity Definitions

Roads: Represents the network of roads in the city.

Intersections: Represents the points where roads meet.

Traffic Signals: Represents the signals installed at intersections to regulate traffic.

Traffic Data: Represents real-time traffic data collected from sensors.

Relationship Descriptions

Roads to Intersections: Roads connect to multiple intersections.

Intersections to Traffic Signals: Each intersection hosts one traffic signal.

Roads to Traffic Data: Roads have multiple traffic data entries over time.