**Question 1  
Give an elevator pitch for your final project idea**

Urban planning is crucial for sustainable city development, yet traditional methods often lead to traffic congestion, inefficient land use, and environmental issues. Our AI-Powered Urban Planner Assistant leverages machine learning, geospatial data, and real-time analytics to optimize urban development.

By integrating traffic insights (Google Maps API), land-use predictions (zoning data), and environmental factors (air quality, flood risks, green spaces), the system provides AI-driven recommendations for smarter city planning. It features interactive 2D map visualizations (Leaflet.js), predictive analytics, and zoning optimizations to assist policymakers, developers, and urban planners.

This project aims to reduce congestion, promote eco-friendly zoning, and enhance urban efficiency, making cities more livable and sustainable. The Flask-based backend, React.js frontend, and AI-driven models ensure scalability and real-time decision-making. With a data-driven approach, this tool will revolutionize urban planning, empowering authorities with smarter, eco-conscious strategies.

**Question 2**

**Give the following for your dataset**

**Collectors:**

**Year**

**Title of dataset**

**Version Number (if any)**

**Publisher**

**DOI or URL**

**Study/paper/reason**

**Question 3**

**List the language libraries that you will use?**

Following are the proposed requirements for the AI Urban Planning assistant

**Programming Languages:**

* **Python** (Backend & AI Model Development)
* **JavaScript** (Frontend & Visualization)

**Frameworks & Libraries:**

* **Flask** (Backend API)
* **React.js** (Frontend UI)
* **Leaflet.js** (2D Map Visualization)
* **Scikit-learn, TensorFlow/PyTorch** (Machine Learning Models)
* **GeoPandas, GDAL** (Geospatial Data Processing)
* **Matplotlib, Plotly** (Data Visualization)

**APIs & Data Sources:**

* **Google Maps API** (Traffic Data & Routing)
* **OpenStreetMap API** (Base Map & Zoning Data)
* **OpenWeatherMap API** (Weather, Air Quality Data)
* **Sentinel Hub API** (Satellite Imagery for Vegetation & Flood Risk)
* **GBIF API** (Biodiversity & Ecological Impact Data)

**Database Requirements:**

* **SQLite or MongoDB** (User Data, Urban Plans, Environmental & Traffic Insights)

**Question-4**

**Describe what code you will be writing yourself**

I will be creating three models for analyzing and suggesting best options for urban planning . Those are

**1. Land-Use Prediction Model (Random Forest)**

**Objective:**

Predict optimal land-use classification (e.g., residential, commercial, industrial, green spaces) based on zoning, population, and environmental factors.

**Key Input Parameters:**

* **Zoning Data**: Type of zoning, land-use category
* **Population Density**: People per square km
* **Pollution Index**: Air quality, noise pollution, etc.
* **Land Cover Type**: Forests, water bodies, developed areas
* **Road Network Density**: Number of roads per km²
* **Historical Land-Use Data**: Changes in land use over time

**Datasets to Collect:**

* **Zoning & Land-Use Data** (from OpenStreetMap, government portals)
* **Population Density Data** (from census or urban planning agencies)
* **Pollution Data** (from Air Quality APIs or environmental datasets)
* **Road Network Data** (from OpenStreetMap, Google Maps APIs)

**Data Sources:**

* **Zoning Data** → OpenStreetMap (OSM) or local government GIS portals
* **Population Density** → WorldPop or Census Bureau datasets
* **Pollution Data** → Air Quality Open Data or OpenWeatherMap API
* **Road Networks** → OSM Overpass Turbo or Google Maps API

**2. Traffic Congestion Prediction Model (Random Forest)**

**Objective:**

Predict traffic congestion levels based on historical and real-time traffic data.

**Key Input Parameters:**

* **Road Type & Width**: Highways, arterial roads, local streets
* **Vehicle Count**: Total number of vehicles at a time
* **Traffic Flow**: Peak hours, bottlenecks, average speeds
* **Accident Data**: How frequently accidents occur on specific roads
* **Weather Conditions**: Rain, snow, fog affecting traffic
* **Time of Day & Week**: Rush hour patterns

**Datasets to Collect:**

* **Historical Traffic Data** (traffic density, average speed, congestion reports)
* **Real-Time Traffic Data** (live congestion updates)
* **Road Network Structure** (road types, lanes, intersections)
* **Accident & Incident Reports** (historical crash data)
* **Weather Data** (past and current weather trends)

**Data Sources:**

* **Real-Time & Historical Traffic Data** → Google Maps API or TomTom API
* **Road Network Data** → OSM or City GIS Open Data Portals
* **Accident & Incident Reports** → US Department of Transportation or Local police records
* **Weather Data** → NOAA Climate Data or OpenWeatherMap API

**3. Environmental Impact Analysis Model (Random Forest)**

**Objective:**

Assess the environmental sustainability of urban planning decisions.

**Key Input Parameters:**

* **Air Pollution Levels**: PM2.5, PM10, NO2, CO levels
* **Green Space Availability**: Area covered by parks, forests
* **Carbon Emissions Data**: Emission hotspots, vehicle-based pollution
* **Water Bodies & Quality**: Rivers, lakes, contamination levels
* **Temperature & Climate Trends**: Urban heat island effect
* **Noise Pollution Data**: Highways, industrial zones

**Datasets to Collect:**

* **Air Quality Data** (PM2.5, CO2 levels, pollution sources)
* **Green Space Coverage** (Parks, forests, tree density)
* **Urban Heat Island Data** (Temperature differences in city zones)
* **Water Quality Data** (Clean vs polluted water zones)
* **Noise Pollution Levels** (Traffic and industrial noise sources)

**Data Sources:**

* **Air Quality Data** → OpenAQ or EPA Air Quality API
* **Green Space Data** → NASA Earth Data or Global Forest Watch
* **Urban Heat Data** → NASA MODIS or Landsat satellite data
* **Water Quality Data** → USGS National Water Information System
* **Noise Pollution Data** → WHO Noise Data