

Problem

The University of Tikrit is experiencing severe traffic congestion, with over 2,000 vehicles per hour moving through a limited number of entrances. This congestion causes significant delays, safety concerns, and inefficient mobility for students, faculty, and staff.

As an engineering team, your task is to investigate the problem, assess the traffic conditions mathematically, and propose an engineering solution that improves traffic flow while maintaining safety and efficiency.

Answer the following questions

Q1: Identify the Engineering Problem

- What are the main causes of traffic congestion at the University of Tikrit?
- How does the limited number of entrances affect traffic flow and safety?
- What are the peak congestion hours, and why?
- How do parking spaces impact overall traffic conditions?
- How does the lack of an intelligent traffic management system contribute to congestion?

Q2: Assess the Current Status Using Equations and Calculations

Use the following traffic engineering concepts and equations to analyze the situation:

1. **Traffic Volume (V):**

$$V = \text{Number of Vehicles} / \text{Time Period}$$

- Calculate the number of vehicles per hour passing through key campus roads.

2. **Traffic Density (D):**

$$D = \text{Number of Vehicles} / \text{Length of Road Segment (km)}$$

- Measure how congested each road segment is.

3. **Average Speed (S):**

$$S = \text{Sum of Speeds of Vehicles} / \text{Number of Vehicles}$$

- Determine if lower speeds are due to congestion.

4. **Flow Rate (Q):**

$$Q = D \times S$$

- Assess the level of congestion at different locations.

5. **Travel Time and Delay (T):**

$$T = \text{Distance} / \text{Speed}$$

- Compare expected vs. actual travel time to quantify delay.

Using these calculations, summarize the current state of congestion.

Q3: Propose an Engineering Solution & Use the Same Equations

Now, based on your analysis, suggest a practical engineering solution that can reduce congestion. Some possible solutions include:

- ✓ Redesigning entrances and exits to improve traffic flow.
- ✓ Implementing traffic signals or intelligent control systems to optimize movement.
- ✓ Reorganizing parking areas to reduce unnecessary circulation.
- ✓ Introducing alternative transportation methods (buses, carpooling, cycling lanes).

Recalculate traffic parameters (V, D, S, Q, T) based on your proposed solution to predict its impact.

Q 4: Compare Before and After (Show the Difference)

- How does your solution improve each parameter?
- What is the reduction in congestion levels?
- How do changes in traffic density, speed, and travel time affect overall efficiency?

Rate your ability to solve this problem (out of 4.0)