

Traffic Stream Flow Models

Q1. A rapid-transit system employing single vehicles is scheduled at constant headways. Plot the relationship between the spacing in meter (m) and speed in meter per second (m/s) using the following data for **safety regime a, b, c, d and e.** (Use MS Excel or any other graphic tools)

Perception-reaction time = 2.5 s, normal deceleration = 2.5 m/s², emergency deceleration = 10 m/s², vehicle length = 12.2 m, and safety clearance $x_0 = 1.3$ m.

Q2. The u vs. k relationship for a particular freeway lane was found to be

$$u = 92.4 - 1.32k$$

Given that the speed (u) is in (km/h) and the concentration (k) is in (veh/km), find:

- the free-flow speed,
- the jam concentration,
- the lane capacity,
- the speed at capacity.

Q3. The observations, a long 4 km roadway route, from a moving observer method are given in the table below. column (1) shows the number overtaking the test vehicle, (2) shows the number of vehicles overtaken by the test vehicle, (3) shows the number of vehicles moving against traffic stream, (4) is the travel time with the traffic (s), and (4) is the travel time against the traffic (s):

- Assuming linear speed-density relation, plot the u - k diagram and calibrate $u = a + bk$
- What is the maximum flow (capacity), speed, and density?. show the details of the calculation.

M_o	M_p	M_a	T_w (s)	T_a (s)
5	119	618	422	300
26	12	389	253	188
24	9	401	226	300
2	55	410	274	255
26	9	374	226	200