

Exercise 9.1

To analyse traffic in a city area flow traffic and speeds of vehicles have been measured. The considered section has a length of 72 metres and traffic flow has been measured at intervals of 5 minutes, as shown on table 1, where traffic composition has been divided in vehicles and heavy ones. To calculate the speed of the vehicles, 20 vehicles speed have been measured during 30 minutes, as shown on table 2.

Finally, the time of 15 out of the 20 vehicles to cover the above distance has been measured. These times are shown on table 2.

Calculate:

- a) For each type of vehicle and for all of them, the next traffic flows: I_{15MAX} and I_{30} . For light vehicles calculate the mean traffic flow I_{5MEAN} .
- b) Calculate for each type of vehicle the time mean speed and space mean speed in km/h. ¿Is logical the obtained result?
- c) Calculate for the complete traffic composition, without distinguishing by type of vehicle, the time mean speed and the space mean speed in km/h.
- d) Calculate the percentil speed 85 in km/h.
- e) Calculate the mean gap value.
- f) Calculate the density.
- g) Calculate the spacing.
- h) Calculate the capacity.
- i) In another road traffic flow is measured during 1 hour in intervals of 5 minutes, as shown on table 3. Calculate the peak hour factor.

NOTE:

The coefficients to calculate the spacing s are: $b=0.2$ and $c=0.003$.

The mean length of a vehicle is 4 metres.

The mean length of a heavy vehicle is 8 metres.

| | | | | | | |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 5' | 5' | 5' | 5' | 5' | 5' |
| Light vehicles | 43 | 30 | 37 | 38 | 53 | 35 |
| Heavy vehicles | 1 | 1 | 1 | 2 | 2 | 2 |

Table 1. Traffic flow

| Time (s) | Speed (m/s) | |
|----------------|----------------|----------------|
| Light vehicles | Light vehicles | Heavy vehicles |
| 6.38 | 11.29 | 5.44 |
| 5.80 | 12.41 | 7.82 |
| 6.00 | 12 | 11.13 |
| 8.57 | 8.4 | 10.48 |
| 5.75 | 12.52 | 9.93 |
| 19.83 | 3.63 | |
| 6.75 | 10.67 | |
| 6.09 | 11.82 | |
| 26.28 | 2.74 | |
| 4.91 | 14.66 | |
| 5.91 | 12.18 | |
| 7.22 | 9.97 | |
| 5.53 | 13.02 | |
| 7.85 | 9.17 | |
| 11.75 | 6.73 | |

Table 2. Speeds and times for light vehicles

| | 5' | 5' | 5' | 5' | 5' | 5' | 5' | 5' | 5' | 5' | 5' | 5' |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Vehicles | 40 | 40 | 50 | 48 | 52 | 42 | 48 | 65 | 50 | 37 | 46 | 70 |

Table 3. Traffic flow