

Birla Institute of Technology and Science, Pilani
 First Semester 2023-24
 Mid-Semester Examination
CE G568: Traffic Systems Analysis

Maximum Duration: 90 minutes

Maximum Marks: 50

1. Consider two different road sections (say, R1 and R2). If R2 has higher free-flow speed, then which of the two sections can have better level-of-service for the same flow rate (in pcphpl)? Explain briefly with a neat sketch. [06]
2. Consider a detector of width W . Derive an expression for the density (k) if the fraction of time the detector was occupied is given by D . Assume the average length of a vehicle to be L . [08]
3. Calculate the PHF_{15} and the corresponding peak flow rate for the minute flow rate data provided in Table 1. [12]

Table 1: Observed minute flow rate.

Minute, i	1-7	8-10	11-20	21	22-32	33-45	46-47	48-55	56-60
N_i	15	25	20	36	9	5	10	25	15

4. From two consecutive film frames of traffic flow along a single lane road, one observes that there are ten cars per kilometer having zero velocity (they are parked), 20 cars per kilometer traveling at 10 km/h and 40 cars traveling at 20 km/h. Determine the space mean speed and the time mean speed of traffic. [06]
5. Find out the capacity of a road section for which the traffic stream obeys the fundamental diagram presented in Figure 1. Derive the corresponding $q-k$ relation and plot it also indicating all the critical points in the plot. [18]

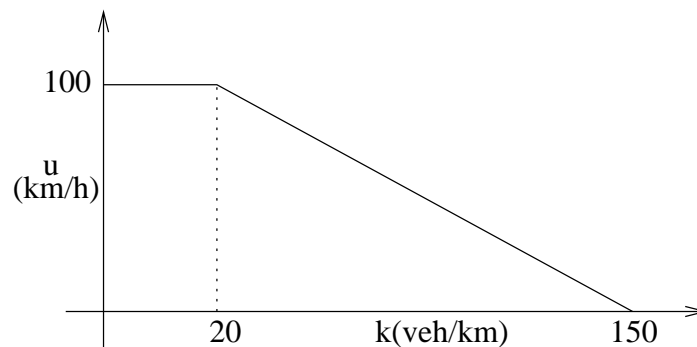


Figure 1: Fundamental Diagram of the traffic stream.