

CE 774 - Traffic Management and Design (2022)

Assignment - 3

Instructions: (i) Start each question on a new page, (ii) All questions and answers should be written by hand, (iii) Scan the assignment in the same order and submit as a single pdf file, (iv) through the google form that will be shared by the TA.

1. Describe why cellular automata is computationally faster compared to a conventional micro-simulation?
2. Illustrate the concept of lane changing using 2-D cellular automata using a numerical example that shows (i) lane-changing possible and (ii) lane-changing not possible (ignore any probability rules). Assume $V_{max}=3$.
3. Assume a single lane stretch road divided into 8 cells and vehicles are present in the first, third, sixth, seventh cells with 2, 1, 1, 0 as their speeds respectively. Apply the rules of cellular automata for two seconds and show the state. Also compute the density in vehicle per km at the end of two seconds. Assume cell size is 7.5 meter and V_{max} is 5.
4. Illustrate the concept of platoon dispersion with the help of a sketch
5. The average travel time for a given stretch was found out to be 38.2 seconds. Using Robertson's platoon dispersion model find out the downstream flow if the upstream flows are as given below $q_{10}^u=9$, $q_{20}^u=12$, $q_{30}^u=15$, $q_{40}^u=16$, $q_{50}^u=12$, $q_{60}^u=6$. Given that the travel time factor is 0.803 and the update interval is 10 seconds. Assume any two values of platoon dispersion ratio greater than zero and show graphically the downstream flow for a duration of 120 seconds for the two assumed values of platoon dispersion ratios.
6. What are the traffic calming measure one can adopt for the road from IIT Main Gate to Hostel 12? Draw neat sketch and show at least four more suitable measures.
7. Illustrate the concept of Road hierarchy considering the roads in and around IIT campus.
8. Illustrate with a neat sketch four zones for managing traffic during construction.
9. Explain with a neat sketch Co-centric Widening – a traffic management during construction.
10. What are the signs and marking that can be applied for a temporary diversion due to road closure.