

CE 774 - Traffic Management and Design (2022)

Assignment - 1

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 Kendall's representation of a queuing system with few examples.
2. Explain M/M/s queuing system along with its assumptions.
3. Give that vehicles arrive at a service station at an expected rate of one every 20 minutes and the expected service time is 15 minutes per vehicle. Compare the performances if the system is modelled as (i) M/M/1 queuing system, (ii) M/M/s queuing system, and (iii) two M/M/1 queuing system (show detailed calculations and comparisons).
4. Write a detailed note on how congestion can be quantified?
5. Write in detail (i) how congestion can be mitigated, and give (i) two examples of demand side interventions, and (iii) two examples of supply side interventions.
6. Explain the concept of congestion pricing using a numerical example. Hint: formulate a private cost function, then find the corresponding marginal cost equation, formulate a demand function, and find the optimum pricing assuming equilibrium conditions. Assume linear functions and solve graphically. The numerical example should be your own.
7. Derive the length required to park 'N' cars at 60 degree (with respect to the road) angular parking. Illustrate with neat sketch.
8. Illustrate the concept of the six parking statistics with a numerical example of your own creation (Hint: Refer to '3.0.1 Numerical Example' in https://www.civil.iitb.ac.in/tvm/nptel/581_Parking/web/web.html).
9. Illustrate the concept of the 'in-out survey' with a numerical example of your own creation (Hint: Refer to '4.1.1 Numerical Example' in https://www.civil.iitb.ac.in/tvm/nptel/581_Parking/web/web.html)
10. Illustrate the concept of the 'License plate method of survey' with a numerical example of your own creation (Hint: Refer to '4.2.1 Numerical Example' in https://www.civil.iitb.ac.in/tvm/nptel/581_Parking/web/web.html)