CE434 Traffic Analysis and Design

I   *Introduction to Transportation System Engineering*:

   1   Activity - Transport flow system, equilibrium between demand and supply

II   *Microscopic and Mesoscopic traffic flow modeling*

   2   *Car-following models:* Concept of stimulus-response, general motors' models …
   3   *Lane changing models:* Conceptual framework, lane selection model …
   4   *Vehicle arrival models:* Poisson distribution, headway modeling, vehicle generation.
   5   *Discrete simulation models*: Cellular automata concepts …

III   *Signalized intersection control*

   6   *Design and evaluation of traffic signal*: Review of basics, delay models …
   7   *Capacity and Los analysis of a signalized I/S:* HCM 2000 method of analysis …
   8   *Coordinated traffic signal:* Concepts of offset, common cycle length bandwidth …
   9   *Vehicle actuated signals and Area traffic control*: Basic principles, architecture …

IV   *Macroscopic traffic flow modeling*

   10   *Traffic progression models*: Robertson progression model, platoon movement …
   11   *Traffic flow modeling analogies:* Fluid flow analogy, Lighthill-Withams theory
   12   *Cell transmission models*: Flow conservation, flow transmission.

V   *Capacity analysis of traffic facilitates*

   13   *Urban Street:* HCM Classification, operational performance measures …
   14   *Multilane highways:* Characteristics, capacity and level of service HCM.
   15   *Freeway operations:* Operational considerations, basic segment, weaving operation …
   16   *Ramp metering:* Merging and diverging areas; fixed, reactive, and predictive systems.

IV   *Traffic impact studies*

   17   *Accident Studies*: Accident data collection, statistics, safety audit, safety measures.
   18   *Fuel consumption and emission studies:* pollutants, models, mitigation measures.
   19   *Congestion studies*: Performance measures, intensity, duration, extent, remedial measures …
   20   *Toll operation:* Queuing models, operations…

V   *Self-study*

   21   *Automated traffic measurement:* GPS, loop, video, and other technologies.
   22   *Intelligent Transportation System:* Introduction, architecture, evaluation…
   23   *Traffic simulation software VISSIM*

Reference:

   1.   Roess, R. P., McShane, W. R. & Prassas, E. S. (1998), Traffic Engineering, Prentice - Hall
   2.   May, A. D. (1990), Fundamentals of Traffic Flow, second edn, Prentice Hall.
   3.   Papacostas, C. S. (1987), Fundamentals of Transportation Engineering, Prentice-Hall, India
   4.   Kadiyali, L. R. (1987), Traffic Engineering and Transportation Planning, Khanna, India.
   5.   Highway Capacity Manual (2000), Transportation Research Board, USA
   6.   Khanna, S. K. & Justo, C. E. G. (1991), Highway Engineering, Nemchand Bros., Roorkee.
   7.   Pingnataro, G. J. (1970), Principles of Traffic Engineering, Mc Graw-Hill.