GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

Civil (Transportation Engineering)

Subject name: **Traffic Flow Theories and Simulation (Major Elective - IV)**

Sr.No	Course content
1	**Traffic Stream Characteristics:** Measurement, microscopic and macroscopic Study of Traffic Stream Characteristics - Flow, Speed and Concentration; Use of Counting, Interval and Translated Distributions for Describing Vehicle Arrivals, Headways, Speeds, Gaps and Lags, Fitting of Distributions, Goodness of Fit Tests, gap acceptance.
2	**Traffic Stream Models:** Fundamental Equation of Traffic Flow, Speed-Flow-Concentration Relationships, Normalised Relationship, Fluid Flow Analogy Approach, Shock Wave Theory, Platoon Diffusion and Boltzman like Behaviour of Traffic Flow, Car-Following Theory, Linear and Non-Linear Car-Following Models, Acceleration Noise
3	**Queuing Analysis:** Fundamentals of Queuing Theory, Demand Service Characteristics, Deterministic Queuing Models, Stochastic Queuing Models, Multiple Service Channels, Models of Delay at Intersections and Pedestrian Crossings.
4	**Highway Capacity & Level-of-Service Studies:** Concepts, Factors Affecting Capacity & Level-Of Service, Capacity Analysis of Different Highway Facilities, Passenger Car Units, Problems in Mixed Traffic Flow.
5	**Traffic Simulation:** System Simulation, Simulation Languages, Generation of Random Numbers, Generation of Inputs – Vehicle Arrivals, Vehicle Characteristics, Road Geometrics, Design of Computer Simulation Experiments.

Practical:

1. Classified traffic volume count along with spot speed data on congested urban road mid-block section (Preferably using video-graphy).
2. Generation of speed-flow-density relationship from the collected data.
3. Statistical analysis of the collected data for the parameters like - vehicle arrival pattern, headway, speed, gap, overtaking, queuing etc.
4. Intersection volume count and delay measurements.
5. Data collection for determining highway capacity and level of service.
6. Computer simulation of observed traffic data, using programme or software.
7. Simulation experiments for improving the traffic conditions.

References Books:

1. TRB - SR No.165 - Traffic Flow Theory, Transportation Research Board, Washington - D.C.
2. May, A D., Traffic Flow Fundamentals, Prentice-Hall, NJ
3. Drew, D.R., Traffic Flow Theory and Control, McGraw-Hill, New York.
4. TRB Special Report 209: Highway Capacity Manual, Transportation Research Board, Washington DC, 1985.
5. Wohl M. and Martin, B V., Traffic System Analysis for Engineers and Planners, McGraw-Hill, New York.
6. McShane W R & Roess R P, Traffic Engineering, Prentice-Hall, NJ
7. Neylor, T.H. et al., Computer Simulation Techniques, John Wiley.