# Modern Transportation System

# 01CI1707

**Objective of the Course:**

- To gain a deep understanding of the dynamics of transportation within urban environments, including factors such as population density, land use patterns, economic activities, and demographic trends.
- To explore sustainable transportation solutions aimed at mitigating the negative impacts of transportation on the environment and society.
- To encourage interdisciplinary perspectives by incorporating insights from fields such as urban planning, engineering, economics, environmental science, sociology, and public policy.

**Credit Earned: 04**

**Student's learning outcomes:**

After successful completion of the course, it is expected that students will be able to,

1. Specify key concepts related to urbanization.
2. Analyze various transportation survey data with proper sample size, accuracy and consistency checks.
3. Evaluate transportation data using appropriate analytical and techniques.
4. Develop optimal bus route network design and scheduling.

**Teaching and Examination Scheme**

| Teaching Scheme (Hours) | | | Credits | Theory Marks | | | Tutorial/ Practical Marks | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| Theory | Tutorial | Practical | | ESE (E) | IA (M) | CSE (I) | Viva (V) | Term Work (TW) | |
| 03 | 01 | 00 | 04 | 50 | 30 | 20 | 25 | 25 | 150 |

**Detailed Syllabus**

| Sr. No | Topic name | Hours |
|---|---|---|
| **1** | **Urban Mass Transportation System** | **06** |

| | | |
|---|---|---|
| | 1.1 Urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails. | 04 |
| | 1.2 Capacity, merits and comparison of systems, coordination, types of coordination | 02 |
| **2** | **Introduction to Land Use Planning Models, Land Use and Transportation Interaction.** | **08** |
| | 2.1 The transportation study area definition; division into traffic zones; network identification and coding | 04 |
| | 2.2 Types of trips, characteristics of various surveys; home interview; roadside survey mass transit and intermediate public transport surveys; sampling and expansion factors; accuracy checks, screen line checks, and consistency checks. | 04 |
| **3** | **Travel Demand Modeling** | **15** |
| | 3.1 Trip generation-zonal regression and category analysis, Trip distribution-growth factor models, gravity model, opportunity models, and Desire line diagram. Modal split analysis-trip end. | 10 |
| | 3.2 Trip interchange models, logit models, Trip assignment techniques choice, diversion curves, shortest path algorithms, all-or-nothing assignment, capacity restraint models and Direct demand models. | 05 |
| **4** | **Scheduling and Route Network Design** | **13** |
| | 4.1 Scheduling: Component, procedure and patterns, bus & crew scheduling, fleet requirement | 03 |
| | 4.2 Route network design: Corridor identification, route system, the capacity of transit lines, the process for improving transit line capacity | 03 |
| | 4.3 Bus Station Design: Bus-Station Interface, Station Layout and Size, Distance between Stations, Architectural Features, Terminal Design | 03 |
| | 4.4 Universal Accessibility for Corridor: Footpaths, Pedestrian Infrastructure, Passenger Access, Station Ramps, Bus Interior, Bus Stops on Service Extensions. | 04 |
| | **TOTAL** | **42** |

**List of Tutorials:**

| Sr. No | Topic name | Hours |
|---|---|---|
| **1** | Examples to determine trip generation of a network | **03** |
| **2** | Examples to determine trip distribution of the selected study area | **03** |
| **3** | Examples to determine modal split of the particular flow | **03** |
| **4** | Examples to determine route assignment | **03** |
| **5** | Examples to determine passenger & vehicular capacity of mass transportation system | **02** |
| | **TOTAL** | **14** |

**Suggested Theory Distribution**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

| Distribution of Theory for course delivery and evaluation | | | | | |
|---|---|---|---|---|---|
| Remember | Understand | Apply | Analyze | Evaluate | Create |
| 5% | 10% | 30% | 30% | 15% | 10% |

**Instructional Method and Pedagogy:**

1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2 Lectures shall be conducted in class room using various teaching aids.
3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.

**Recommended Study Material:**

**Reference Book:**

1. Khisty, C J., Transportation Engineering – An Introduction, Prentice-Hall, NJ
2. S.C. Saxena, Traffic Planning and Design, Dhanpat Rai Pub., New Delhi.
3. Partho Chakraborty and Animesh Das, Principles of Transportation Engineering, PHI
4. C. S. Papacostas, Fundamentals of Transportation System Analysis, PHI.

**Text Book:**

1. Kadiyali L.R., Traffic Engineering and Transport Planning, Khanna Publishers.

**Web Links**

- https://onlinecourses.nptel.ac.in/noc21_ce35/preview