Traffic Engineering and Road Safety

01CI0612

Objective of the Course:

- To understand fundamentals of traffic engineering and road safety.
- To learn different types traffic survey methods and checklists of road safety audit.
- To create basic awareness about level of service for various roadways.
- To explore the fundamentals of traffic control device such as traffic signal, intersection design and road safety audit report preparation.

Credit Earned: 03

Student's learning outcomes:

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

1. Recognize the basic characteristics of traffic stream at micro and macro level.
2. Apply knowledge of traffic studies and analyze traffic data for practical applications.
3. Design, plan and regulate traffic operation of different roadway facilities and elements.
4. Evaluate causes of road accidents and carry out road safety audits.

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	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of Hours
1	**Traffic Characteristics**	**10**
1.1	Introduction, Human-vehicle-environment system, Characteristics of road users and vehicles, Pedestrian characteristics, vehicular dynamics-force balance equation, Fundamental traffic flow relationships; Time and space headways and flow patterns;	04
1.2	Interrupted and un-interrupted traffic; speed characteristics, Speed characteristics mathematical distributions; Speed and travel time variations,	04

1.3	Computation of AADT, Design Hourly Volume from Short- and Long-Term Counts to develop adjustment factors, expanding and adjusting traffic counts in urban area and region, case studies and applications.	02
2	**Intersection Traffic Operations and Control**	**12**
2.1	Measurement of traffic flow characteristics at intersections, saturation headway, saturation flow, control delay and operational delay. Traffic signals design - pre-timed fixed control and Automatic traffic control system (Traffic actuated vs Adaptive traffic control).	06
2.2	Design of signal setting - phase diagrams, timing diagram – Signal co-ordination – Area traffic Control System, Rotary Intersection design	06
3	**Traffic Analysis and Management:**	**04**
3.1	Capacity and Level of Service concepts,	02
3.2	LOS for multilane and freeways	02
4	**Road Safety Diagnosis**	**06**
4.1	Introduction to Road Safety Engineering and Crash Investigation, Human Factors Relating to Crashes/Accidents,	02
4.2	Crash/Accident Investigation & Crash Problem Diagnosing, Crash Problems into Solutions & Crash, Investigation Reporting,	04
5	**Road Safety Audit**	**10**
5.1	Road Safety Auditing: An Introduction, Concept and need of Road Safety Audit (RSA).	02
5.2	Procedures in RSA, design standards, audit tasks, stages of road safety audit,	04
5.3	Road Safety Audit Types, audit team and requirements, Checklist, how to use Checklists Road Safety inspection.	04
	Total	**42**

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%	35%	30%	15%	5%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.

4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

Recommended Study Material

1. Drew, D.R., Traffic Flow Theory & Control, McGraw Hill, New York, 1968.
2. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi,2002.
3. Khisty C J, Lall B. Kent; Transportation Engineering-An Introduction, Prentice-Hall, NJ,2005.
4. Salter, R J., Hounsel, N.D., Highway Traffic Analysis and Design, Macmillan, London,1996.
5. McShane W R &Roess R P, Traffic Engineering, Prentice-Hall, NJ, 2010. 8. Mannering, F. L., & Kilareski, W.P., Principles of Highway Engineering and Traffic Analysis, John Wiley & Sons,2008.
6. A. Veeraragavan, S.K. Khanna and C.E.G. Justo, Highway Engineering, Nem Chand &Brothers,2014.
7. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press,2016.
8. IRCSP:88, Manual on Road Safety Audit, 2019.