TRANSPORTATION ENGINEERING

Course Code:	L	T	P	C
	3	0	0	3

COURSE OUTCOMES:

At the end of the course the student will be able to:

CO1: explain various engineering surveys for highways (L2)

CO2: Illustrate the tests on highway Materials (L3)

CO3: illustrate various Geometric design and alignment concepts (L2)

CO4: explain the importance of traffic volume studies and regulation (L2)

CO5: Illustrate the design of intersection and pavements (L2)

UNIT –I **(10 Lectures)**

Highway Development and Planning: Highway development in India – Necessity for Highway Planning- Road Development Plans- Road Development Process (feasibility, prioritization, detailed project report)- Classification of Roads- Road Network Patterns – Highway Alignment and influencing Factors – Engineering Surveys

Learning outcomes:

At the end of the unit, the student will be able to

1. illustrate the importance of highway development (L2)
2. classify highways based on field conditions and alignment (L2)
3. explain various engineering surveys for highway alignment (L2)

UNIT –II **(10 Lectures)**

Highway Materials: Highway Materials- Soil, Aggregate and Bitumen –Tests on Aggregates– Aggregate properties and their importance. Tests on Bitumen – Bituminous Concrete – Requirements of design mix – Marshall Method of Bituminous mix design, Introduction of Emulsion & Cutback - Alternative materials

Learning outcomes:

At the end of the unit, the student will be able to

1. illustrate different types of materials used in construction (L2)
2. explain procedures used to test materials (L3)
3. determine the optimum Binder content in mix (L3)

UNIT –III **(10 Lectures)**

Highway Geometric Design: Geometric Design- Design Criteria- Cross Section Elements- Sight Distance - Stopping Sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical Alignment-Gradients- Vertical curves.

Learning outcomes:

At the end of the unit, the student will be able to

1. illustrate different aspects govern highway design (L3)
2. explain various features like sight distance and superelevation (L2)
3. explain vertical and horizontal alignment of highways (L2)

UNIT–IV **(10 Lectures)**

Traffic Engineering and Regulation: Basic Parameters - Traffic Volume Studies- Data Collection and Presentation-Travel Demand Forecasting-speed studies- Data Collection and Presentation- Parking Studies and characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams - Road Traffic

Signs (IRC 67) – Road markings (IRC 35)- Design of Traffic Signals –Webster's Method – Saturation flow – phasing and timing diagrams.

Learning outcomes:

At the end of the unit, the student will be able to

1. identify need and basic parameters of traffic channeling (L2)
2. explain importance of traffic volume and regulation (L2)
3. explain the causes for road accidents (L2)
4. explain the safety features traffic using different methodologies (L2)

UNIT– V **(10 Lectures)**

Intersection Design: Conflicts at Intersections- Channelization –Traffic Islands and Design - Types of Intersections – Rotary Intersection and Design.

Introduction to Pavement Design: Flexible and rigid pavements – Components and Functions – design of Flexible pavement (CBR Method as per IRC 37) –Design of Rigid pavements – Westergaard's stress equations.

Learning outcomes:

At the end of the unit, the student will be able to

1. explain the causes for conflicts at intersections (L2)
2. plan types and positioning of traffic intersections on highway (L2)
3. distinguish flexible and rigid pavements (L2)
4. explain the pavements design using different methods (L2)

Text Books:

1. S.K. Khanna, C.E.G.Justo & A.Veeraraghavan "Highway Engineering", 7th Edition, Nemchand & Bros.,2000.
2. L.R. Kadiyali and Lal, "Principles & Practices of Highway Engineering", 4th Edition, Khanna Publications, 2004.
3. V.N. Vazirani and S.P.Chandra, "Transportation Engineering", Vol. I, 4th Edition, Khanna Publications, 1994.

References:

1. S.P. Bindra, "Highway Engineering", 4th Edition, Dhanpat Rai & Sons,1981
2. L.R. Kadyali, "Traffic Engineering & Transportation Planning", 6th Edition, Khanna Publications, 1997.
3. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications.
4. Relevant IRC codes (IRC 35, 37, 38, 52, 64, 65, 66, 67, 73, 93, 108)
5. Relevant IRC SP codes (IRC SP:23)

Web References:

1. https://nptel.ac.in/courses/105/101/105101087/
2. https://nptel.ac.in/courses/105/105/105105107/