TRANSPORTATION ENGINEERING – I

Course Code: 13CE1122

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Course Educational Objectives:

To develop

- Basic knowledge on various highway developmental engineering surveys and drawings and reports.
- Skill of conducting various tests on bitumen & aggregate.
- Knowledge on designing geometry of highways.
- Knowledge on conducting traffic surveys.
- Knowledge on traffic signs, markings and design of traffic signal.
- Basic knowledge on various intersections.

Course Outcomes:

The student will be able to

- Understand various engineering surveys
- Know what drawings & reports are to be produced
- Understand the procedure of conducting tests on bitumen and aggregate.
- Design geometries like sight distance, super elevation, extra-widening, transition curves and vertical curves.
- Understand the procedure of conducting various traffic surveys and traffic regulations by signboards, markings and signals.
- Understand various types of At-grade & grade separated intersections.

UNIT-I (12 Lectures)

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India– Necessity for Highway Planning-Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT-II (12 Lectures)

HIGHWAY MATERIALS:

Highway Materials- Soil, Aggregate and Bitumen –Test on Aggregate – Aggregate properties and their importance. Tests on Bitumen – Bituminous Concrete – Requirements of design mix – Marshall Method of Bituminous mix design.

UNIT-III (14 Lectures)

HIGHWAY GEOMETRIC DESIGN-I :

Importance of Geometric Design- Design Controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance.

HIGHWAY GEOMETRIC DESIGN-II:

Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical Curves.

UNIT-IV (12 Lectures)

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures-Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

UNIT-V (14 Lectures)

AT GRADE INTERSECTION DESIGN:

Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelisation: Objectives –Traffic Islands and Design Criteria – Rotary - Types.

GRADE SEPARATED INTERSECTION DESIGN:

Types of Grade Separated Intersections- Rotary Intersection – Flyovers, ROB, Cloverleaf (partial, full). Criteria for selection, Advantage, Disadvantages of grade separated intersection.

TEXT BOOKS:

1. S.K.Khanna & C.E.G.Justo, *"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. Dr.L.R.Kadyali, *"Traffic Engineering & Transportation Planning"*, 6th Edition, Khanna publications, 1997.
3. NPTEL Videos
4. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications.