

16CE304 TRANSPORTATION ENGINEERING - I



Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	30	20	42	6	12	3	2

Course Description and Objectives:

This course offers an introduction to transportation and characteristics of road transport, history of highway development, surveys and classification of roads. The main objective of the course is to give knowledge to study on geometric design of highways, to study about traffic characteristics and design of intersections and to know about the pavement materials and design.

Course Outcomes:

The students will be able to:

- understand surveys involved in planning and highway alignment.
- know the design principles of cross section elements, sight distance, horizontal and vertical alignment.
- understand the behaviour of flexible and rigid pavements.
- develop an understanding of various BIS, IRC and ISO standards and to design the highways in conformity with these codes.

SKILLS:

- ✓ *Monitor and maintain road pavements.*
- ✓ *Develop insight for characterization of materials for highways and railways.*
- ✓ *Develop job mix for various types of bituminous constructions such as WMM, SDBC, BC, DBM and BM etc.*
- ✓ *Develop technical skills for pavement construction.*
- ✓ *Implement traffic studies, traffic regulations and control, and intersection design.*

ACTIVITIES:

- *Characterize the pavement materials.*
- *Perform quality control tests on pavements and pavement materials.*
- *Prepare the testing reports related to highway engineering works.*
- *Design a pavement using KENPAVE software.*

UNIT - 1**L-9**

HIGHWAY DEVELOPMENT IN INDIA: Brief Introduction, Jayakar Committee recommendations, Classification of roads, Highway planning in India.

HIGHWAY ALIGNMENT: Factors controlling alignment, Engineering surveys, Drawing and report.

UNIT - 2**L-9**

HIGHWAY GEOMETRIC DESIGN: Highway cross-section elements, Sight distance, Design of horizontal alignment, Design of vertical alignment.

PAVEMENT MATERIALS AND CHARACTERIZATION: IS Soil classification, CBR tests, Plate bearing tests, Stone aggregates, Bitumen materials, Paving mixes.

UNIT - 3**L-9**

DESIGN OF FLEXIBLE PAVEMENTS: Design factors of flexible pavement, Design of flexible pavements, Group index method, CBR method, IRC-37 recommendations.

DESIGN OF RIGID PAVEMENTS: Design factors of rigid pavement, Design of rigid pavements, Westergard's stress equation for wheel loads, IRC recommendations.

UNIT - 4**L-9**

TRAFFIC ENGINEERING: Basic parameters of traffic volume, Speed and density, Traffic volume Studies, Data collection and presentation, 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 - 5**L-9**

INTERSECTION DESIGN: Types of intersections, Conflicts at intersections, Types of at grade intersections, Channelization: Objectives, Traffic islands and design criteria, Types of grade separated intersections, Rotary intersection, Concept of rotary and design criteria, Advantages and disadvantages of rotary intersection.

HIGHWAY CAPACITY: Importance of highway capacity, Passenger car units (PCUs), Capacity of uninterrupted flow conditions in the HCM manual (1965), Level of service in HCM manual, Capacity of urban streets, Capacity of signalized intersections.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

Total hours: 30

Tests on Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angeles abrasion test.
4. Deval's attrition value test.
5. Shape test: a) Flakiness index test b) Elongation index test c) Angularity number test .
6. Specific gravity Test.

Tests on Bituminous Materials

7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

Test on Bituminous Mixes

14. Marshall stability test.

Test on Soil Sub-grade

15. California bearing ratio test

TEXT BOOKS:

1. S. K. Khanna and C. E. G. Justo, "Highway Engineering", Nemchand and Brothers, Roorkee, 2002
2. L. R. Kadiyali, "Traffic Engineering and Transport planning", Khanna Publishers, 2011.

REFERENCE BOOKS:

1. Partha Chakroborty and Aminesh Das "Principles of Transportation Engineering", Prentice Hall of India, New Delhi. 2009
2. L. R. Kadiyali and Lal, "Highway Engineering Design", Khanna Publications, 2006.