

3/4 B.Tech. FIFTH SEMESTER

CE5T5

TRANSPORTATION ENGINEERING – I

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Pre-requisites: Building Materials, Concrete technology

Learning objectives:

- To know about highway planning, alignment and route selection
- To design the geometric elements of highways and highway pavements
- To study about highway materials and construction procedure of various types of pavements

Course outcomes:

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

1. Comprehend the highway development and planning in India
2. Perform geometric design of highway alignment and management of traffic
3. Design traffic intersection and choose material for highway
4. Deal with the design procedures of flexible and rigid pavements
5. Understand the constructional and maintenance issues related to highways

UNIT I

HIGHWAY DEVELOPMENT

Highway development in India–Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

HIGHWAY PLANNING

Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Planning Surveys.

UNIT – II

HIGHWAY GEOMETRIC DESIGN

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

TRAFFIC ENGINEERING AND MANAGEMENT

Basic Parameters of Traffic- Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation- Speed studies- Data Collection and Presentation- Parking Studies - Road Accidents- Causes and Preventive measures - Road Traffic Signs – Types – Road markings- Need for Road Markings- Types of Road Markings.

UNIT – III

INTERSECTION DESIGN

Types of Intersections – Types of At-Grade Intersections- Channelization: Objectives – Traffic Islands and Design criteria- Design of Traffic Signals – Webster Method – IRC Method. Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

HIGHWAY MATERIALS

Subgrade soil: classification – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

UNIT – IV

DESIGN OF FLEXIBLE PAVEMENTS

Objects & Requirements of pavements – Types – Functions of pavement components – Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method

DESIGN OF RIGID PAVEMENTS

Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of Joints – IRC method – Continuously Reinforced Cement Concrete Pavements

UNIT – V

HIGHWAY CONSTRUCTION

Types of Highway Construction – Earthwork – Proportion of Sub grade – Construction of Earth Roads – Construction of Gravel Roads – Construction of Water Bound Macadam Roads – Construction of Bituminous Pavements – Construction of Cement Concrete Pavements.

ADVANCES IN HIGHWAY CONSTRUCTION

Soil stabilisation, Soil-Cement Stabilisation, Soil-Lime Stabilisation, Specific equipments for road construction.

Learning resources:

Text books:

1. Highway Engineering, (9th edition) by Khanna, S.K. and Justo, C.E.G., Nem Chand Bros, Roorkee, 2010.
2. Traffic Engineering and Transportation Planning, (7th edition) by Kadiyali, L.R., Khanna Publishers, New Delhi, 2010.
3. Specifications for Roads and Bridges - Manual for Maintenance of roads, Most publications, 1976.

Reference books:

1. Fundamentals of Transportation Engineering, (3rd edition) by Papacostas, C.S., Prentice Hall of India Pvt.Ltd, New Delhi, 2009.
2. Principles of Highway Engineering by Kadiyali, L.R., Khanna Publishers, New Delhi, 2012.
3. Traffic Planning and Design by Saxena, Dhanpat Rai Publishers, New Delhi, 2010.
4. Transportation Engineering - An Introduction, (3rd edition) by Jotin Khisty. C, Prentice Hall, Englewood Cliffs, New Jersey, 2012.

e-learning resources:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>

IS CODE: IRC -37 – 2001 & IRC – 58 - 2002

These codes are permitted in the examination.