

CIPC3002 TRANSPORTATION ENGINEERING (3-0-0)

Course objectives

- To acquaint about different transportation systems and about their planning
- To conversant with road alignment and various parameters required for road geometric design
- To acquire knowledge on traffic studies of data collection procedures, analysis, control measures, capacity and service quality assessment
- To familiar with different types of material used for road construction and their quality assurance

Module-I: (06 Hrs.)

Course objectives

Transportation System, Modes of transportation – their importance & limitation, Historical Development of road construction. Highway Development & Planning in India: Classification of roads and road patterns, Highway alignment: Requirements, factors controlling alignment & Engineering surveys for Highway alignment.

Module-II: (08 Hrs.)

Geometric Design of Highways: Cross-sectional elements, Sight Distances, Horizontal alignments: Horizontal Curves, Super elevation design, Attainment of Super elevation, Radius of horizontal Curve, Extra Widening, Transition Curve and Setback Distance. Vertical alignments- Gradients, Types and Length of Vertical Curves, Grade Compensation on Horizontal Curve.

Module-III: (08 Hrs.)

Traffic Engineering: Traffic Studies- Volume studies, Speed Studies, OD Studies, Capacity Studies and Level of service, Peak hour factor, parking study, accident study and analysis, Statistical analysis of traffic data, Microscopic and macroscopic parameters of traffic flow, fundamental relationships, Operations and Traffic Control devices, Signal design by Webster's method. Types of intersections and channelization.

Module-IV: (08 Hrs.)

Highway Pavements materials: Aggregate - desirable properties & quality control tests of Aggregates, Bitumen-Types, Source, desirable properties & quality control tests of bitumen. CBR Test of Soil, Design of bituminous paving mixes by Marshall Method. Highway Pavement Design: Requirements, types & Design Factors. Design of flexible pavement using IRC: 37, Design of rigid pavements using IRC: 58, Stress analysis, Design of Joints in Rigid Pavement

Module-V: (04 Hrs.)

Economic aspects and analysis: Economic analysis- Depreciation methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis-Energy efficient motors
Computation of Economic aspects: Calculation of simple payback method, net present worth method-Power factor correction, lighting-Applications of life cycle costing analysis, return on investment.

Course Outcomes

After successfully studying this course, students will able to:

- CO1: Understand the basic concept of road transport and road cross-sectional elements.
- CO2: Carry out detailed studies on horizontal and vertical alignment geometric design of roadways
- CO3: Understand basics of traffic engineering, estimate capacity and level of service of roadways and intersections
- CO4: Apply the concept of testing on subgrade soil, road aggregates, and bitumen used for mix design and structural design of flexible pavement in the field.

Books:

- S. K. Khanna, C. E. G. Justo, A. Veeraragavan, Highway Engineering, Nem chand Bros, Roorkee, 10th edition, 2014.
- S.C. Saxena, Textbook of highway and traffic engineering, CBS Publication, 2020
- P. Chakraborty & A. Das, Principles of Transportation Engineering, PHI Publication, 2nd reprint 2005.
- L. R. Kadiyali, Traffic Engineering and Transport Planning, Khanna Publications, 7th edition, New Delhi, 2008.
- Karen K. Dixon Paul H. Wright, Highway Engineering, Wiley Publications, 7th edition,
- Yang H. Huang, Pavement Analysis and Design, Pearson, 2nd edition, 2008.