3/4 B.Tech. SIXTH SEMESTER

CE6T5 TRANSPORTATION ENGINEERING – II Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

- To know about railway planning and design
- To study railway track construction maintenance and operation
- To study different modes of transport
- To know about the fundamental of airways, harbor and docks

Learning outcomes:

At the end of course the student will be able to

- Understand about the components and design of railway track and signaling.
- Understanding about the airport planning and layout, runway design and specifications for runway.
- Insight into the layout and facilities in docks and harbours.

UNIT-I
TRANSPORTATION SYSTEMS:
Role of railways in transportation-Comparison of railway and highway transportation-Development of railway systems with particular reference to India-Classification of railways.

RAILWAY TRACK:
Permanent way: Gauges in Railway track-Railway track cross-sections-Coning of wheels.

UNIT-II
RAILS & RAIL JOINTS:
Functions of rails-Requirements of rails-Types of rails sections-Standard rail sections-Length of rails-Rail failures-Wear on rails. Requirements of an ideal joint-Types of rail joints-Welding of rails.

SLEEPERS:
Functions of sleepers-Requirements of sleepers-Classification of Sleepers-Timber sleepers, Metal sleepers & Concrete sleepers-Comparison of different types of sleepers.

FISH PLATES:
Fish plates-section of fish plates-failure of fish plates.

BALLAST:
Functions and requirements of ballast-Types of ballast-Renewal of ballast.

UNIT-III
GEOMETRIC DESIGN OF TRACK:

Necessity-Gradients & Gradient Compensation-Elements of horizontal alignment-Super elevation; Cant deficiency and cant excess- Negative Super elevation-Length of Transition Curve- Length of vertical curve.

POINTS AND CROSSINGS:
Functions of components of turnout- Crossings.

UNIT-IV
STATIONS AND YARDS:
Site selection for railway station- Requirements of railway station- Classifications- Station yards- Level crossing.

SIGNALLING:
Objects of signaling - Classification of signals - Controlling- absolute block system. Automatic block system Standards of inter locking.

UNIT-V
AIRPORT PLANNING AND DESIGN:
Introduction, Development of air transportation system with particular reference to India. Aero plane components- Air–craft characteristics.

AIRPORT PLANNING AND LAYOUT:
Selection of site; Apron-Hanger-Typical airport layouts-Airport marking-Airport lighting-Drainage systems.

UNIT-VI
AIRPORT OBSTRUCTION:
Zoning laws-Classification of obstructions-Imaginary surfaces-Approach zone-Turning zone.

RUNWAY DESIGN:
Runway orientation-Basic runway length-Corrections for elevation-Temperature and gradient-Runway geometric design.

SPECIFICATIONS FOR STRUCTURAL DESIGN OF AIRPORT PAVEMENTS:
Design factors methods for flexible and rigid pavements-LCN system of pavement design.

UNIT-VII
DOCKS AND HARBOUR ENGINEERING :
Introduction, Types of water transportation-Economics and advantages of water transportation

UNIT-VIII
PLANNING AND DESIGN OF PORT FACILITIES:
General layout and design considerations-Pier and wharf structures-Fender systems-Transit sheds and Apron-Container ports-Docks-Dredging-Light Houses.

Learning resources

Text books:
1. Railway Engineering by Saxena, S.C. and Arora S., Dhanpat Rai & Sons.

2. Airport Planning and Design, (6th edition) by Khanna, S. K. and Arora, M. G. Nemchand and Bros, Roorkee, 1999.
3. Dock and Harbour engineering by Oza H.P. and Oza G., Anand Chartor Publishing House Pvt , Gujarat, 2010.

Reference books:

1. Railway Engineering by Agarwal M.M., Prabha & Co, New Delhi, 2012.
2. Airport Engineering by Rao G.V., Tata Mc Graw Hill, New Delhi, 1992.