

## CIPE3004 ADVANCED TRANSPORTATION ENGINEERING (3-0-0)

### Course objective

- To provide understanding of railway infrastructure and their components.
- To identify the factors governing design of railway tracks and associated components.
- To apply principles of efficiency and safety in the layout of runways, terminals, and other airport components.
- To develop knowledge about maritime facilities for cargo/passenger handling

### Module-I

History of Indian Railways, Railway track & Component- Permanent Way, Gauge, Track Structure, rails, rail joints, Wear and other defects in rail, creep of rail, Coning of wheels Sleepers- Function, Requirements and Classification, Sleeper Density. Ballast- Function, Requirements, Different materials used for ballast, Depth of ballast Cushion.

### Module-II

Traction, tractive effort and hauling capacity. Geometric design- Alignment, horizontal curves, super elevation, equilibrium cant and cant deficiency, Gradients and grade compensation, vertical curves. Point and Crossing-Turnout, Design of simple turn out, Crossing, various types of track junction and their configurations. Signalling and interlocking: Objective and Classification, Control. Interlocking-Purpose, Principle and Methods. Train Control System.

### Module-III

Air Transport Development: Aircraft characteristics, Airport site selection, Imaginary surfaces. Airport components: orientation and configuration, Basic runway length and corrections, Taxiway and Exit taxiway, holding aprons. Hangar, Terminal building. Visual Aids and Air Traffic Control: Airport making and lighting, Instrumental landing systems and Air navigation aids. Bridge Engineering: Terminology, Types and Site Selection.

### Module-IV

Harbour Engineering: Break Waters, Harbour related terminology, Type of harbours, Site selection, accessibility, size and shape of harbour, Navigational aids: Fixed and Floating Signals, lighthouse, Beacons, Buoys, Fog Signals, Wharves and Jetties – Types – Materials of Construction.

### Course outcomes

After successfully studying this course, students will able to:

- Understand the basic concepts of railway and airport Engineering
- Know the concept of operation and maintenance related to railway engineering
- Have knowledge about airport components, planning, and design as per Indian standards
- Understand efficient maritime facilities for cargo/passenger handling

### Books:

1. S.C. Saxena and S.P. Arora, Textbook of Railway Engineering, Dhanpat Rai Publication
2. S. Chandra & M.M. Agarwal, Railway Engineering, Oxford publication, Second edition
3. H. P. Oza, G.H. Oza, Dock & Harbour Engineering, Charotar Publishing House Pvt.Ltd,7<sup>th</sup> edition
4. R. Srinivasan, Harbour Dock and Tunnel Engineering,Charotar Publishing House Pvt. Ltd.28<sup>th</sup> Edition
5. B.L. Gupta & A. Gupta, Roads, Railways, Bridges, Tunnels & Harbour Dock, Standard Publishers Distributors
6. S.C. Rangwala, Airport Engineering,Charotar Publishing House Pvt. Ltd.,14<sup>th</sup> edition
7. S.C. Saxena, Airport Engineering Planning and Design, CBS Publication,
8. P. Nagarajan, Design of Bridges, Wiley India Pvt. Limited, first edition