TRANSPORTATION ENGINEERING – II

Lectures : 4 Periods/Week Sessional marks : 40
Semester End Exam. : 3 Hours Semester End Exam. marks : 60
Credits : 4

Course Objectives:

- To understand the role of railways in transportation.
- To understand various parts of a railway track. And Introduction to geometric design of a railway section.
- To emphasize on various requirements of stations
- It will present the concept airport planning, various obstruction runway and structural design of airport pavement.
- Emphasize on various facilities of a harbor and port and various controlling devices of an harbour

Course Outcomes:

- An ability to understand the importance of railway sector
- An ability to judge and select proper material and component for a railway track and to understand and deign various component of a track.
- For basic knowledge of a railway station.
- Better planning of various amenities of an airport and planning and also serves as a basic for air port pavement design and runway design.
- Creates a basic introduction of various features of a harbor and a port to enable for proper design and maintenance of various amenities.

UNIT - I
RAILWAY ENGINEERING

Introduction

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.

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 – II

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.
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. Standards of inter locking

UNIT – III
AIRPORT PLANNING AND DESIGN

Introduction
Development of air transportation system with particular reference to India; Aeroplane components; Air–craft characteristics.

Airport planning and layout
Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems.
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 – IV
DOCKS AND HARBOUR ENGINEERING

Introduction
Types of water transportation; Economics and advantages of water transportation.
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.

NOTE
Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
UNIT I & II: Railway Engineering by S.C.Saxena and S.Arora , Dhanpat Rai & sons.
UNITIII & IV: Airport Planning and Design by S. K. Khanna & M. G. Arora, 6th Edition, Nemchand & Bros, 1999.

REFERENCE BOOKS
1. Railway Engineering by M.M.Agarwal and Satish Chandra, Oxford University Press, 2007.
2. Airport Engineering by G.V.Rao; Tata Mc Graw Hill, 1991.

WEB REFERENCES:
For videos refer to www.iitm.ac.in
www.iricen.gov.in