Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE407	TRANSPORTATION ENGINEERING - II	3-0-0-3	2016

Prerequisite : CE308 Transportation Engg.-I

Course Objectives:

- To set a solid and firm foundation in Railway engineering, including the history development, modern trends, maintenance, geometric design and safety of railways.
- To introduce dock, harbour and tunneling

Syllabus :

Introduction to railways in India and its evolution, modern technologies, geometric design of tracks, railway operation control, maintenance and an introduction to the railway accidents. Alignment, surveying, driving, ventilation and drainage of tunnels and types of harbours and docks.

Course Outcome:

- This course will enable students to gain knowledge in railway and water transportation.

Text Books:

1. Mundrey J. S, Railway Track Engineering, Tata McGraw Hill, 2009
2. Rangawala, S.C. , Railway Engineering, Charotor Publishing House
3. Rao G. V, Principles of Transportation and Highway Engineering, Tata McGrawHill, 1996
4. Srinivasan,R., Harbour, Dock & Tunnel Engineering, Charotor Publishing House, 28e, 2016

References:

1. Bindra, S.P., A course in Docks and Harbour Engineering, Dhanpat Rai& Sons
2. Chandra, S. and Agarwal, M.M. ,Railway Engineering, Oxford University Press, New Delhi, 2008
3. Saxena, S. C and Arora, S. P, Railway Engineering, Dhanpat Rai& Sons, 7e, 2010
4. Subhash C. Saxena, Railway Engineering, Dhanpat Rai& Sons

Module	Contents	Hours	Sem. Exam Marks %
I	**Introduction to Railways in India**: Role of Indian Railways in National Development – Railways for Urban Transportation – Modern developments- LRT & MRTS, tube railways, high speed tracks. Alignment- basic requirements and factors affecting selection, Component parts of a railway track - requirements and functions - Typical cross-section	7	15
II	**Permanent Way**: Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks . Sleepers – Functions, Materials, Density , Ballast less Tracks. Geometric design of railway track: Horizontal curves, radius – super	7	15

	elevation -cant deficiency - transition curves - gradients - different types - Compensation of gradients.		
FIRST INTERNAL EXAMINATION			
III	**Railway operation and control:** Points and Crossings – Design features of a turnout – Details of station yards and marshalling yards – Signaling, interlocking of signals and points - Principles of track circuiting - Control systems of train movements – ATC, CTC – track circuiting	**6**	**15**
IV	**Maintenance**:- Introduction to track maintenance, Items of track maintenance, packing and over hauling, screening **Railway accidents:** Human and system contribution to catastrophic accidents, Human Factors in Transport Safety.	**6**	**15**
SECOND INTERNAL EXAMINATION			
V	**Tunnel Engineering: Tunnel** - sections - classification - tunnel surveying -alignment, transferring centre, grade into tunnel – tunnel driving procedure - shield method of tunneling, compressed air method, tunnel boring machine, Tunnel lining, ventilation - lighting and drainage of tunnels.	**8**	**20**
VI	**Harbours**– classification, features, requirements, winds and waves in the location and design of harbours. **Break waters** - necessity and functions, classification, alignment, design principles, forces acting on break water – construction, general study of quays, piers, wharves, jetties, transit sheds and warehouses - navigational aids - light houses, signals - types - Moorings **Docks** – Functions and types - dry docks, wet docks – form and arrangement of basins and docks	**8**	**20**
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks :100 **Exam Duration: 3 Hrs**

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2 Each question can have a maximum of 4 subdivisions (a,b,c,d)