RAILWAY ENGINEERING
(Professional Elective- II)

Course Code: 20CE1156	**L**	**T**	**P**	**C**
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Pre-requisites: Surveying and Geomatics, Transportation Engineering

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Describe the railway zoning, gauges and wheels (L2)
CO2: Explain the components of permanent way (L2)
CO3: Design geometry and turnout of a railway track (L3)
CO4: Explain junction and signals of track (L2)
CO5: Illustrate the concepts of high speed tracks, station and yards of railways (L2)

UNIT-I **(10 Lectures)**

INTRODUCTION TO RAILWAY ENGINEERING:

Importance of Transportation-History of Indian Railways-Zoning System-Comparison with road transport.

GAUGES & PERMANENT WAY:

Gauges-Classification on Indian Railways-Problems of Multi-Gauge System-Unigauge Policy on Indian railways -Specific Gauge Permanent Way; Coning of Wheels: Wheel and axle arrangement-Track Capacity-Coning of Wheels-Adzing of Sleepers

Learning outcomes:

At the end of the unit, the student will be able to

1. Explain about various aspects of gauges (L2)
2. Discuss about the wheel and axle arrangement (L2)
3. Explain about coning of wheels (L2)

UNIT-II **(10 Lectures)**

RAILS:

Functions of Rails-Types-Selection-Length of rail -Tests on rails-Rail Deformation & Defects; Creep in Rails -Effect of creep-Theories of creep-Creep Indicator-Methods to reduce creep; Wear & Failures in Rails: Wear in rails-Classification of wear-Effects of rail wear Permissible Limits-Remedial Measures; Jointed or Welded Rails: Rail Joints- Welding of Rails-Advantages of Welded rails-Short Welded Rails-Long Welded Rails

SLEEPERS, BALLAST & FASTENING:

Sleeper: Functions-Requirements-Types-Sleeper Density-Spacing Ballast: Definition-Requirements-Types-Ballast Cushion Specifications, Rail Fastening- Fastening Types.

Learning outcomes:

At the end of the unit, the student will be able to

1. Explain various functions of rails (L2)
2. Discuss about theories of creep (L2)
3. Discuss about sleepers, ballast and types of fastenings (L2)

UNIT-III **(10 Lectures)**

GEOMETRIC DESIGN:

Necessity of geometric design -Alignment, Horizontal Profile-Vertical Profile-Speed on track-Selection Horizontal Curve and Super elevation: Curves-Degree of curve-field setting-Super Elevation Design-Negative Super elevation; Speeds on Track: Speed and its effect-

Safe Speed-Equilibrium Speed-Maximum permissible speed Computation of speed and cant; Transition Curve Widening of track Vertical Curve-Summit Curve-Valley Curve Gradients

TURNOUT:
Turnout-Types-Components of a turnout-Points & Switches; Crossing Working of a turnout-Angle of Crossing and its measurement-Design of turnout

Learning outcomes:
At the end of the unit, the student will be able to
1. Explain various aspects of curves and super elevation (L2)
2. Discuss about the transition curve (L2)
3. Design a turnout (L3)

UNIT-IV **(10 Lectures)**

TRACK JUNCTIONS AND DESIGNS: Track Junctions/Crossover-Design
SIGNALS: Signals-Objectives-Classification; Train Control Systems: Basic Objectives-Non-Block & Block System,
INTERLOCKING OF TRACK: Interlocking-Principles-Methods-Devices

Learning outcomes:
At the end of the unit, the student will be able to
1. Explain various aspects of track junctions (L2)
2. Discuss about the objectives of train control systems (L2)
3. Discuss about the interlocking of track (L2)

UNIT-V **(10 Lectures)**
HIGH SPEED TRACKS
High Speed Tracks-Traction-Modernization of Track-Effects of High Speed-Limitations of Super High Speed-Concepts of Super High Speed
RAILWAY STATION AND YARDS:
Station-Purpose-Selection of Site-Features of railway station -Types of station; Yard-Types

Learning outcomes:
At the end of the unit, the student will be able to
1. Explain various aspects of high speed tracks (L2)
2. Discuss about the purpose and features of railway station (L2)
3. Explain about the station yards (L2)

Text Books:

1. Rangwala. S.C, "Railway Engineering", 27rd Edition, Charoatar Publishing House Pvt. Ltd, 2017.
2. Chandola, S.P. "Railway Engineering - A Text book of Transportation Engineering", S. Chand & Co. Ltd. 2016.
3. Satish Chandra, Agarwal M. M, "Railway Engineering", 2nd Edition, Oxford University Press, 2013.

References:

1. Saxena S.C and Arora S.P, "Railway Engineering", Dhanpat Rai Publications, 8th Edition, 2017.
2. Mundrey J.S, "Railway Track Engineering", McGraw Hill Publications, 4th Edition, 2010.
3. RajatRastogi," Transportation Engineering-II", NPTEL Videos.