

No	Information on Transportation Engineering	
1.	Unit Name: Transportation Engineering III	
2.	Unit Code: CE 41017	
3.	Classification : Engineering Subject	
4.	Credit Hours : 2	
	2 for lecture: (2 hours ×15 weeks)	
5.	Semester/ Year Offered: 1/3	
6.	Pre-requisite (if any):	
7.	Mode of Delivery : Lecture and Assignment	
8.	Assessment System and Breakdown of Marks::	
	Tutorial	20%
	Assignment	10%
	Midterm examination	70%
	Total	100%
9.	Academic Staff Teaching Unit:	
10.	<p>Objective of Unit:</p> <p>The objective of this course is to</p> <ul style="list-style-type: none"> - Civil engineering students who discussed and applied the railways track construction and maintenance. 	
11.	<p>Learning Outcome of Unit:</p> <p>On completion of this unit, students shall be able to:</p> <ul style="list-style-type: none"> a) Discuss the railway track construction components b) Calculate rail track stresses, track curves and superelevation c) Discuss railway track maintenance system 	
12.	<p>Synopsis of Unit:</p> <p>The unit is intended to discuss fundamental concepts and modern technological developments.</p>	
13.	<p>Topic 1 History and General Features of Indian Railways</p> <ul style="list-style-type: none"> - Developments on Indian Railways - Different Modes of Transport - Classification of Railway lines in India - General Features of Indian Railways <p>Topic 2 Railway Track Gauge</p> <ul style="list-style-type: none"> - Gauges on World Railways - Different Gauges on Indian Railways - Choice of Gauge - Problems Caused by Multi-gauge System 	

- Loading Gauge
- Construction Gauge

Topic 3 Alignment of Railway Lines

- Importance of Good Alignment
- Basic Requirements of an ideal Alignment
- Selection of a Good Alignment
- Mountain Railways
- Rack Railways

Topic 4 Track and Track Stresses

- Requirements of a Good Track
- Maintenance of Permanent Way
- Track as an Elastic Structure
- Forces Acting on the Track
- Pressure on Formation or Subgrade

Topic 5 Rails

- Function of Rails
- Types of Rails
- Requirements of an Ideal Rail Section
- Rail Wear
- Rail Failure

Topic 6 Sleepers

- Functions and Requirements of Sleepers
- Sleeper Density and Spacing of Sleepers
- Types of Sleeper
- Wooden Sleeper
- Steel Trough Sleepers
- Cast Iron Sleepers
- Concrete Sleepers

Topic 7 Ballast

- Functions of Ballast
- Types of Ballast
- Sizes of Ballast
- Requirements of a Good Ballast
- Design of Ballast Section
- Specifications for Track Ballast

Topic 8 Subgrade and Formation

- General Description of Formation
- Execution of Earthwork
- Blanket and Blanketing Material
- Failure of Railway Embankment

Topic 9 Track Fittings and Fastenings

- Rail-to-rail Fastenings
- Fittings for Wooden Sleepers
- Fittings of Steel Trough Sleepers
- Fittings of CI Sleepers

Topic 10 Creep of Rails

- Theories for the Development of Creep
- Causes of Creep
- Effects of Creep
- Measurement of Creep
- Adjustment of Creep

Topic 11 Geometric Design of Track

- Necessity for Geometric Design
- Details of Geometric Design of Track
- Gradients
- Grade Compensation on Curves

Topic 12 Curves and Superelevation

- Circular Curves
- Superelevation
- Safe Speed on Curves
- Transition Curve
- Compound Curve
- Reverse Curve
- Extra Clearance on Curve
- Widening of Gauge on Curves
- Vertical Curves

Topic 13 Points and Crossings

- Important Terms
- Switches
- Design of Tongue Rails

	<ul style="list-style-type: none"> - Crossing - Number and Angle of Crossing - Reconditioning of Worn-out Crossings - Turnouts <p>Topic 14 Track Junctions and Simple Track Layouts</p> <ul style="list-style-type: none"> - Turnout of Similar Flexure - Turnout of Contrary Flexure - Symmetrical Split - Three-throw Switch - Double Turnout - Crossover Between Two Parallel Tracks with an Intermediate Straight Length - Diamond Crossing <p>Topic 15 Rail Joints and Welding of Rails</p> <ul style="list-style-type: none"> - Effects of a Rail Joint - Requirements of an Ideal Rail Joint - Types of Rail Joints - Welding a Rail Joint <p>Topic 16 Modern Welded Railway Track</p> <ul style="list-style-type: none"> - Development of Welded Rails - Theory of Long-welded Rails - Short-welded Rails - Continuous Welded Rails <p>Topic 17 Track Maintenance</p> <ul style="list-style-type: none"> - Necessity and Advantages of Track Maintenance - Essentials of Track Maintenance - Measuring Equipment and Maintenance Tools for Tracks - Maintenance of Rail Surface - Protection of Track for Engineering Work
14.	<p>Main Reference:</p> <p>Satish Chandra, M.M. Agarwal 2nd edition, Railway Engineering.</p>

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