

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)
SEMESTER	5
COURSE TITLE	RAILWAY BRIDGE AND TUNNEL ENGINEERING
COURSE CODE	01CI0512
COURSE CREDITS	3

Objective:

- 1 To learn different types of load acting on truss and arch bridges in accordance to codal provisions.
- 2 To understand fundamentals of planning and design of railway cross section.
- 3 To learn different types of load acting on truss and arch bridges in accordance to codal provisions.
- 4 To explore the fundamentals of methods of tunneling.

Course Outcomes: After completion of this course, student will be able to:

- 1 Identify the components of railway track: materials, sizes, function and importance.
- 2 Compare different methods of tunnelling.
- 3 Differentiate the theories, principles, and practices involved in bridge construction.
- 4 Examine the roles of components in diverging, merging, crossing, signaling and interlocking systems of railway tracks.
- 5 Design railway tracks using geometric principles for alignment, gradients, and curvature.

Pre-requisite of course:..

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Railway Engineering Introduction: Development of railways in India, Permanent way and railway track components, different gauges in India, Rail: Function and types of rails, rail sections, conning of wheels, defects in rails, creep of rails, rail joints and welding of rails, Sleepers: Types of sleepers, spacing of sleepers and sleeper density, rail fixtures and fastenings, ballast, Geometric design of railway track: Gradients, grade compensation, speed of trains on curves, super elevation, cant deficiency, negative super elevation, curves, widening on curves, Points and crossings: Turnouts, switches, crossings, track junctions, and its types: splits, diamond, gauntlet, scissor crossovers, Railway stations & yards: Requirements, facilities, classifications, platforms, and railway yards: their type, required equipment's in yards., Signaling and control system: Objectives, classification, interlocking of signals and points	20
2	Bridge Engineering Introduction: Classification of bridges, investigations and planning, choice and type of bridges, components of bridge, factors affecting site selection, Bridge hydrology: Design discharge, water way, afflux, scour depth, economical span, general design specifications, loads acting on bridges, live load specifications for road bridges as per IRC, Methods of erection of different types of bridges: River training works and maintenance of bridges. Testing and strengthening of bridges	16
3	Tunnel Engineering Introduction: Necessity and advantages of a tunnel, classification of tunnels, size and shape of a tunnel, alignment of a tunnel, portals and shafts, Methods of Tunneling: Tunneling in hard rock and soft ground, Mucking, lighting and ventilation in tunnel, dust control and drainage of tunnels.	6
Total Hours		42

Textbook :

- 1 A Text Book of Railway Engineering, S.C. Saxena and S. P. Arora, Dhanpat Rai & Sons, New Delhi, 2018

References:

- 1 Railway Engineering, Railway Engineering, Satish Chandra and M.M. Agrawal, Oxford University Press, New Delhi, 2019
- 2 Principles and Practice of Bridge Engineering, Principles and Practice of Bridge Engineering, S.P. Bindra, Dhanpat Rai & Sons, New Delhi, 2017
- 3 Tunnel Engineering, Tunnel Engineering, S.C. Saxena, Dhanpat Rai & Sons, New Delhi, 2017

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	35.00	30.00	15.00	5.00

Instructional Method:

- 1 At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- 2 Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both
- 3 Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation
- 4 Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
- 5 Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%
- 6 Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation

Supplementary Resources:

- 1 <https://www.edx.org/learn/railway-engineering>
- 2 <https://www.aboutcivil.org/railway-engineering>
- 3 <https://www.aboutcivil.org/bridges.html>
- 4 <https://www.britannica.com/technology/bridge-engineering>
- 5 <https://theconstructor.org/construction/tunnel-engineering-construction/15720/>
- 6 <https://vincivilworld.com/2021/09/12/tunnel-engineering-definition-study/>