

Branch Name:	CIVIL ENGINEERING
Program Code:	ET106
Course Title:	Railway, Bridge And Tunnel Engineering
Course Code:	2ET1060602T
Pre-requisite Course:	-

Course Objectives:

CO-1: Civil engineers have to play a vital role in the design and construction of railway track and other associated structures for safe and efficient movement of the trains..

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topic	Total Hours	Weight age (%)
01	Railway : Development of railways in India, Permanent way and railway track components, different gauges in India, conning of wheels, function and types of rails, rail sections, defects in rails, creep of rails, rail joints and welding of rails, sleepers –types, spacing and density, rail fixtures and fastenings, ballast, subgrade and embankment.	05	12
02	Geometric design of railway track: gradients, grade compensation, speed of trains on curves, super elevation, cant deficiency, negative super elevation, curves, widening on curves.	05	13
03	Railway traction and track resistance, stresses in railway track–rails, sleepers, ballast. Points and crossings – turnouts, switches, crossings. Track junctions types, splits, diamond, gauntlet, scissor crossovers. Railway stations -requirements, facilities, classifications, platforms, loops, sidings. Railway yards –types, required equipments in yards. Signalling and control system –objectives, classification, Interlocking of signals and points.	06	15
04	Railway track-construction, drainage, maintenance. Recent developments in railways–high speed trains, modernization in track for high speed, Metro rails, Monorail, automation in operation and control. Safety in railways – accidents and remedial measures.	04	10

05	Bridges: Classification of bridges – with respect to construction materials, structural behavior of super structure, span, sub structure, purpose. Temporary and movable bridges. Factors affecting site selection. Various loads/stresses acting on bridges. Bridge hydrology –design discharge, water way, afflux, scour depth, economical span. Bridge components – foundation, piers, abutments, wing wall, approach, bearings, floor, girders, cables, suspenders. Methods of erection of different types of bridges. River training works and maintenance of bridges. Testing and strengthening of bridges. Bridge architect.	14	30
06	Tunnels: Necessity/advantage of a tunnel, Classification of Tunnels, Size and shape of a tunnel, Alignment of a Tunnel, Portals and Shafts, Methods of Tunneling in Hard Rock and Soft ground, Mucking, Lighting and Ventilation in tunnel, Dust control, Drainage of tunnels, Safety in tunnel construction, Advanced construction work in tunnel engineering	08	20

List of Text and Reference Books:

1. Satish Chandra and M.M. Agrawal, Railway Engineering, Oxford University Press, New Delhi
2. S.C. Saxena and S. P. Arora, A Text Book of Railway Engg., Dhanpat Rai & Sons, New Delhi
3. S.C. Rangwala, K.S. Rangwala and P.S. Rangwala, Principles of Railway Engineering, Charotar Publishing House, Anand.
4. S.P. Bindra, Principles and Practice of Bridge Engineering, Dhanpat Rai & Sons, New Delhi
5. S.C. Saxena, Tunnel Engineering, Dhanpat Rai & Sons, New Delhi
6. D.J. Victor, Essential of Bridge Engineering, Oxford & IBH Pub. Co. Ltd. Mumbai

E-Resources:

1. <http://nptel.ac.in/>

Course Learning Outcomes (CLO):

1. Know about railway track components, their materials, size, function and importance
2. Carry out geometric design of railway track
3. Know about various components in diverging, merging and crossings of railway tracks, stations, yards
4. Signaling, interlocking and control systems.
5. Know about requirements of railway track for high speed trains, safety aspects and maintenance.
6. Understand about different types of bridges, their components, loads/stresses acting on bridges,
7. Requirement and function of the components, hydrological design, methods of erection, maintenance of bridges.
8. Understand about importance, types, methods of construction, mucking, ventilation, lining and lighting in Tunnels.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Know about railway track components, their materials, size, function and importance	L-1
CLO2	Carry out geometric design of railway track	L-6
CLO3	Know about various components in diverging, merging and crossings of railway tracks, stations, yards	L-5
CLO4	Signaling, interlocking and control systems.	L-3
CLO5	Know about requirements of railway track for high speed trains, safety aspects and maintenance.	L-2
CLO6	Understand about different types of bridges, their components, loads/stresses acting on bridges.	L-4
CLO7	Requirement and function of the components, hydrological design, methods of erection, maintenance of bridges.	L-2
CLO8	Understand about importance, types, methods of construction, mucking, ventilation, lining and lighting in Tunnels.	L-2

L1- Remember, **L2-** Understand, **L3-** Apply, **L4-** Analyze, **L5-** Evaluate, **L6-** Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CLO1	H	M	M	M			M					M	M	M	
CLO2	H	H	M	M			M					M	M	M	M
CLO3	M	H	M	M	M	M	L	L				M	M	M	M
CLO4	M	M	H	M		M	M					M	M	M	M
CLO5	M	H	M	M		M						M	M	M	M
CLO6	M	H	M	M		L							M	M	M
CLO7	M	L	M	M	M							M	M	M	
CLO8	M	M	M	M	L							L	M		M

H: High, **M:** Medium, **L:** Low