3CE04: RAILWAY AND BRIDGE ENGINEERING
CREDITS - 3 (LTP: 2,1,0)

Course Objective:

1. Impart basic knowledge of railway track components and their functions.
2. Introduce geometric design, points and crossings, track resistances, signaling and control system.
3. Learn advancement in Railway stations, yards, modernization of railways & High Speed Trains.
4. Acquaint with bridge terminology, types of bridges, bridge hydrology and river training works.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Tutorial Marks		
L	T	P	C	ESE	CE	ESE	CE	100
2	1	0	3	30	20	20	30	

Course Content:

Unit No.	Topics	Teaching Hours
1	**Railway Engineering in General** Permanent way and railway track components, different gauges in India, conning of wheels, function and types of rails, creep of rails, sleepers – types, spacing and density, rail fixtures and fastenings, ballast.	05
2	**Geometric design of railway track** Gradients, grade compensation, speed of trains on curves, super elevation, cant deficiency, negative super elevation, curves, widening on curves. Track Resistances: Railway traction and track resistance, stresses in railway tracks, sleepers, ballast. Points & Crossings. **Railway stations:** requirements, facilities, classifications, platforms, and types of yards. Modernization of railways- Metro rail.	09
3	**Railway tunnel** Preliminary consideration, surveying, shafts, driving in soft ground, Driving tunnels in soft ground, Mucking, ventilation and dust control and lighting	04
4	**Bridge Engineering** Definition, components of a bridge, importance of bridge, classification of bridges based on structural behavior and materials, Bridge components: superstructure, bridge piers, abutments, wing walls, bridge foundations, bridge joints and bearings. Factors affecting site selection. Types of loads. Engineering feasibility studies for bridges: Need for investigations, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above HFL, afflux, scour depth. (Metro alignment linked with bridge)	06
6	**Methods** Erection of different types of bridges. River training works and maintenance of bridges. Testing and strengthening of bridges**.**	06
	Total	**30**

List of References:

1. Chandra Satish and Agrawal M.M., "*Railway Engineering*", ISBN: 978-0198083535, Oxford University Press, New Delhi.
2. Saxena S.C. and Arora S. P., "*A Text Book of Railway Engineering*", Dhanpat Rai & Sons, New Delhi.
3. Bindra S.P., "*Principles and Practice of Bridge Engineering*", Dhanpat Rai & Sons, New Delhi.
4. Victor D.J., "*Essential of Bridge Engineering*", Oxford & IBH Pub. Co. Ltd. Mumbai.
5. Ponnuswamy S., "*Bridge Engineering*", ISBN: 9780-070656956, Tata McGraw Hill, New Delhi, 2003.
6. IRC Bridge code, Indian railway bridge code, IS 456.IS 800, IS 875
7. Learning Websites: NPTEL Sites

Course Outcomes (COs):

At the end of this course students will be able to

1. Apply the knowledge of railway track components, materials and fixtures and fastenings.
2. Solve problems of railway track geometrics, train resistance, points and crossings, Signaling and control system.
3. Carry out feasibility study of rail tracks.
4. Compute economical spans, hydraulic design of bridge and carry out erection and maintenance of bridge.