

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B Tech Civil Engineering
Course Code:	
Course Title:	Port, Airport and Railway Engineering
Course Type:	Core
Year of Introduction:	2025-2026

L	T	Practical Component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

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

1. apply design requirements for port, airport, and railway infrastructure. (BL3)
2. develop components, protection, and navigational aids for a port. (BL3)
3. analyse the geometric elements, pavement types, and traffic control systems for airports. (BL4)
4. classify railway track components based on the geometric principles applied in their design. (BL4)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Port Planning selection of site and planning, site investigations: hydrographic survey, topographic survey, soil investigations and tidal observations. port components: breakwaters, dry and wet docks, jetties, piers, wharves, fenders, dolphins, trestle, mooring accessories.	08
Unit-II	Dredging, Coastal Protection and Navigational Aids classification, types and choice of dredger, coastal erosion and protection, sea wall, revetment, bulkhead. requirements of signals, fixed navigation structures: lighthouses, beacon lights, floating navigational aids - lightships, buoys, radar.	07
Unit-III	Geometric Design of Airport civil aviation policy, aircraft characteristics, airport classification, runway orientation, length analysis and design, taxiway design, terminal building requirements, terminal configurations, vehicular circulation and parking area.	07
Unit-IV	Airport Pavement Design and Control design factors, flexible pavement, rigid pavement, pavement failures, drainage, maintenance and evaluation, markings, lighting, runway protection surfaces, air traffic control network, air traffic control aids.	08

Unit-V	Components of Railway Track permanent way and its components, rail gauges and their significance, coning of wheels and its impact, rails: types, characteristics, and maintenance, creep of rail and its effects, rail fastenings, sleepers, ballast, points and crossings.	07
Unit-VI	Geometric Design of Railway Track gradients in railway tracks, grade compensation on curves, superelevation and negative superelevation, cant deficiency and excess, permissible speed on tracks.	08

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/References:

- Chandra S. & Agarwal, M.M., *Railway Engineering*. Oxford University Press.
- Ashford, N. J., Mumayiz, S. A. & Wright, P. H., *Airport Engineering Planning, Design, and Development of 21st Century*, Wiley.
- International Civil Aviation Organization, *Aerodrome Design Manuals, Parts I-VI*.
- Khanna, S. K., Arora, M. G. & Jain, S. S., *Airport Planning and Design*, Nem Chand and Bros.
- Srinivasan, R., *Harbour, Dock and Tunnel Engineering*, Charotar Publishing House.
- Bindra, S. P., *A course in Docks and Harbour Engineering*, Dhanpat Rai Publications.
- Saxena, S.C. & Arora, S.P., *A Text Book on Railway Engineering*. Dhanpat Rai Publications.

Suggested List of Experiments: Laboratory work will be based on the above syllabus with a minimum 9 experiments/exercises to be incorporated. The students in a suitable group size will design and perform one experiment as a part of laboratory work.

Sr. No.	Name of Experiments/Exercises	Hours
1.	Determination of crushing value of aggregate	02
2.	Determination of skid resistance of aggregate	04
3.	Determination of thin film oven test of bitumen	04
4.	Determination of specific gravity of bitumen	02
5.	Determination of soundness of aggregate	04
6.	Determination of flakiness and elongation index of aggregate	02
7.	Determination of specific gravity and water absorption of aggregate	04
8.	Determination of flash and fire point of bitumen and	04
9.	Determination of stripping value of aggregate	02