NIRMA UNIVERSITY

Institute:	**Institute of Technology**
Name of Programme:	**B Tech Civil Engineering**
Course Code:	
Course Title:	**Transportation 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 students shall be able to:

1. analyse the fundamental principles of different transportation systems. (BL4)
2. design the geometric elements of roads (BL6)
3. apply knowledge of pavement materials to determine stresses in flexible and rigid pavements. (BL3)
4. select appropriate road construction techniques, integrating economic and intelligent transportation systems (BL5)
5. plan traffic systems using data from traffic studies. (BL6)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Introduction to Transportation Engineering transportation systems and their classifications, road transportation - planning, survey and reports, rail transportation – alignment, components of permanent way, air transportation – layout of airside and landside, water transportation – harbor classification and layout.	08
Unit-II	Geometric Design and Traffic Studies elements of road transportation system and their characteristics, cross-sectional elements of roads, sight distance, design of horizontal alignment, design of vertical alignment, traffic studies, traffic flow parameters, traffic regulation and control, road safety.	10
Unit-III	Pavement Materials and Design Stresses pavement materials - properties, tests, flexible pavements - factors affecting design and performance, stresses in flexible pavements, rigid pavements - factors affecting design and performance, stresses in rigid pavements.	10
Unit-IV	Road Construction and Maintenance earthwork, construction of embankments, specifications of materials, construction methods and field quality control checks for various layers and types of flexible and rigid pavement, introduction, pavement roughness measurement system, pavement distress surveys and evaluation, pavement maintenance management system.	10
Unit-V	Transportation Economics and Intelligent Transportation System economics evaluation of transportation plans, basics of intelligent transportation systems	07

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:

- Chakraborty, P., Das, A. Principles of Transportation Engineering. PHI Learning. Delhi
- Garber, N. J., & Hoel, L. A. (2019). Traffic and highway engineering. Cengage Learning.
- Mannering, F. L., & Washburn, S. S. (2020). Principles Of Highway Engineering And Traffic Analysis. John Wiley & Sons.
- Chandra S., Agarwal, M.M. Railway Engineering. Oxford University Press.
- Saxena, S.C., Arora. S.P. A Text Book on Railway Engineering. Dhanpat Rai Publications.
- Ashford, N., Mumayiz, S., Wright, P.H. Airport Engineering: Planning, Design, and Development of 21st Century Airports. John Wiley & Sons.
- Khanna, S.K., Justo, C.E.G., Veeraragavan, A. Highway Engineering. Nem Chand & Bros. Rookies.
- Kadiyali, L.R. Traffic Engineering and Transport Planning. Khanna Publishers. New Delhi.
- Rangwala, S.C., Rangwala, P.S. Airport Engineering. Charotar Publishing House.
- Srinivasan R. Harbour Dock and Tunnel Engineering. Charotar Publishing House.

Suggested List of Experiments: Laboratory work will be based on the above syllabus with a minimum 10 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 impact value of aggregate	02
2.	Determination of abrasion value of aggregate	02
3.	Determination of penetration and viscosity grade of bitumen	02
4.	Determination of ductility value of bitumen	02
5.	Determination of softening point of bitumen	02
6.	Marshall mix design	04
7.	Traffic studies: volume and spot speed	04
8.	Introduction to Civil 3D Interface and Workspace Navigation	04
9.	Creation and Editing of Surfaces, Alignments, and Profiles	02
10.	Design of Basic Road Corridor and Generation of Plan and Profile Sheets	04