



GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (TRANSPORTATION ENGINEERING) (13)

Master of Engineering

Subject Code: 3731310

Semester – III

Subject Name: TRANSPORTATION FACILITY DESIGN

Type of course: Program Elective - V

Prerequisite: Urban Transportation System Planning and Traffic Engineering

Rationale:

The Indian Government has set ambitious plans for upgrading of the National Highways in a phased manner. It is required to upgrade the knowledge of current practices in design of pavement structures. The objective of the course is to introduce the basic concepts of analysis and design of pavement structure. The current trends in design considering cumulative fatigue damage due to the combined effect of load and pavement temperature in rigid pavement are included in the present study. The study of recent development in design considering fatigue resistant mix and rut resistant mix for improving properties of various bituminous mix are also included. It includes the study of various types of failures of pavement and its remedial measures. It is necessary to reduce the cost of repairs and maintenance. The knowledge of construction techniques of various types of roads is backbone for the students. Various evaluation techniques are also covered in the course.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Design of highways, design of at-grade intersections, design of signalized intersection, design of grade separated intersection, terminal design, and design of facilities for non-motorised transport.	8
2	Terminal Planning & Design: Terminal functions, analysis of terminals, process flow charts of passenger & goods terminals, terminal processing time, waiting time, capacity & level of service concept, study of typical facilities of highway, railway, airport and waterway terminals, concept of inland port.	10
3	Design of Highways: Hierarchy of highway system, functions, design designations, concepts in horizontal &	10



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	vertical alignment, integration, optical design, geometrical standards for mobility & accessibility components, cycle track design, bridge architect, landscaping and safety considerations, evaluation and design of existing geometrics.	
4	Design of Intersections: Review of design of at-grade intersections, signal coordination- graphic methods & computer techniques, grade separated intersections- warrants for selection, different types & geometric standards, spacing & space controls, , ramps & gore area design.	10
5	Pedestrian Facility Design: Footpath, Zebra crossings, Foot over bridge, Under pass, Pedestrian precincts, Pedestrian actuated signals.	7
	TOTAL	45 Hr.

Suggested Specification table with Marks (Theory): (For ME only)

Bloom's Taxonomy for theory marks weightage (%) for cognitive Domain/level

Cognitive Domain	Remembrance	Comprehension	Application	Analysis	Evaluate	Create
Weightage (%)	10	10	20	20	20	20

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna publishers.
2. Salter, R J., Highway Traffic Analysis and Design, ELBS.
3. Edward K. Morlock, Introduction to Transportation Engineering & Planning, International Student Edition, Mc-Graw Hill Book Company, New York.
4. Khanna S.K., Arora M.G., Jain S.S., Airport Planning & Design, Nemchand Bros., Roorkee
5. Horenjeff Robert, The planning & Design of Airports, McGraw Hill Book Co.
6. Saxena S.C., Railway Engineering, Dhanpat Rai & Sons, 1995.
7. Vukan R. Vuchic, Urban Transit : Operations, Planning and Economics, Wiley Sons Publishers.
8. Bindra S.P., Docks & Harbour Engineering, Dhanpat Rai Publications,
9. Srinivasan R., Harbours, Docks & Tunnel Engineering, Charotar Publishing House, Anand, 1999.
10. IRC-SP41-1994: Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas
11. IRC-73-1980: Geometric Design for Rural Highways
12. IRC-86-1983: Geometric Design Standards for Urban Roads in Plains
13. IRC-38-1988: Guidelines for Design of horizontal curves for Highway and design tables
14. IRC-103-2012: Guidelines for Pedestrian Facilities (First Revision)
15. IRC-11-2015: Recommended Practice for the Design and Layout of Cycle Tracks (First Revision)



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Course Outcomes: At the end of the course, Student will be able

Sr. No.	CO statement	Marks % weightage
CO-1	To analyse factors affecting for the facility given in details, information and data set and able to present frameworks for mechanistic-empirical design methods for transportation facilities required for the users.	20%
CO-2	To design different types of motorised and non motorised transportation facility using standard procedures and have knowledge of failures in given transportation facilities along with aesthetic and safety aspects.	30%
CO-3	To describe various methods of transportation facilities of different types of intersections, terminals, roadways and their components, specifications and tests thereof.	10%
CO-4	To assess the problems / causes of failures in highway, terminals, pedestrian facilities in specific conditions and suggest preventive measures thereof.	30%
CO-5	To explain techniques to evaluate facilities of transport, evaluation techniques of different facilities, describe techniques of maintenance and strengthening, and suggest remedies.	10%

List of Practicals:

The practical may include study of existing traffic facility which includes various surveys, Data Collection for design, Study of various codes of practice and implementation. The students will work in group for the design work based on syllabus such as

1. Design of at-grade intersections, signalized intersection and/or grade separated intersections.
2. Design of facilities required for non-motorised transport and pedestrians.
3. Design of terminals for passenger and goods on highway, railway, and airport and waterway port.
4. Design of horizontal and vertical alignment of highways with landscaping and safety aspects.

List of Open Source Software/learning website:

<https://nptel.ac.in/courses/105101087/>

<https://nptel.ac.in/courses/105101008/>

<https://nptel.ac.in/courses/105101008/47>

<https://nptel.ac.in/courses/105104098/>

<https://freevidelectures.com/subject/civil-engineering/>

<https://freevidelectures.com/course/2673/transportation-engineering-ii>