

An Autonomous Institute
Shree Warana Vibhag Shikshan Mandal's
**Tatyasaheb Kore Institute of
Engineering And Technology,**
Warananagar
NBA Accredited Institute

Department of Civil Engineering

Honor's Course in Infrastructure
Engineering 2023-24

B. Tech. In Civil Engineering

Syllabus Structure and Curriculum under Autonomy



Abbreviations

Sr. No.	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE-I	In-Semester Examination-I
3	ISE-II	In-Semester Examination-II
4	ESE	End Semester Examination
5	ISA	In-Semester Assessment (Term Work)
6	L	Lecture
7	T	Tutorial
8	P	Practical
9	CH	Contact Hours
10	C	Credit

Course/ Subject Categories

Sr. No.	Acronym	Definition
1	BSC	Basic Science Course
2	HSC	Humanity Science Course
3	ESC	Engineering Science Course
4	PCC	Professional Core Course
5	OEC	Open Elective Course
6	MC	Mandatory Course
7	PEC	Professional Elective Course
8	PW	Project Work (Mini and Major Project)
9	II	Industrial Internship

CO, PO & PSO Mapping Correlation:

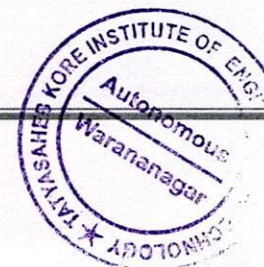
Low	Medium (Moderate)	High (Substantial)
1	2	3

Course/ Subject Code

C	E	5	0	1
Branch Code		Semester		Course Number

Course Term work and POE Code

C	E	5	0	1	T / P / A
Branch Code		Semester		Course Number	
T- Tutorial P- POE A- Audit Course					





Vision

To become an academy of excellence in technical education and human resource development.

Mission

- To develop engineering graduates of high repute with professional ethics.
- To excel in academics and research through innovative techniques.
- To facilitate the employability, entrepreneurship along with social responsibility.
- To collaborate with industries and institutes of national recognition.
- To inculcate lifelong learning and respect for the environment.

Quality Policy

To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.





Department of Civil Engineering

Program Educational Objectives (PEO's)

After completion of program, Graduates will be able to

1	To Impart quality technical education and graduate the students for employment in civil engineering and related professions.
2	To provide students with solid foundation in mathematical and analytical subjects so as to solve civil engineering problems and also to pursue higher studies.
3	To develop the ability among the students to organize the data, synthesize data and technical concepts which will helps them to solve problems relevant to the general practice of various civil engineering disciplines
4	To inculcate with the student the expertise of using computer tools to solve problems, for presentations works, acquaint them with professional level software for planning, analysis and design purpose
5	To provide an experience in surveying work, site investigations, familiarity with the real issues of civil engineering including ethics, economy, management and emerging technologies
6	To provide an opportunity for the students to work in team by organizing various curricular and professional activities resulting in the improvement of technical and soft skills.





Department of Civil Engineering

Program Outcomes (PO's)

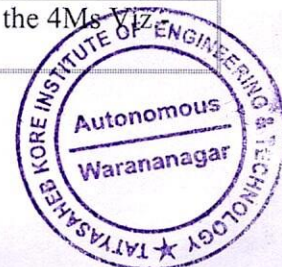
After completion of program, Graduates will be able to

PO1	Demonstrate knowledge in mathematics, basic sciences & civil engineering
PO2	Identify , formulate and solve civil engineering problems.
PO3	Prepare structural design such that fulfills design specification, durability, economy & safety.
PO4	Design and conduct experiment, analyze data & also interpret result to provide conclusion.
PO5	Use appropriate engineering techniques & software tools to analyze civil engineering problems.
PO6	Apply civil engineering knowledge for construction site in all respect like planning, execution and supervision.
PO7	Sensitive towards ethical, societal & environmental issue along with professional work.
PO8	Exhibit understanding of professional & ethical responsibility.
PO9	Ability to function as a leader of multidisciplinary team.
PO10	Communicate effectively in both verbal & written form.
PO11	Develop engineering research ability & project management skill.
PO12	Possess confidence for self education & ability for lifelong learning.

Program Specific Outcomes (PSO's)

After completion of program, Graduates will be able to

1	Plan and Design, Maintain and execute smart infrastructural projects.
2	Assess and analyze environmental impact of civil engineering projects and take corrective action for sustainable development.
3	Use leadership and communication abilities to optimally integrate the 4Ms, Men, Money, Material and Machine





Honor's Course in Infrastructure Engineering

Syllabus Structure under Autonomous Status of TKIET, Warananagar

2023-24





Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering & Technology



Warananagar, Tal- Panhala, Dist- Kolhapur -416 113. Maharashtra

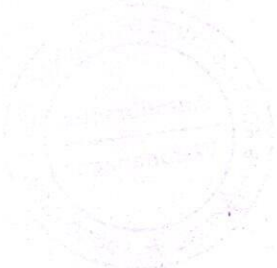
Final Year B. Tech. (Civil Engineering)

Semester-VII

(To be implemented from 2023-24)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Components	Marks	Min for Passing	
CE-H-701	PCC	Metro Transportation System	4	-	-	4	4	ESE	60	24	40
								ISE	40	16	
CE-H-701P	PCC	Metro Transportation System Lab	-	-	2	1	2	ISA	25	10	10
			4	-	2	5	6		125	50	-





Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering & Technology



Warananagar, Tal- Panhala, Dist- Kolhapur -416 113. Maharashtra

Final Year B. Tech. (Civil Engineering)

Semester-VIII

(To be implemented from 2023-24)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Compon ents	Marks	Min for Passing	
CE-H-801	PCC	Urban Transportation Systems Planning	4	-	-	4	4	ESE	60	24	40
								ISE	40	16	
CE-H-801T	PCC	Urban Transportation Systems Planning Lab	-	-	2	1	2	ISA	25	10	10
			4	-	2	5	6		125	50	-



CE-H-701- Metro Transportation System

Lectures	:	4 Hrs/Week	Evaluation Scheme
Credit	:	4	ISE : 40 Marks
Tutorials	:	---	ESE : 60 Marks

Course Objectives: The objective of the course is to

1. To build facts related to metro development in India and at global level.
2. To impart knowledge of functioning of metro railway surveys
3. To understand the alignments and land utilizations for mass transport development
4. To build the geometrical features of a metro rails
5. To understand the signal arrangement and its functions
6. To impart knowledge of metro construction and the fundamentals

Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Appreciate the importance of different modes of transportation and characterize the rail transportation.	Knowledge Understand
CO2	Alignment and geometry of urban metro rail according to topography.	Knowledge
CO3	Assess the properties of rail alignment and design of curves	Understand
CO4	Analyze the track stresses and will be able to proposes a design of a rail track	Analyze
CO5	Learn the electrification of metro trains in brief	Knowledge Understand
CO6	Understand the structural needs for the elevated structures	Knowledge Understand

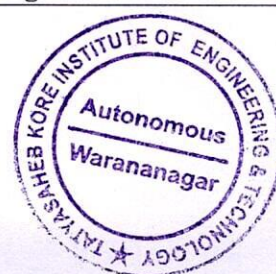
Description

The purpose of introducing or expanding public transportation is to increase access to and use of public transit while, at the same time, reducing motor vehicle miles driven and traffic congestion. Metro Transportation System aims in providing the technical knowledge and understanding in the domain of Mass Rapid Transit System

Prerequisites:	1:	Knowledge of different components of a railway track
	2:	Engineering surveys
	3:	Alignment and land utilization
	4:	Rail electrification and designing

Section – I

Basics of Metro development in India and at global level



Unit 1	Origin of railways and metro Development of metro in Indian metropolitan cities Rail transit development in foreign countries Various organizations working for the development of metro rail transit system and vision of the governing bodies behind the development	6 Hrs
Engineering surveys for metro construction		
Unit 2	Engineering surveys importance-necessity and types Engineering Surveys and Construction of Metro Railway Need for Construction of a New Metro Railway Lines, Preliminary Investigations for a Metro Railway, Traffic Survey, Reconnaissance Survey, Preliminary Survey, Preliminary Engineering-cum-traffic Survey, Final Location Survey, Modern Surveying Techniques for Difficult Terrain, Construction of New Lines of Metro Railway Drainage surveys	6 Hrs
Alignment and land utilization for urban metro rail		
Unit 3	Introduction to urban transportation system Land use zoning and planning, The transportation study area definition; division into traffic zones; network identification and coding Design of horizontal and vertical alignment, Track recording car and track parameters in terms of alignment, unevenness, twist, cross level and gauge. Allocation of dedicated freight corridor, Curved Track – classification of curves, measurement of radius, transition curve, true curve, super elevation on curves, cant deficiency, movement of vehicle on curves, speed on curves, check rails, gauge widening on curves. Gradients / Vertical Curves	6 Hrs
Section – II		
Track Designing and Track stresses		
Unit 4	Track Designing and Track stresses a) Requirements of a Good Track, Maintenance of Permanent Way, Track as an Elastic Structure, Forces Acting on the Track Tunnel Railways b) Types of station, site selection and requirements for a railway station and yards	6 Hrs.
Metro electrification (introduction) and signal designing		
Unit 5	a) Different types of signaling systems (historic), Semaphore (Lower & Upper Quadrant) mechanical signals, Multiple Aspect Colour Light Signals b) Track circuits – Train detection (occupancy of track) Panel Interlocking signaling system, Route Relay Interlocking (RRI) system, Electronic Interlocking Axle counters c) Principle and Methods of Interlocking and Devices used for interlocking	6 Hrs.
Introduction to elevated structures for Metro Designing		
Unit 6	Choice of Foundation for Piers and Abutments, Types of Bridges and Loading Standards, Setting out for Piers and Abutments, Open Foundation, Pile Foundations, Well Foundation—Case Studies, Piers and Abutments, Superstructure—Design Aspects, Superstructure – Construction, Inspection of Bridges, Maintenance of Bridges – substructure, Maintenance of superstructure – Girders	6 Hrs.



CE-H-701(T)- Metro Transportation System

Practical's: 2 hrs / week
Credits: 1

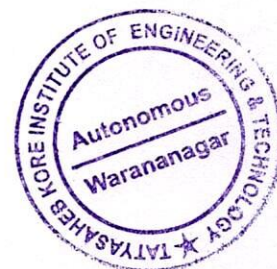
Examination Scheme:
ISA: 25 Marks

Course Objectives: The objective of the course is to		
1. To build facts related to metro development in India and at global level. 2. To impart knowledge of functioning of metro railway surveys 3. To understand the alignments and land utilizations for mass transport development 4. To build the geometrical features of a metro rails 5. To understand the signal arrangement and its functions 6. To impart knowledge of metro construction and the fundamentals		
Course Outcomes (CO):		
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Appreciate the importance of different modes of transportation and characterize the rail transportation.	Knowledge Understand
CO2	Alignment and geometry of urban metro rail according to topography.	Knowledge
CO3	Assess the properties of rail alignment and design of curves	Understand
CO4	Analyze the track stresses and will be able to proposes a design of a rail track	Analyze
CO5	Learn the electrification of metro trains in brief	Knowledge Understand
CO6	Understand the structural needs for the elevated structures	Knowledge Understand

TUTORIALS

A] One assignment on each unit- Assignment should include:

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
01	Basics of Metro development in India and at global level	2	Knowledge Understand
02	Engineering surveys for metro construction	2	Knowledge

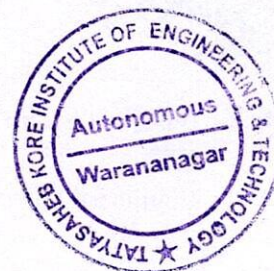


CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	1	1	--	1	1	--	--	--	--	--	--	--	--	--
CO2	2	2	--	--	2	2	--	--	--	--	--	--	1	--	--
CO3	--	2	2	1	-	1	--	--	--	--	--	--	1	--	--
CO4	--	2	--	2	1	2	--	--	--	--	--	--	1	--	--
CO5	--	1	--	2	2	2	--	--	--	--	--	--	--	--	--
CO6	1	1	2	2	1	--	--	--	--	--	--	--	--	--	--
AVG	1.33	1.5	1.67	1.75	1.4	1.6	--	--	--	--	--	--	1	--	--

REFERENCES

Text Books	
1	Metro Rail Projects in India: A Study in Project Planning Book by M. Ramachandran
2	Urban rail transit construction technology demonstration project: Guangzhou Metro Line Paperback – January 1, 2000 by LU GUANG LIN. CHEN SHAO ZHANG (Author)
3	The Metro Railway Corporation and Maintenance ACT 2002 PART A – Act Indian Railway Board Act, 1905
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 Engineering, Dhanpat Rai & Sons, New Delhi
3	S.C. Rangwala, K.S. Rangwala and P.S. Rangwala, Principles of Railway Engineering, Charotar Publishing House, Anand



CE-H-801- Urban Transportation Systems Planning

Lectures	:	4 Hrs/Week	Evaluation Scheme	
Credit	:	4	ISE	: 40 Marks
Tutorials	:	---	ESE	: 60 Marks

Course Objectives: The objective of the course is to

7. To Understand Urbanization and Its Impact on Transportation
8. To Identify Transportation Problems
9. To Explore Trip Generation and Distribution
10. To Understand Mode Choice and Route Choice Behavior
11. To Examine the Interaction between Land Use and Transportation
12. To Analyze the challenges and considerations related to urban goods movement

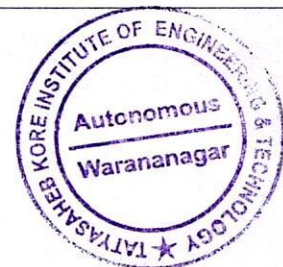
Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand the impacts of urbanization on transportation, Transport Planning	Knowledge Understand
CO2	Understand the methods of trip generation	Understand
CO3	Analyze trip distribution using growth factor, gravity, and synthetic models	Understand Analyze
CO4	Analyze disaggregate models using utility and probabilistic choice theories for transport planning.	Understand Analyze
CO5	Understand route choice behavior and apply deterministic, stochastic, and dynamic traffic assignment techniques for transport network optimization.	Remember Understand
CO6	Analyze urban land use-transport interaction, classify urban goods movement, and apply modeling and forecasting techniques for goods transport facility planning.	Understand Analyze

Description

The strategic design and management of transportation networks within urban areas to facilitate efficient, safe, and sustainable movement of people and goods. It encompasses a range of activities, including analyzing current transportation infrastructure, forecasting future demand, identifying transportation needs, and developing plans and policies to address them.

Prerequisites:	1:	Urbanization processes
	2:	Fundamentals of transportation systems
	3:	Land use patterns, zoning regulations, and urban development policies
	4:	Transportation engineering principles



03	Alignment and land utilization for urban metro rail	2	Understand
04	Track Designing and Track stresses	2	Understand
05	Metro electrification (introduction) and signal designing	2	Knowledge Understand
06	Introduction to elevated structures for Metro Designing	2	Knowledge Understand

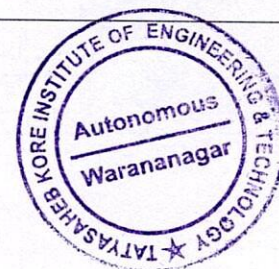
B] One assignment on each unit

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	1	1	--	--	--	---	--	--	---	--	--	---	--
CO2	2	1	2	2	--	--	--	---	--	--	---	--	--	---	--
CO3	--	2	2	--	--	--	--	---	--	--	---	--	--	---	--
CO4	--	2	--	--	--	--	--	---	--	--	---	--	--	---	--

REFERENCES

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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 Engineering, Dhanpat Rai & Sons, New Delhi
3	S.C. Rangwala, K.S. Rangwala and P.S. Rangwala, Principles of Railway Engineering, Charotar Publishing House, Anand



Section – I	
Unit 1	Introduction to Urban Transportation Planning
	Urbanization, Urban Transportation: Impacts, Behavioral Changes, Urban Transportation problems & Externalities- Congestion, Safety, Emissions, etc. Introduction to Transport planning; Transport Planning Morphology: Problem definition, Solution generation, solution analysis, Evaluation and choice, Implementation Hierarchical levels of Urban Transport Planning: Conceptual Plan, Outline plan, Master plans, statutory or advisory plans, detailed development plans
Unit 2	Trip Generation
	Introduction; Basic considerations in trip generation - amount of urban activity, character of urban activity, other considerations, special generators; Trip classification; Factors affecting trip generation Methods of trip Generation- Regression analysis, trip rate analysis, cross classification analysis; Multiple Linear Regression- Regression analysis concept;
Unit 3	Trip Distribution
	Introduction, Basic considerations in Trip Distribution, P-A Matrix to O-D Matrix, Factors affecting trip distribution: Properties of transport network, spatial separation between various zones Growth factor methods- Uniform factor method, Average factor method, Detroit Method, Fratar method; Furness method Synthetic methods -Introduction to Gravity Model Gravity Model - Calibration, BPR Approach of Calibration Intervening opportunities model: Concept, Advantages, Limitations, Illustrative example, Competing opportunities model, Limitations Doubly restrained model: Concept, Calibration, Linear programming approach to Trip Distribution: Concept, limitations
Section – II	
Unit 4	Modal Split
	Introduction; Influencing factors of mode choice; Types of modal split models- Trip end type and trip interchange type; Types of modal split models - Trip end type (Southern Wisconsin Model) and trip interchange type (Diversion curve model), Limitations, Aggregate and disaggregate models, advantages of disaggregate over aggregate modelling; Elements of choice decision process; Framework for the choice process of an individual Disaggregate mode choice models- Introduction, Utility theory, Probabilistic choice theory
Unit 5	Traffic Assignment
	Route Choice Behavior: User equilibrium, system equilibrium, stochastic equilibrium, Diversion Curves: California diversion curves, Detroit diversion curves, Bureau of Public roads diversion curves Deterministic traffic assignment techniques- All-or-nothing assignment, Multi-Path Traffic Assignment, Incremental assignment, capacity restraint assignment, Stochastic Traffic assignment techniques; Dynamic traffic assignment techniques: Basic Concepts and Approach
Unit 6	Land Use and Transportation
	Introduction; Urban land use planning- land use and land cover, land use classification; Land use transportation interaction; Accessibility and mobility, Land use models



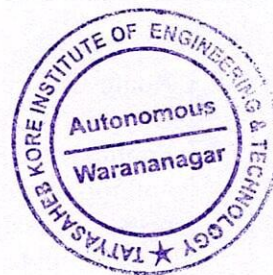
Module-H: Urban Goods Movement Introduction; Classification of urban goods movement; Factors affecting goods movement; Modelling Approaches Data collection; Strategy for goods transport facility planning; Facilities required in goods terminals; Time series techniques for forecasting truck traffic; Classification of urban goods movement; Factors affecting goods movement;
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CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	-	-	1	1	1	-	-	-	-	-	1	-	-
CO2	2	1	-	-	1	1	1	-	-	-	-	-	-	-	-
CO3	2	2	1	-	1	-	1	-	-	-	-	-	1	-	-
CO4	1	2	1	-	1	-	-	-	-	-	-	-	1	-	-
CO5	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	1	2	-	1	1	2	1	-	-	-	-	-	-	-	-
AVG	1.5	1.5	1	1	1	1.33	1.33	-	-	-	-	-	1	-	-

REFERENCES

Text Books	
1	"Urban Transportation: Planning, Operations and Management" by Prabhakar Karve
2	"Principles of Transportation Engineering" by Partha Chakroborty
Link	
1	https://nptel.ac.in/courses/105105208



CE-H-801-P- Urban Transportation Systems Planning

Practical's: 2 hrs / week
Credits: 1

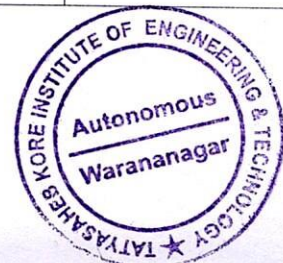
Examination Scheme:
ISA: 25 Marks

Course Objectives: The objective of the course is to		
1. To Understand Urbanization and Its Impact on Transportation 2. To Identify Transportation Problems 3. To Explore Trip Generation and Distribution 4. To Understand Mode Choice and Route Choice Behavior 5. To Examine the Interaction between Land Use and Transportation 6. To Analyze the challenges and considerations related to urban goods movement		
Course Outcomes (CO):		
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
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CO5	Understand route choice behavior and apply deterministic, stochastic, and dynamic traffic assignment techniques for transport network optimization.	Remember Understand
CO6	Analyze urban land use-transport interaction, classify urban goods movement, and apply modeling and forecasting techniques for goods transport facility planning.	Understand Analyze

TUTORIALS

A] One assignment on each unit- Assignment should include:

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
01	Introduction to Urban Transportation Planning	2	Knowledge Understand
02	Trip Generation	2	Knowledge



03	Trip Distribution	2	Understand
04	Modal Split	2	Understand
05	Traffic Assignment	2	Knowledge Understand
06	Land Use and Transportation	2	Knowledge Understand

B] One assignment on each unit

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	1	1	--	--	--	---	--	--	---	--	--	---	--
CO2	2	1	2	2	--	--	--	---	--	--	---	--	--	---	--
CO3	--	2	2	--	--	--	--	---	--	--	---	--	--	---	--
CO4	--	2	--	--	--	--	--	---	--	--	---	--	--	---	--

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1	https://nptel.ac.in/courses/105105208





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