



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: M. E. Civil (Transportation Engineering)

Subject Code: ME02069111

Subject Name: Regional and Mass Transportation System Planning

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Urban Transportation System Planning
Rationale:	Regional and mass transportation system planning is crucial for sustainable development, economic growth, and social equity. It enhances mobility by providing efficient, accessible, and reliable travel options, reducing traffic congestion and travel time. Proper planning promotes environmental sustainability by decreasing reliance on private vehicles, cutting greenhouse gas emissions, and supporting energy-efficient transit systems. It guides urban development, curbing urban sprawl and encouraging compact, sustainable growth. Additionally, well-designed transportation networks boost economic activity, attract investments, and connect communities, fostering inclusivity and resilience. Overall, it improves quality of life while addressing environmental, economic, and societal challenges.

Program Outcomes

No	Program Outcomes
01	Engage in critical thinking and research to develop solutions to multifold real-world problems.
02	Communicate effectively with the engineering community at large level on complex design tasks & write and present technical reports.
03	Demonstrate a high level of professionalism in handling multidisciplinary and complex engineering problems.
04	Plan, assess, create, integrate, carry out, and oversee complex engineering projects in a sustainable local and global context.
05	Address societal issues by offering technologically advanced, reasonably priced solutions while upholding high standards of ethics and professionalism.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Analyse a regional economic and demographic characteristic and forecast for planning horizon	N
02	Forecast multimodal intercity passenger travel demand	E
03	Generate traffic forecast based on historical traffic and economic data	E



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04	Assess the road network plan and evaluate economics of a transport facility	A
05	Plan the transit route network after determining the transit demand.	C

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE (E)		PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<p>Demographic and Employment Forecasting Models: Classification of regions: Transport systems functions, regional delineation, regional growth, concepts of GDP and GNP</p> <p>Demographic models -linear, exponential and logistic models; cohort survival models - birth, aging and migration models.</p> <p>Employment forecasting models - employment classification, economic base mechanism; input and output models - dynamic models of population and employment, multiregional extensions.</p>	09	20
2.	<p>Transport Modelling: Need & role of transport models, types of models, issues, transport models in practice, simplified transport demand models, Definition of Intercity travel, dimensions of intercity travel decision making, aggregate and disaggregate models, O-D demand at regional level, Seasonal variations in demand, Mode choice behaviour of travellers at regional level.</p>	08	20
3.	<p>Regional Traffic Forecasting: Importance, Traffic growth components & influencing factors, Project Influence Area, Data collection, Growth factor methods, Univariate and Multivariate Time series models, Estimation of cyclic and seasonal components, Diversion analysis</p>	06	10
4.	Regional Transportation Development	11	25



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	<p>Delineation of Planning Regions: Concept of region and space, types of regions, rural road network development approach, regional freight transportation- issues & approach, demand assessment, various models.</p> <p>Planning of Rural roads Principles, Methodology, Network planning and hierarchy, Network development approach, Saturation method, Multimodal transportation system</p> <p>Freight Transport & Logistics Freight demand, Characteristics of Freight Transport, Aggregate and Disaggregate Demand Estimation Models, Equilibrium approach.</p>		
5.	<p>Mass Transit Planning & Modelling: Transit classification, transit network design, classification of routes, prediction of transit usage, evaluation of network, scheduling principles & methodology, urban freight transportation: freight demand, spatial distribution of goods, truck terminal planning. Social, economic and environmental impacts of urban/regional mass transit systems, mitigation measures.</p>	11	25
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	10	20	25	25	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Hutchinson, B.G., Principles of Urban Transportation System Planning, Mc-Graw Hill 1974.
2. Khisty C J., Lall B.Kent, Transportation Engineering – An Introduction, Prentice- Hall, NJ, 2005
3. Chand Mahesh, Puri U.K., *Regional Planning in India*, Allied Publishers, New Delhi,1983.
4. Christopher Blow., Transport Terminals and Modal Interchanges: Planning and Design, Elsevier Pub.,2005.
5. D. Salvo Perspectives in Regional Transportation Planning, Lexington Books, USA, 1974.
6. Glassion John, *Introduction to Regional Planning*, Hutchinson & MIT press, Cambridge, 1996.



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7. IRC: 108-2015., Guidelines for Traffic Forecast on Highways (First Revision), Indian Roads Congress, New Delhi
8. Jason Monios, Rickard Bergqvist., Intermodal Freight Transport & Logistics Taylor & Francis Group., CRC Press, 2017
9. Jean-Paul Rodrigue, The Geography of Transport Systems, Routledge Pub., New York 2017. (<https://people.hofstra.edu/geotrans/index.html>)
10. Kanafani, Adib, K., *Transportation demand Analysis*, Mc Graw Hill, New York, 1983.
11. Mishra Sundaram and Prakash Rao, Regional Development Planning in India, Vikas Publishing House Pvt. Ltd., 1974.
12. Morlok, K. E., *Introduction to Transportation Engineering*, McGraw-Hill, New York, 1978.
13. Oppenheim, N., *Applied Models in Urban and Regional Analysis*, Prentice-Hall, NJ., 1980.
14. Ortuzar, J. D., Willumsen, L.G., *Modeling Transport (4th edition)*, John Wiley & Sons, 2011.
15. Sarkar P., Maitry V., Joshi G.J., *Transportation Planning –Principles, Practices & Policies*, (2nd edition) PHI, New Delhi 2017.
16. Sarkar P K., Maitri V., *Economics in Highway and Transportation Planning*, Standard Publisher, New Delhi, 2010.
17. Vukan R. Vuchic, *Urban Transit : Operations, Planning and Economics*, Wiley & Sons Publishers.

(b) Open source reading material on website:

1. <https://nptel.ac.in/courses/105105208>
2. <https://nptel.ac.in/courses/105106058>
3. <https://nptel.ac.in/courses/105106115>
4. <https://nptel.ac.in/courses/105107067>

Suggested Course Practical List:

Field visit:

1. Visit to the urban mass transit system depot, terminal and management office.
2. Visit to the truck terminal area.
3. Visit to GSRTC depot, Railway station and yard, Airport terminal, Seaport.
3. Review the existing urban/regional mass transit system and freight transportation system.
4. The suggestions for the improvements should be presented with group discussion.

List of Tutorials:

1. Problems based on population and employment forecasting by different methods.
2. Problems based on cohort analysis.
3. Problems based on regional and rural road network development concept.



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4. Problems based on urban mass transit routing and scheduling procedure.
5. Problems based on freight demand and goods transportation.
6. Planning and design of truck terminal.

Suggested Project List:

Conduct field-based design for regional and mass transportation planning, considering a small study area.

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