GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering (Transportation Engineering)

Course / Subject Code: ME01069021

Course / Subject Name: Urban Transportation System Planning

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PCC

Prerequisite:	**Nil**
Rationale:	The Urban Transportation planning is most important area in the field of transportation. Looking to the present scenario, suitable transportation planning is the backbone of the urbanization. Urbanization is going on at alarming rate in developing countries like India. After studying the subject, the student will be able to understand the importance of the transportation and systematic planning in urban area. The subject covers various types of transportation systems and its characteristics. It is necessary to coordinate each mode for optimizing transportation system and reducing congestion and environmental pollution. It is important to carryout thorough study of travel demand and fulfillment. The subject is useful for estimating Trip Generation, Trip Distribution, Modal Split and Trip Assignments. Land use planning models and their suitability should be studied for designing of suitable transportation systems. As urbanization increases, it is necessary to identify the freight corridor to provide efficient service. The subject also covers the study of various types of Transportation System Management (TSM) techniques and urban goods movement with case studies.

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 traffic engineering problems.
04	Plan, assess, create, integrate, carry out, and oversee complex transportation infrastructure projects in a sustainable local and global context.

05	Address societal issues pertaining to transportation 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	Understand the concepts of transportation planning, various modes, transit systems and their suitability.	R
02	Analyze the various stages of travel demand modeling for Urban Transportation Systems.	N
03	Apply knowledge of Land use planning and transportation interaction, urban goods movement for urban transport planning.	A
04	Choose an appropriate TSM action for a given problematic area	A
05	Distinguish transportation demand management strategies for their applicability	E

**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
				Theory		Tutorial / Practical		
L	T	PR	C	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.	Introduction to transportation systems planning, various modes of transportation and comparisons, urban transportation system planning process, use and evaluation of various models.	2	5
2.	Planning methodologies, modeling techniques in planning, problem solving techniques.	2	5

3.	Urban Mass transportation Systems: Urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, coordination, types of coordination.	4	5
4.	Travel demand modeling: Trip generation, trip distribution, modal split analysis, trip assignment techniques, and various models, Transportation compact study methodologies.	15	40
5.	Network assignment methods, connectivity, strategies for the evaluation of ultimate transportation framework and case studies. Strategies for the evaluation of alternate transportation plans and plan implementation.	5	10
6.	Land use planning models and their suitability. Transportation Impacts study methodologies.	3	5
7.	Transportation System Management: Objectives; Need for TSM Long – Range vs. TSM Planning; TSM Actions: Traffic Management Techniques for Improving Vehicular Flows, Preferential Treatment for High occupancy Modes; Promoting Non – Auto and High Occupancy vehicles; Transit and Intermediate Public Transport Service Improvements, Demand Management Techniques for Reduced Traffic Demand, Staggered working Hours, Vehicular Restrictions, Traffic operation improvement, Parking management, Intersection Management Techniques – Signal Progression – Optimization.	6	15
8.	Transit System Management: Multimodal traffic management, reducing transportation needs, reducing dependence on the car, improving traffic flow, Improving road safety, Route Planning, and Scheduling.	3	5
9.	Transportation Demand Management: Policies to Control Vehicle Growth Rate, Alternative work schedules, Congestion pricing, Employer incentives and disincentives, Land-use reorientation, ICT applications.	3	5
10.	Urban goods movement, framework and case studies.	2	5
	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**
30	**20**	**20**	**20**	**10**	**--**

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

(a) Books:

References/Suggested Learning Resources:

1. B.G. Hutchinson, Principles of urban transportation system planning- McGraw- Hill, New York, 1974
2. Edward K. Morlok, Transportation Engg. And Planning
3. W. Dickey, Metropolitan Transportation Planning Tata McGraw-Hill, NewDelhi,1975
4. Blunder and Black, Land use transportation System J. Ortuzer and L.G. Willumsen, Modelling Transport, Johan Wiley and Sons Chincester,1994
5. Vukan R. Vuchic, Urban Transit: Operations, Planning and Economics, Wiley Sons Publishers.
6. Peter White, Public Transport, UCL Press
7. Kadiyali L. R., Traffic Engineering and Transport Planning, Khanna Publishers
8. Khisty, C J, Transportation Engineering–An Introduction, Prentice-Hall, NJ
9. TCRPReport30, TCRPReport95, TCRPReport100
10. S.C. Saxena, Traffic Planning and Design, Dhanpat Rai Pub., New Delhi.
11. Partho Chakraborty and Animesh Das, Principles of Transportation Engineering, PHI
12. C. S. Papacostas, Fundamentals of Transportation System Analysis, PHI.
13. James H. Banks, Introduction to Transportation Engineering, WCB-McGraw Hill, New York
14. Transportation System Management and Operations: Action Kit – Immediate Solutions for Transportation Operational Issues, FHA, ITE, 2005.
15. Traffic Engineering Handbook, Institute of Transportation Engineers, John Wiley and Sons, 2016, Seventh Edition.
16. Transportation System Management, Special Report 172, Program Committee for the Conference on Transportation System Management, Transportation Research Board, Washington DC, 1977
17. Transportation System Management, State of the Art, UMTA, USDOT, 2008

(b) Open-source software and website:

Open-Source Software (May not be open source but useful for the subject):

Auto Desk, EMME/2, TRIPS, VISUM, TransCAD, CUBE, SPSS, MATLAB, Open Office.

Learningwebsite:

nptel.ac.in/courses/105107067/nptel.ac.in/courses/105106058/
www.nptelvideos.in/2012/11/urban-transportation-planning.htmlhttp://ocw.mit.edu/

https://dot.ca.gov/programs/traffic-operations/tsmo 2.
https://ops.fhwa.dot.gov/plan4ops/focus_areas/planning_prog.htm 3.
https://ops.fhwa.dot.gov/publications/fhwahop14019/fhwahop14019.pdf 4

https://ops.fhwa.dot.gov/publications/fhwahop16037/index.htm 5. https://ops.fhwa.dot.gov/tsmo/

Suggested Course Practical List:

1. Passenger occupancy survey.
2. Boarding-Alighting survey.
3. Modal split analysis-RP / SP survey.
4. Study of Urban Goods movement
5. Computer application for solving transportation problem using various models.

List of Laboratory/Learning Resources Required:

Tutorials:

Problems based on:

1. Trip generation: Linear Regression and Cross Category analysis.
2. Trip distribution: Growth Factor Methods, Gravity Model.
3. Modal split analysis.
4. Trip assignment: Shortest path analysis and network-assignment, connectivity.
5. Land use planning model (Lowery and Garin Lowery model).
6. Computer application for solving the above-mentioned problems
7. Traffic data collection on congested/problematic corridor for TSM action.
8. Traffic data collection on congested/problematic traffic network area for TSM action.
9. Analysis of data and suggestion of suitable TSM techniques, preparation of alternatives.
10. Prediction of impacts due to suggested TSM alternatives- either by computer simulation or by actual implementation.

Field work:

Collection of Home Interview Survey data. Do the analysis and interpretation of the collected data, along with presentation and group discussion.

Suggested Activities for Students:

Field Visit: Visit to Urban Mass Transportation System Service- Control room, Depot, Terminals, Infrastructure, Offices.

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