GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering (Transportation Engineering)

Subject Code: ME02069071

Subject Name: Multimodal Urban Transportation Systems

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

Prerequisite:	Urban Transportation System Planning
Rationale:	The subject of Multimodal Urban Transportation Systems is crucial for addressing modern urban mobility challenges. It provides a holistic approach to integrate various transport modes, such as road, rail, cycling, and walking, for more efficient and sustainable urban transportation. By focusing on issues like congestion, pollution, and smart city development, the subject prepares students to design systems that promote accessibility and sustainability. This subject aligns with global trends in urban planning and mobility, preparing students for future roles in transforming cities.

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 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.

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Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	To grasp the concepts of transportation planning, various transit mode systems, and their suitability.	R, U
02	To assess the efficiency and effectiveness of different mass transit systems in planning, operations, and management	A
03	To comprehend Travel Demand Management (TDM) in the context of sustainability, along with data collection techniques.	R, U
04	To evaluate the coordination of public transport systems.	A
05	To demonstrate the applications of software in transportation modelling.	A

**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.	**Urban Mass Transportation Systems:** Urban transit problems, Travel demand, Types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails, capacity, merits and comparison of systems.	5	10

2.	**Mass Transit Operations:** Introduction to routing and scheduling, parameters to measure performance of transit system. Corridor identification and corridor screen line analysis, Suitability of transit system.	5	15
3.	**Urban Transport & Sustainability:** Overview of Travel Demand Management (TDM), Transit Oriented Development (TOD), Multimodal transportation (MMT) environment, Multimodal Level of Service (MMLOS), Design of multimodal transfer facilities. Provision for walkways, non-motorized vehicle tracks, bicycle ways, park and ride facilities at stations.	10	25
4.	**Transit Data Collection and Performance Analysis:** Methods for data collection and analysis, Determination of Frequency and Headway, Measurement of performance and its monitoring.	10	15
5.	**Coordination of Public Transport:** Need for Coordination, Selection of transit mode, Transit fare structure, Intermodal Transfer, Access and Egress mode facilities, Last mile connectivity.	8	20
6.	**Transportation Modelling:** Overview of various Transportation Software, Overview of travel demand modeling using CUBE and VISUM software.	7	15
	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**
20	**30**	**20**	**20**	**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. Vukan R. Vuchic, Urban Transit: Operations, Planning and Economics, Wiley Sons Publishers.
2. Peter White, Public Transport, UCL Press
3. B.G. Hutchinson, Principles of urban transportation system planning- McGraw- Hill, New York, 1974
4. Edward K. Morlok, Transportation Engg. And Planning

5. W. Dickey, Metropolitan Transportation Planning Tata McGraw-Hill, NewDelhi,1975
6. Blunder and Black, Land use transportation System J. Ortuzer and L.G. Willumsen, Modelling Transport, Johan Wiley and Sons Chincester,1994
7. Kadiyali L.R., Traffic Engineering and Transport Planning, Khanna Publishers
8. Khisty, C J., Transportation Engineering – An Introduction, Prentice-Hall, NJ
9. TCRP Report 30, TCRP Report 95, TCRP Report 100.
10. Transportation System Management, Special Report 172, Program Committee for the Conference on Transportation System Management, Transportation Research Board, Washington DC, 1977
11. Papacostas, C. S., and Prevedouros, P. D, "Transportation Engineering and Planning" 3rd Edition, Prentice - Hall of India Pvt. Ltd., 2002.
12. S Ponnuswamy. Dr. (Late) David Johnson Victor, " Urban Transportation: Planning, Operation and Management", 1st Edition2012 McGraw-Hill Education Private Limited
13. George E. Gray and Lester A. Hoel, 'Public Transportation', Prentice Hall, New Jersey
14. S.C. Saxena, Traffic Planning and Design, Dhanpat Rai Pub., New Delhi

(b) Open source software and website (May not be open source but useful for the subject):

1. https://onlinecourses.nptel.ac.in/noc22_ce70/preview
2. https://www.coursera.org/learn/sustainable-regional-principles-planning-and transportation#modules
3. PTV VISSIM/ VISUM Student Version, CUBE, TransCAD, QGIS, SUMO

(c) Suggested Course Survey List:

1. Travel Behavior Survey: Analyze travel patterns, mode preferences and trip purposes in an urban area.
2. Parking Survey: Study of parking demand and supply near multimodal hubs or city centers.
3. Public Transport Accessibility Survey: Evaluate accessibility to bus stops, metro stations and multimodal transfer points.
4. First-Mile and Last-Mile Connectivity Survey: Identify challenges and options for connecting residential areas to transit nodes.
5. Design solution of problematic situations of existing transit systems.

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