GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering (Transportation Engineering)

Subject Code: ME02069061

Subject Name: Public Transportation Planning

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

Prerequisite:	Urban Transportation System Planning
Rationale:	The rapid growth of urban populations necessitates the development of efficient urban mass transportation systems to address the challenges posed by an increase in personal vehicle trips. Similarly, effective regional mass transportation systems are essential for the safe, timely, and cost-effective movement of passengers and freight at the regional level. Transportation engineers must be equipped to understand, plan, and design such systems, focusing on routing, scheduling, infrastructure, management, and fare structures. This subject covers the components of transportation networks and their operational aspects, enhancing students' knowledge and skills in the field.

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.

Course Outcome:

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

No	Course Outcomes	RBT Level
01	Study the historical evolution of public transportation systems and gain insights into their operations, planning processes, and economic factors.	R, U

02	Design transit networks, define guiding principles, categorize various transit modes, analyze their geometry and characteristics, and assess transit routes along with their key features.	N, E
03	Address issues related to transit routing, scheduling, infrastructure planning, fare structures, and overall management.	A
04	Design transit infrastructure facilities like bus stops, rail transit stops, terminals, layout of depot and location	N, E
05	Assess transit performance based on efficiency, capacity, productivity, and network utilization.	N, 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.	**Development of Public Transit System:** Historical Growth, Modes of public transport and comparison, Public transport travel characteristics, technology of bus, rail, rapid transit systems, Air-cushioned and Maglev System, S-Bahn Dual mode busses, Para-Transit, Dial-a-Ride-Taxi-Jitney and Ride sharing – PRT Networks - DRTS technological characteristics, basic operating elements.	05	10
2.	**Transit Network Planning:** Objectives, principles, Intercity and Regional transit system considerations, transit lines, its capacity – types, geometry and characteristics, transit routes and their characteristics, timed transfer networks, prediction of transit usage, network evaluation, accessibility considerations.	07	20
3.	**Transit Scheduling:** Components, determination of service requirements, patterns of Bus Services, frequency of Services, special services, single route bus scheduling, fleet requirement, marginal	07	20

	ridership concept, use of optimization technique, load factor, depot location, spacing of bus stops, scheduling procedure, marginal ridership, crew scheduling.		
4.	**Transit Infrastructure Facilities:** Design of bus stops, rail transit stops, design of terminals– principles of good layout, types of layouts, depot location, twin depot concept, crew facilities and amenities.	05	15
5.	**Transit Agency and Economics:** Organizational structure of transit agency, management and personnel, transit system statistics, performance and economic measures, operations, fare structure.	05	10
6.	**Public Transport Management Measures:** RTC Act - ASRTU System Efficiency and Effectiveness Measures, performance indicators, LOPTS, preferential treatment to HOV: Exclusive Bus lanes, Bus Streets, Contra Flows, Reversible Lanes, Bus Bypass, Bus Pre-emption Signals for Bus Operations.	07	10
7.	**Transit Terminals and Performance Evaluation:** Transit Terminal Planning and Design, Parking facilities, Walk-way and non-motorized modes' accessibility, pedestrian facilities. Approach for green energy application, Performance Evaluation, Efficiency, Capacity, Productivity and Utilization, Performance Evaluation Techniques and Application, System Network Performance.	09	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. Peter White, Public Transport, UCL Press
8. Kadiyali L.R., Traffic Engineering and Transport Planning, Khanna Publishers
9. Khisty, C J., Transportation Engineering – An Introduction, Prentice-Hall, NJ
10. TCRP Report 30, TCRP Report 95, TCRP Report 100.
11. C. S. Papacostas, Fundamentals of Transportation System Analysis, PHI.
12. Transportation System Management, Special Report 172, Program Committee for the Conference on Transportation System Management, Transportation Research Board, Washington DC, 1977
13. David A. Hensher, Bus Transport: Economics, Policy, and Planning, Research in Transportation Economics Volume 18. Elsevier Publications, 2007.
14. Ashish Verma, Ramanayya, T.V., Public Transport Planning and Management in Developing Countries, CRC Press, 2014.
15. Carlos F Daganzo, Yanfeng Ouyang, Public Transportation Systems: Principles of System Design, Operations Planning and Real-time Control, World Scientific Publishing Company, 2019.
16. George E. Gray and Lester A. Hoel, Public Transportation: Planning, Operation and Management, Prentice Hall; 1992, Second Edition.
17. Alan Black, Urban Mass Transportation Planning, McGraw-Hill International, 1995.
18. Simpson, Barry J., Urban Public Transport Today, Taylor & Francis Routledge Publisher, 2003.
19. Tiwari G., Urban Transport for Growing Cities: High Capacity Bus System, MacMillan India Ltd., 2002.
20. Johnson Victor D., Ponnuswamy, S., Urban Transportation: Planning, Operation and Management Tata McGraw-Hill Education, 2012.

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

1. https://onlinecourses.nptel.ac.in/noc22_ce34/preview
2. https://ocw.mit.edu/courses/1-258j-public-transportation-systems-spring-2017/
3. PTV VISSIM/ VISUM Student Version, CUBE, TransCAD

Suggested Course Tutorial List:

1. Problems based on routing, scheduling.
2. Problems based on fare structure, transit system statistics.
3. Design of bus stops, terminals, depot, and goods terminal area.
4. Computer applications for solving the above.

Field visit:

Visit to the City Bus Transport/any mass transit system Office, depot and terminal area. Review operation, management and its performance. Prepare a report based on the observations and suggest solutions.

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