GUJARAT TECHNOLOGICAL UNIVERSITY

BE (CIVIL & INFRASTRUCTURE ENGINEERING)
ADVANCED TRANSPORTATION ENGINEERING
SUBJECT CODE: 2174006
B. E. 7th Semester

Type of course: Departmental Elective II

Prerequisite: NIL

Rationale:

Efficient urban mass transportation system is the prime need of today's life. Well planned road/railway network and reliable mass transportation systems are necessary to cater the increased need of the passengers and goods trips within urban as well as suburban area. Safe, economic, timely and comfortable urban mass transportation systems can reduce private vehicle trips, which ultimately reduce traffic congestion, accidents and environmental pollution. Study of this subject imparts knowledge of urbanization process, urban transportation system planning, land use planning, travel demand modeling procedure, different urban mass transportation systems and urban goods movement.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA(M)	Viva	PA (I)	
3	2	0	5	70	30	30	20	150

Contents:

Sr. No	Topics	Hrs.	% Weightage
1	**Introduction:** Urbanization, problems in transportation, urban transportation system planning process.	4	10
2	**Urban Mass Transportation Systems:** Types, public, private and para-transit systems, their capacities and suitability, need of coordination	6	16

3	**Travel Demand Modeling:** Land use planning, traffic analysis zones, types of trips, Trip generation analysis: Home interview and road side interview survey, regression and category analysis Trip distribution analysis: O-D matrix, Growth factor methods, Gravity model, opportunity model Modal split analysis: Trip-end type and trip-interchange type models, RP and SP survey, Probit and Logit models Trip assignment analysis: route choice behavior, diversion curves, shortest path algorithms, All-Or-Nothing assignment, capacity restraint models, static and dynamic models	**18**	**40**
4	**Introduction to routing and scheduling:** Problems in routing and scheduling of urban mass transit systems, transit system's performance parameters.	**5**	**12**
5	Urban goods movement, transportation system management techniques, ITS applications.	**4**	**10**
6	Procedure in urban mass transit infrastructure planning, construction and maintenance, impact analysis and economic evaluation.	**5**	**12**

Course Learning Outcomes:

After learning the course the students should be able to:

- To understand urbanization and its problems
- To understand different urban mass transportation systems
- To carry out travel demand modeling analysis
- To understand routing and scheduling of urban mass transportation systems
- To understand transportation system management techniques and urban goods movement
- To understand procedure in urban mass transit infrastructure planning, construction and maintenance

Reference Books:

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, New Delhi, 1975
4. Blunder and Black, Land useTtransportation System
5. J.Ortuzer and L.G. Willumsen, Modelling Transport, Johan Wiley and Sons Chincester,1994
6. Vukan R. Vuchic, Urban Transit : Operations, Planning and Economics, Wiley Sons Publishers.

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. 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

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N	E Level	C
10	**15**	**20**	**30**	**15**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

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,
5. Computer application for solving the above mentioned problems.

Field work: Collection of Home – Interview data. Presentation with group discussion on its analysis and interpretations.

Field Visit: Visit to Urban Mass Transportation System Service - Depot, Terminals, Offices, Construction site.

List of Open Source Software/learning website: http://nptel.ac.in/courses/105107067/30

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.