

GUJARAT TECHNOLOGICAL UNIVERSITY

8th Semester Civil Engineering - PDDC

Subject Code & Name: X80603 - Urban Transportation System (Department Elective-II)

Teaching scheme hours				Subject Credits	Evaluation Scheme (Examination Scheme)				
Theory Hours	Tutorial Hours	Practical Hours	Total Hours		University Exam (E)		Internal Exam		Total Marks
					Theory (E)	Practical (E)	Mid Sem Theory (M)	Practical (I)	
4	2	0	6	6	70	30	30	20	150

Sr. No.	Course content	Total Hrs.
1.	Introduction: Development plans, objectives and goals; level of planning; role of transportation at national, regional and urban level. Urbanisation: Definition of urban area; trends in urbanization; urban class groups; metropolitan city; transportation problems & identification. Travel Demand: Concepts of travel demand; factors affecting demand and the demand functions; calibration methods; sequential, direct demand models; introduction to aggregate and disaggregate approaches.	12
2.	Transportation Surveys: The transportation study area definition; division into traffic zones; network identification and coding; types of travel and characteristics of various surveys; home interview; roadside survey; goods, mass transit and intermediate public transport surveys; sampling and expansion factors; accuracy checks, screen line checks, consistency checks. Travel Forecasting: Growth factor methods and urban transportation planning system; growth factors; average growth factor method and Furness method.	12
3.	UTP System: Trip generation; zonal regression methods and category analysis; trip distribution method; gravity models and opportunity models; mode split methods; factors affecting modal split; trip end models and trip distribution models; route assignment; factors affecting route choice; diversion curve; shortest paths; all or nothing assignment.	12
4.	Corridor Identification: Prediction issues and forecasting of the travel demand and future desires; corridor identification and corridor screen line analysis. Mass Transit Systems: Bus and rail transit; characteristics, capacities, route planning. Transportation Plan Preparation: Urban forms and structures; point, linear, radial, poly-nuclear developments and preparation of plan; comprehensive and traffic system management plans.	12

Note: Each module carries equal weight age

Term Work: Term work shall be based on the above mentioned syllabus

Reference Books:

1. B. G. Hutchison, Introduction to Transportation Engg. & Planning McGraw Hill Book Co.
2. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Pub. Co.
3. Edward K. Morlok, Introduction to Transportation Engg. & Planning, McGraw Hill Book Co
4. Vukan R. Vuchic, Urban Public Transportation System & Technology, Prentice Hall, Inc.

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-VIII EXAMINATION – SUMMER 2016****Subject Code: X80603****Date: 05/05/2016****Subject Name: Urban Transportation System****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the goals and objectives of urban transportation planning? Describe in detail. **07**
 (b) Define – Urban Area, Screen Line Check, CBD, Trip generation, Metropolitan City, Study Area, Home based trip. **07**

- Q.2** (a) What is Multiple Linear Regression Analysis? State the various assumptions and advantages for the same. **07**
 (b) The total trips production in and attracted to the three zones 1, 2 and 3 of a survey area in the design year are tabulated as below: **07**

Zones	Trips produced	Trips attracted
1	2500	3500
2	3000	4500
3	4000	2500

It is known that the trips between two zones are inversely proportional to the second power of the travel time between zones, which is uniformly 45 minutes. If the trips interchange between zones 2 and 3 is known to be 600, calculate the trip interchange between zones 1 to 2, 1 to 3, 2 to 1, 3 to 1 and 3 to 2.

OR

- (b) Explain any two methods of Trip distribution with their disadvantages. **07**
- Q.3** (a) Obtain the future O-D matrix from the given data using Average growth Factor Method for only two iterations. **07**

D \ O	1	2	3	Future trips
1	60	150	250	460
2	150	25	350	1250
3	250	350	25	3250
Future attraction	460	1250	3250	

- (b) Write short note on “Opportunity Models”. **07**

OR

- Q.3** (a) What are the types of Modal Split in transportation Planning Process? Explain any one with the help of elaborate flowchart. **07**
 (b) Explain Probit Analysis of Modal split analysis. **07**
- Q.4** (a) Which are the different techniques of Traffic assignment? Explain any two with the help of a neat diagram. **07**
 (b) Explain Moore’s Algorithm with the help of an example. **07**

OR

- Q.4 (a)** Write short note on Category Analysis. Enlist its advantages and disadvantages. **07**
- (b)** Write a short note on Urban Class Groups. **07**
- Q.5 (a)** Write short note on i) Segment Capacity ii) Home interview survey **07**
- (b)** (1) Discuss factors influencing individual choice of travel mode **04**
- (2) Explain Trip Production and Attraction with the help of neat figure. **03**
- OR**
- Q.5 (a)** Write short note on Diversion Curves. In order to relieve congestion on an urban street network, the construction of a motorway is proposed. The travel time from one zone centroid to another via the proposed motorway is estimated as 12 minutes against 20 minutes on an old connectivity. The flow between the two zone centroid is 1000 vehicles per hour. Assign the flow between the new motorway and existing streets. **07**
- (b)** What is meant by Mass Rapid Transit System? Compare between Metro Railway System and BRTS. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII EXAMINATION – WINTER 2015

Subject Code: X80603**Date: 04/12/2015****Subject Name: URBAN TRANSPORTATION SYSTEM (DEPT.ELE.-II)****Time: 2:30pm to 5:00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) 1. What are the factors affecting travel demand? **04**
 2. State 3 important problems in urban transportation. **03**
 (b) Explain various urban class groups. **07**
- Q.2** (a) Write about study area, zoning, sector, coding and basic movements in transportation survey with suitable sketch. **07**
 (b) Write about sampling size for home interview survey. Also, explain expansion of data from sample data collection for study area. **07**
- OR**
- (b) Discuss about various checks applied on collected data for transportation survey. **07**
- Q.3** (a) Explain concept of screen line survey and cordon line survey of study area for urban transportation plan preparation. **07**
 (b) What is mass transit system? Write suitability of bus transit and rail transit along with classification of urban mass transit system. **07**
- OR**
- Q.3** (a) Sketch and name basic urban forms and urban structures. **07**
 (b) Discuss about traffic system management techniques. **07**
- Q.4** (a) Discuss about sequential transportation demand analysis. **07**
 (b) 1. Find the maximum capacity per hour of BRTS for the frequency of 20 trips per hour on a corridor. Number of seats in a bus is 45 and load factor is 1.3. **03**
 2. Write short note on route planning for mass transit system. **04**
- OR**
- Q.4** (a) The present trips between the 3 zones A, B and C of a study area is as shown in trip matrix as below: produced trips in future and attracted trips in future is also given in table. **07**

Destination Origin	A	B	C	Future trips
A	-	20	13	50
B	5	-	12	51
C	35	15	-	100
Future trips	100	60	40	

Distribute the trips using Furnace method.

- Q.4** (b) In a mega city along an important roadway there are 5 multiplex. Develop the **07**

trip generation equation from the following data.

Multiplex having number of screen	No. of trips attracted
1	250
2	550
2	600
4	800
5	1000

Q.5 (a) What is captive transit rider?

07

Trip distribution for 4 zones is as shown below:

Destination Origin	1	2	3	4
1	-	500	600	400
2	1800	-	1400	350
3	600	650	-	630
4	2200	580	1620	-

The modal split data analysis indicates 20 % trips by private car and 80 % trips by public transportation bus system.

During peak hour car occupancy is 2 and bus occupancy is 60.

Calculate car trip matrix and bus trip matrix.

- (b)**
1. What is static traffic assignment and dynamic traffic assignment?
 2. Explain in brief intervening opportunity model?

03

04

OR

Q.5 (a) In a town there are 4 residential zones and 2 employment availability zones. The number of trip generation or production from home to job is as tabulated below:

07

Zone	No of trips
1	1000
2	2245
3	1750
4	3194

Total number of trips attracted at zone A is 4000 and zone B is 4400 from different residential zones.

The journey time in min. from home to job is as tabulated below:

Zone	A	B
1	25	20
2	25	14
3	12	14
4	18	22

Calculate interzonal trips using Gravity model and tabulate result matrix.

No need of iterative process.

- (b)**
1. What are the factors affecting modal split?
 2. What are the factors affecting trip production and trip attraction?

03

04

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII • EXAMINATION – SUMMER • 2015

Subject Code: X80603

Date: 13/05/2015

Subject Name: Urban Transportation System (Dept. Elective – II)

Time: 10:30 am - 01:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the factors affecting travel demand in urban area? Discuss in detail. **07**
(b) Give hierarchy of urban class groups; enlist the cities in India having population more than 1 million. **07**

- Q.2** (a) Explain in detail study area, zoning and cordon lines **07**
(b) Explain by drawing flow diagram of system approach for transportation planning stages. **07**

OR

- (b) Explain “linear regression analysis” for trip generation. **07**
Q.3 Develop the trip production equation and calculate multiplying, additive constant and ® coefficient of correlation. **14**

Average household size	2	3	4	5	6
Average total trips per day	5	6	8	11	12

OR

- Q.3** (a) Describe the inventory of transport facilities at urban level. **07**
(b) Give the formula for Uniform growth factor and average growth factor. Explain each parameter. **07**

- Q.4** (a) What are the factors affecting modal split? **05**
(b) The design year total person trips between 4 zones distributed is given in table. The modal split analysis shows 30/70 for private car vs public transport as an overall split. The peak period car occupancies is 2 persons and 50 persons per bus. Develop the trip matrices for 2 modes and total vehicular trips. If the goods vehicle contributes 18 % of person vehicle, calculate the total trips. **09**

	D	A	B	C	D
O					
A		---	1800	600	2200
B		500	---	650	580
C		600	1400	---	1620
D		400	350	630	----

OR

- Q.4** A study area has been divided in four zones A, B, C and D. The result of trip generation analysis and present trips, distribution matrix is shown in the table. **14**

O \ D	A	B	C	D	Present trips t_{ij}	Future trips T_{ij}
A	40	40	40	30	150	300
B	20	20	30	20	90	170
C	40	30	50	60	180	270
D	20	10	30	20	80	240
Trip produced	120	100	150	130	-	-
Future trips	180	300	300	200	-	-

Develop the future trip distribution matrix by average growth factor and Detroit method.

- Q.5** (a) What are the methods for checking the survey data? Explain accuracy check. **07**
 (b) Explain by drawing sketch point segment and corridor model. **07**

OR

- Q.5** (a) Explain the gravity model by giving formula. **07**
 (b) Give the classification of urban mass rapid transit system. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII • EXAMINATION – WINTER • 2014

Subject Code: X 80603**Date: 03-12-2014****Subject Name: Urban Transportation System****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the levels of Urban Transport Planning? Explain with sketch. **07**
 (b) Explain the role of Transportation. **07**

- Q.2** (a) Write a short note on “Road side Interview survey” **07**
 (b) Define – Trip Generation, Trip Distribution, Modal Split, Trip Assignment **07**

OR

- (b) Explain factors affecting Modal Split **07**

- Q.3** (a) Discuss about the Logit Model for Mode choice **07**
 (b) Write a short note on “Gravity Model” **07**

OR

- Q.3** (a) Compare trip modal and trip interchange modals in the modal split analysis. **07**
 (b) Develop the trip production equation and calculate all the relevant statistics to check the validity of the equation using the following data **07**

Household size	3	4	5	6	6
Trips per day	9	10	12	13	10

- Q.4** (a) What are the methods of Trip distribution? Explain any one method in detail. **07**
 (b) Write a short note on “All or nothing method” **07**

OR

- Q.4** (a) Define – Corridor, Segment capacity, Screen line, Home based trips, Zone **07**
 (b) Differentiate between BRT and METRO. **07**

- Q.5** (a) Explain the aggregate and dis aggregate approach to travel demand **07**
 (b) Enlist the methods of Trip Generation. Explain any one. **07**

OR

- Q.5** (a) What are the three basic attributes of any Transportation system? Explain **07**
 (b) Explain – Monorail Transportation System **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII • EXAMINATION – SUMMER • 2014

Subject Code: X 80603**Date: 31-05-2014****Subject Name: Urban Transportation System****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the functions of Transportation? Explain briefly. **07**
 (b) Enlist the various modes of Transportation system. Compare it in terms of attributes. **07**

- Q.2** (a) Explain the necessity of Transportation planning. **07**
 (b) Define - Trip, Growth Factor, Desire line, Through trips, Cordon line, Trip distribution, Trip assignment **07**

OR

- (b) Explain Zonal regression analysis method. **07**

- Q.3** (a) Develop the trip generation models for two independent variables from the following data: **07**

Income in thousand	Persons in household	Trips per day
30	2	2
50	2	2
70	4	4
90	6	6
110	7	4
130	8	5
150	9	5

- (b) Describe the Gravity model with its utility. **07**

OR

- Q.3** (a) A study area has been divided in Zone A, B, C and D. The result of the trip generation and trip distribution matrix is given below. **07**

Description		A	B	C	D
Produced trips	Present	130	160	220	90
	Future	350	180	300	290
Attracted trips	Present	180	80	170	170
	Future	280	300	250	290

Trip distribution matrix (present)

Destination Origin	A	B	C	D
A	30	30	40	30
B	50	20	50	40
C	80	20	60	60
D	20	10	20	40

Develop the future distribution of trip matrix using

- (a) Uniform growth factor method
 (b) Detroit method
 (b) What are the factors affecting individuals choice of travel mode? **07**

- Q.4 (a)** Develop the trip matrixes for the car, bus and total vehicular trips from the following data. **07**

Destination Origin	A	B	C	D
A	---	1800	500	2200
B	500	---	470	520
C	480	1500	---	1600
D	300	400	500	---

The modal split analysis shows 55/45 for private car vs public transport as an overall split. The peak period car occupancy is 1.9 persons per car and 48 persons by bus. If the goods vehicles constitute about 20% of the person vehicle trips, calculate the total vehicle trip.

- (b)** Explain “All or Nothing” Assignment Method **07**

OR

- Q.4 (a)** What is corridor? Explain by drawing sketch typical corridor components. **07**

- (b)** Explain private travel and para transit. **07**

- Q.5 (a)** Compare Trip end modal split and Trip interchange modal split **07**

- (b)** Describe briefly corridor identification and corridor screen line analysis **07**

OR

- Q.5 (a)** Write a short note on “Rail Based transit system” **07**

- (b)** Explain the advantages and limitations of Growth Factor methods. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII • EXAMINATION – SUMMER 2013

Subject Code: X80603**Date: 15-05-2013****Subject Name: Urban Transportation System****Time: 10.30 pm - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the levels of Urban Transport Planning? Explain with diagram. **07**
 (b) Define – Zone, Inter zonal trip, Trip distribution, Trip generation, Cordon line, Horizon year, Home based trip. **07**

- Q.2** (a) Explain the factors affecting Trip generation and Trip attraction. **07**
 (b) Develop a trip generation equation using regression equation from the following data. **07**
 Calculate the coefficient of correlation.

Average Household size	2	3	4	5	6
Average total trips per day	4	8	10	12	14

OR

- (b) Explain the Uniform Growth Factor and Average Growth Factor method of Trip distribution. **07**
- Q.3** (a) Distribute the trips using Furness method of trip distribution for the following data. **07**
 Carry out two iteration.

O \ D	A	B	C	D	Present Trips	Future Trips
A	-	300	200	150	650	1400
B	250	-	400	100	750	1600
C	150	350	-	200	700	1500
D	200	150	300	-	650	1200
Present trips	600	800	900	450	2750	--
Future trips	1300	1600	1700	1100	5700	--

- (b) Write a short note on “Gravity Model” **07**

OR

- Q.3** (a) What are the factors affecting Modal Split? Explain briefly. **07**
 (b) Discuss about the Logit Models for mode choice. **07**
- Q.4** (a) Compare the Private transport and Public transport in urban area. **07**
 (b) Write a short note on “BRTS” **07**

OR

- Q.4 (a)** Write a short note on “Home Interview Survey” **07**
(b) Define: - Corridor, Screen line, Segment capacity, Corridor analysis, Headway, Passenger capacity, Utilization. **07**

- Q.5 (a)** What are the purposes of Traffic Assignment Models ? **07**
(b) Using Gravity model analysis, find the number of trips between zones from the following data. Assume $K_{ij} = 0.9$ and exponent of travel time $n=1.9$ **07**

Trip Table

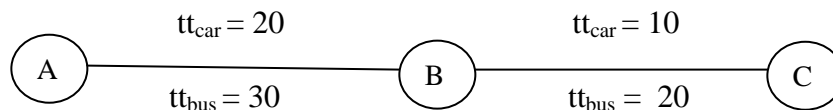
Zone No.	Trip Produced	Trips attracted
1	1000	-
2	1600	-
3	-	1400
4	-	1200

Trip Travel time (minutes)

O \ D	3	4
1	5	10
2	10	5

OR

- Q.5 (a)** Compare the various modes of Transportation in terms of three basic attributes. **07**
(b) Zone A, B, and C are connected by two roads as shown in fig. The Travel time between roads are also shown in fig. **07**



The probability of choosing the car mode is given by

$$P_{car} = \frac{1}{1 + e^{-ux}}$$

Where $ux = 0.90 - 0.08 (tt_{car} - tt_{bus})$

Total trip interchange between zones is as follows.

From	To	Persons trip per day
A	B	1000
B	A	0
A	C	600
C	A	1600
B	C	500
C	B	400

Determine the two way volume in car per day on the road A TO C if the average car occupancy is 2.2
