Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3164017   **Date:10/06/2022**
Subject Name:Urban Transport System Planning
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.**
4. **Simple and non-programmable scientific calculators are allowed.**

MARKS

Q.1 **(a)** Define: Urban Area, Trip, Zonal centroid.   **03**
(b) Briefly discuss with sketch urbanization process, merits and demerits of urbanization.   **04**
(c) From the data given in following table, develop three trip generation equations. Show which of the three models is more reliable and why?   **07**

No. of persons in house hold	Vehicle ownership	Trips per day
3	1	8
4	2	8
3	1	4
2	1	4
5	2	10
6	2	12
7	2	16
9	3	18
10	3	20
1	1	4
4	1	6
7	2	14

Q.2 **(a)** Compare LRT with BRT.   **03**
(b) Give a brief note on different types of para-transit systems.   **04**
(c) A study area has been divided in four zones 1, 2, 3, 4. the present trip distribution matrix is given with future total trip productions and trip attractions. Develop the future trip distribution matrix using: Average growth factor method. Do iteration process up to 2 stages.   **07**

	1	2	3	4	Total present production	Total future production
1	220	250	260	230	960	1870
2	240	200	270	220	930	1780
3	220	260	250	240	970	1800
4	250	270	230	210	960	1810
Total present attraction	930	980	1010	900	3820	-
Total future attraction	1810	1880	1740	1830	-	7260

OR

(c) Solve above example of Q. 2 (c) by Detroit method. Do iteration process up to 2 stages.   **07**

Q.3 **(a)** Define: TAZ, Basic Employment, Service Employment   **03**

(b) Describe 'Hansen's Accessibility Model'. **04**

(c) Using gravity model find the no. of trips between zones, as per following data. Do iterations up to 2 stages. Assume initially Kij = 1 & α = 2.0. Calibrate the gravity model. **07**

Trips between zones	No. of trips	Travel time in Minute
1 to 3	300	6
1 to 4	500	9
2 to 3	400	9
2 to 4	600	6

OR

Q.3 (a) Compare Linear Regression Analysis method with Cross Category Analysis method. **03**

(b) Explain in detail: Registration Number Plate Survey method for O-D matrix estimation. **04**

(c) Find the trip interchange for the given data using Intervening Opportunity Model. Take zonal acceptability factor l = 0.00055 **07**

Zone	1	2	3	4
Trip Produced	1450	1850	2680	1700
Trip attracted	2020	1680	2700	1450

The order of closeness

O \ D	1	2	3	4
1	1	3	4	2
2	4	1	3	2
3	3	2	1	4
4	2	4	3	1

Q.4 (a) What are the factors affecting individual's mode choice behavior? **03**

(b) Differentiate between Revealed Preference Survey and Stated Preference Survey. **04**

(c) The design year total person trips distributed between four zones A, B, C and D are shown in the table below. The modal split analysis shows 40/60 for private car vs public transport as an overall split. The peak period car occupancy is 2.5 persons per car and 52 persons per bus. Develop the trip matrices for the two modes and total vehicular trips. If the goods vehicles constitute at 21% of the person vehicle trips, calculate the total vehicle trips. **07**

O \ D	A	B	C	D
A	-	2080	1020	2300
B	1500	-	1800	1900
C	1800	1600	-	1520
D	1600	1700	1900	-

OR

Q.4 (a) Differentiate in details between Static Traffic Assignment and Dynamic Traffic Assignment. **03**

(b) Briefly explain the Floyd-Warshall's algorithm for finding shortest path. **04**

(c) The characteristics of two routes between two zones are given in table below. The total number of trips between these two zones is 2000 trips/hour. Assign the trips using iterative TRC trip assignment procedure. **07**

RouteNo.	No. of lanes	Speed Limit (kmph)	Length (km)	Critical Volume (vph/lane)	Critical travel time (min/km)	Ideal travel time with no volume (min/km)

1	One	50	6	600	4	3.4
2	One	80	9	1200	3	2.8

Q.5 **(a)** Define: Headway, Reliability, TSM. **03**

(b) Explain with sketches transit routing problem. Discuss the main entities involved in transit routing. **04**

(c) Construct a bus route schedule based on the running times given below. Headways are 25 min and minimum layovers are 7 min at each end or 10% of running time (total both layovers), whichever is greater. The first bus from A to D should leave at 7:00 am. The schedule should cover the time block from 7:00 am to 12:00 noon. **07**

Segment	A-B	B-C	C-D	D-C	C-B	B-A
Travel Time (min)	20	14	35	38	18	25

OR

Q.5 **(a)** Suggest suitable ITS applications in TSM. **03**

(b) Briefly discuss about the Urban Goods Movement. **04**

(c) An urban bus route has a patronage of 800 pass/h and a cycle time of 2.5h. It is operated with buses having a seating capacity of 50 pass. The operating cost is Rs. 3500/bus-h and the transit operator believes that passenger value waiting time at Rs. 600/h. The ratio of max. load to the total no. of pass. Boarding is 0.5 and the operator's max. load factor standard is 1.1. Determine the capacity headway, the headway that minimizes the sum of operating cost and passenger's time costs, and the actual headway to be operated. All headways are to be rounded off to the nearest minute. **07**

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