Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2174006 **Date:30/01/2021**

Subject Name:Advanced Transportation Engineering

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	Draw the flow chart and show various steps involved in Transportation Planning process.	**03**
	(b)	Explain with flow chart 'Lowry's Derivative Model'	**04**
	(c)	Explain different types of para-transit systems.	**07**
Q.2	**(a)**	Briefly discuss about various factors affecting trip production and trip attraction.	**03**
	(b)	Briefly explain 'Land Use Planning' and 'Traffic Analysis Zones'.	**04**
	(c)	Explain the following terms with help of a sketch of study area and zones. (i) Cordon line, (ii) Central business district, (iii) Intra-zonal trip, (iv) Screen line	**07**
Q.3	**(a)**	What are the problems in urban transportation in the present scenario of high vehicle ownership?	**03**
	(b)	Explain briefly various trip distribution methods with their limitations and advantages.	**04**
	(c)	From the data given in following table, develop three trip generation equations. Show which of the parameters is more reliable and why?	**07**

No. of persons in house hold	Vehicle ownership	Trips per day
3	2	8
4	2	8
3	1	4
2	0	2
5	2	10
6	3	12
7	1	16
9	2	18
10	3	20
1	0	4
4	1	6
7	2	14

Q.4	**(a)**	Discuss the factors which are considered for evaluation of urban mass transport systems.	**03**
	(b)	Explain with example category analysis for trip generation analysis. What are the merits and limitations of it?	**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 1 stage.	**07**

O \ D	1	2	3	4	Total present production	Total future production
1	120	150	160	130	560	870
2	140	100	170	120	530	780
3	120	160	150	140	570	800
4	150	170	130	110	560	810
Total present attraction	530	580	610	500	2220	-
Total future attraction	810	880	740	830	-	3260

Q.5 **(a)** Describe Revealed Preference Survey and Stated Preference Survey. **03**

(b) Explain briefly: (i) Metro Rail; (ii) LRT **04**

(c) Using a gravity model, with an impedance term of the form $C^{-\alpha}$, estimate the number of trips from zone – 3 to all other zones. Take $\alpha = 1.8$ **07**

Zone	Travel time to zone-3 (min)	Production	Attractions
1	14	20000	10000
2	22	15000	30000
3	-	35000	18000
4	16	25000	10000
5	30	18000	40000

Q.6 **(a)** Discuss briefly the methods of route assignment analysis. **03**

(b) Explain with sketches transit routing problem. Discuss the main entities involved in transit routing. **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 25/75 for private car vs public transport as an overall split. The peak period car occupancy is 2.5 persons per car and 50 persons per bus. Develop the trip matrices for the two modes and total vehicular trips. If the goods vehicles constitute at 20% of the person vehicle trips, calculate the total vehicle trips. **07**

O \ D	A	B	C	D
A	-	2000	700	2200
B	500	-	800	900
C	800	1600	-	1520
D	600	700	900	-

Q.7 **(a)** Briefly explain the Moore's algorithm for finding shortest path. **03**

(b) On an urban corridor regular bus transit is operated with headway of 10 minutes during peak hour. The reliability of transit arrival at a stop is observed 80%. If the seating capacity of a bus is 50 and load factor 1.5. Calculate vehicle capacity of transit. If 50% schedule operated during peak hour and double decker bus with seating capacity of 75 and load factor is 1.25, what will be the change in passenger capacity? **04**

(c) Explain with sketches various types of urban forms and structures. How these are affecting transportation planning? Suggest the suitable mass transit systems for different urban forms. **07**

Q.8 **(a)** Briefly describe the following parameters used for transit system design: Headway, Generalized cost, Vehicle capacity. **03**

(b) Describe 'Transportation System Management (TSM)' planning, its objectives, planning cycle and various actions. Suggest suitable ITS applications in TSM. **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 1800 trips/hour. Assign the trips using iterative TRC trip assignment procedure (upto 2 iteration stages). **07**

Route No.	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	5	600	3	2.0
2	One	80	8	1200	4	2.8

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