

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2024****Subject Code:3164017****Date:24-05-2024****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) Briefly mention the salient features of BRTS of Ahmedabad. **03**
- (b) Explain with flow chart various steps involved in Urban Transportation System Planning. **04**
- (c) From the data given in following table, develop trip generation equation and find  $R^2$  value using regression analysis. Give statistical comments on the developed model. **07**

HH Size	4	1	3	2	4	5	3	5	4	2
Trips/day	9	2	8	5	12	14	7	16	11	6

- Q.2** (a) Justify the necessity of Metro Rail System in the Indian cities. **03**
- (b) State the limitations of growth factor methods in trip distribution. **04**
- (c) A study area has been divided in three zones 1, 2, and 3. 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 iterative process up to two stages. **07**

D \ O	1	2	3	Total present production	Total future production
1	1200	1500	1600	4300	8400
2	1400	1000	1700	4100	8000
3	1100	1300	1800	4200	8300
Total present attraction	3700	3800	5100	12600	-
Total future attraction	7100	7600	10000	-	24700

**OR**

- (c) Explain briefly Gravity model with its limitations and advantages for trip distribution analysis. **07**

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  $\alpha = 1.9$ .

Zone	Travel time to zone-3 (min)	production	Attractions
1	9	20000	30000
2	10	15000	20000
3	-	30000	28000
4	7	25000	15000
5	8	18000	24000

- Q.3** (a) Briefly discuss land use-transportation interaction. **03**  
 (b) Compare “Trip-End Model” with “Trip-Interchange Model”. **04**  
 (c) A market segment consists of 1500 individuals. A multinomial logit mode choice model is calibrated for this market segment, resulting in the following utility function. **07**

$$u = \beta_m - 0.41 C - 0.031 T$$

where, C = out-of-pocket cost (Rs.) and T = travel time (min). Values of  $\beta_m$  for Bus transit: 0.10, Rail transit: 0.70 and Auto: 2.1. For a particular O-D pair, the cost & travel time for these three modes are as follows.

Mode	Travel Time (min)	Cost (Rs.)
Bus	30	15.40
Rail	20	18.70
Auto	15	24.40

Predict the number of trips by each mode from this market segment.

**OR**

- Q.3** (a) Draw the typical diversion curves for the Mode Choice Analysis and give your comments on it. **03**  
 (b) Explain the procedure of conducting ‘Home Interview Survey’ with its format. **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 2.3 persons per car and 50 persons per bus. Develop the trip matrices for the two modes and for the total vehicular trips. If the goods vehicles constitute at 20% of the person vehicle trips, calculate the total vehicle trips including goods vehicles. **07**

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

- Q.4** (a) Differentiate between RP and SP survey in modal split analysis. **03**  
 (b) Discuss about necessity and method of conducting Boarding-Alighting of Passenger survey in urban mass transportation system planning. **04**  
 (c) The total trip volumes from zone 1 to 2 are 4600. Find the volumes on each route connecting two zones, using the particulars given in table below. Use TRC trip assignment. **07**

Route No.	Length (Km)	Speed (kmph)
1	2.6	30
2	1.8	22
3	1.5	10
4	3.4	20

**OR**

- Q.4** (a) Describe “All-Or-Nothing” trip assignment procedure. **03**  
 (b) Briefly discuss the importance and applications of TSM techniques. **04**

- (c) On an urban corridor, regular bus transit is operated with headway of 8 minutes during peak hour. The reliability of transit arrival at a stop is observed 85%. If the seating capacity of a bus is 52 and load factor 1.3. Calculate vehicle capacity and passenger capacity of transit. If 50% schedule operated during peak hour with double decker bus having seating capacity of 75, and load factor is 1.2. What will be the change in passenger capacity? **07**

- Q.5** (a) Define: Corridor, Zonal centroid, Intrazonal trips. **03**  
 (b) Describe the general problems in urban goods movement. **04**  
 (c) Construct a bus route schedule based on the running times given below. Headways are 15 min and minimum layovers are 5 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 8:30 am. The schedule should cover the time block from 8:30 am to 12:30 pm. **07**

Segment	A-B	B-C	C-D	D-C	C-B	B-A
Travel Time (min)	15	10	30	32	14	18

**OR**

- Q.5** (a) Briefly discuss with sketches bus routing problem. **03**  
 (b) Briefly explain with sketch “Linear type urban structure”. Suggest suitable mass transport systems for it. **04**  
 (c) State various measures of increasing the capacity of urban mass transit system. If the corridor is converted into BRT corridor, then the reliability is 0.85. The buses are of articulated with 100 seat capacity and permissible stands are 52%, headway is 8 minutes. Calculate the vehicle capacity and passenger capacity. **07**

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