Seat No.: ________ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2174006 **Date: 03/12/2019**

Subject Name: Advanced Transportation Engineering(Departmental Elective - II)

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. **Support your answers with suitable neat sketches.**

Q.1 **(a)** Briefly discuss main objectives of the Urban Transport Planning. **03**

(b) Discuss the parameters to be satisfied by urban mass transport systems. **04**

(c) From the data given in following table, develop trip generation equation and find R^2 value. **07**

HH Size	2	1	3	2	4	6	7	5	3
Trips/day	6	2	8	4	12	18	20	16	10

Q.2 **(a)** Briefly explain with sketch the process of urbanization. **03**

(b) Compare in detail Metro Railway with BRTS. **04**

(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 – 2 to all other zones. Take $\alpha = 2.1$

Zone	Travel time to zone-2 (min)	production	Attractions
1	8	20000	10000
2	-	15000	30000
3	12	30000	18000
4	6	25000	10000
5	10	18000	40000

OR

(c) Find the trip interchange for the given data using Intervening Opportunity Model. Take l (zone factor) = 0.0005 for all zones. **07**

Zone	1	2	3
Trip Produced	1000	1500	800
Trip attracted	2000	1600	2700

The order of closeness

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

Q.3 **(a)** Briefly discuss about various factors affecting trip production and trip attraction. **03**

(b) Briefly explain the following terms with help of a sketch of study area and zones. (i) Cordon line, (ii) Zones, (iii) Centroid of zone, (iv) Inter-zonal trip. **04**

(c) A study area has been divided in three zones 1, 2, 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 **07**

iteration process up to 2 stages.

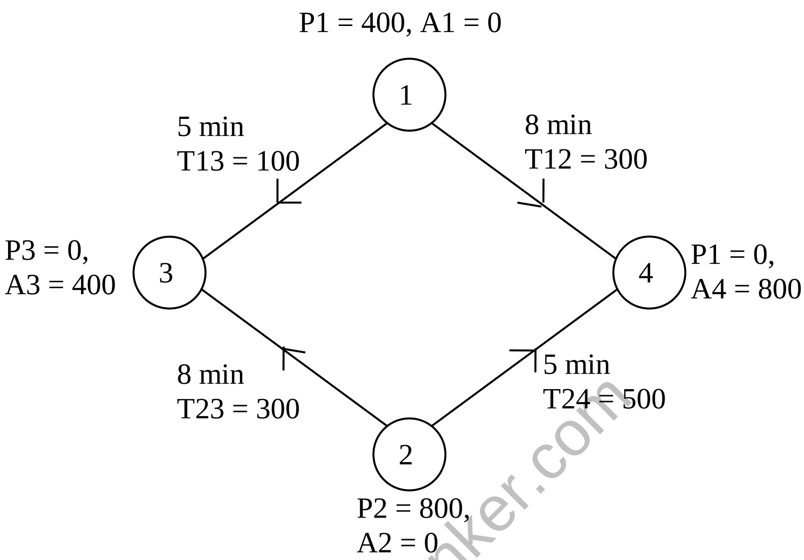
D / O	1	2	3	Total present production	Total future production
1	120	150	160	430	840
2	140	100	170	410	810
3	110	130	180	420	820
Total present attraction	370	380	510	1260	-
Total future attraction	720	750	1000	-	2470

OR

Q.3 **(a)** What are the factors affecting individual's choice of the travel mode? **03**

(b) Explain briefly with format: Home Interview Survey. **04**

(c) Using gravity model find the no. of trips between zones, shown in the following figure. Do iterations up to 2 stages. Assume initially Kij = 1 & $\alpha = 2.0$. Calibrate the value of α after 2 iterations. **07**



Q.4 **(a)** Briefly explain with flow chart 'Lowry's Derivative Model'. **03**

(b) Briefly discuss any two methods of route assignment analysis. **04**

(c) A market segment consists of 1000 individuals. A multinomial logit mode choice model is calibrated for this market segment, resulting in the following utility function. **07**

$u = \beta_m - 0.42\,C - 0.032\,T$

where, C = out of-pocket cost (Rs.) and T = travel time (min). Values of β_m for Bus transit: 0.20, Rail transit: 0.85 and Auto: 2.25. 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	2.40
Rail	20	2.70
Auto	15	4.40

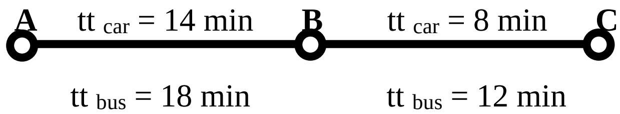
Predict the number of trips by each mode from this market segment.

OR

Q.4 **(a)** Briefly describe 'Hansen's Accessibility Model'. **03**

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

(c) Three zones A, B and C are connected by two lane roads as shown in figure below. The probability of choosing the car mode (P_c) is found to be given by $P_c = 1 / (1+e^{-u(x)})$. Where, $u(x) = 0.70-0.04(tt_{car} - tt_{bus})$ **07**



The total trip exchanges between zones are as follows. Determine the two way volume in cars per day on the roads AB and BC, if the average car occupancy is 2.6.

From	To	Person trips per day
A	B	1100
B	A	0
A	C	800
C	A	1500
B	C	900
C	B	800

Q.5 **(a)** Give a brief note on 'Urban Goods Movement'. **03**

(b) Briefly describe the following parameters used for transit system design: Headway, Capacity, Load factor, Passenger capacity. **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 1500 trips/hour. Assign the trips using iterative TRC trip assignment procedure. **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	800	4	3
2	One	70	6	1200	3	2

OR

Q.5 **(a)** Briefly describe 'Transportation System Management (TSM)' planning and its objectives. **03**

(b) Briefly explain with sketches any two types of urban forms and structures. Suggest the suitable mass transit systems for them. **04**

(c) Construct the minimum path tree for origin node-1 using Moore's method for a given road network in Figure-1. Travel time in minutes is shown on each link. **07**

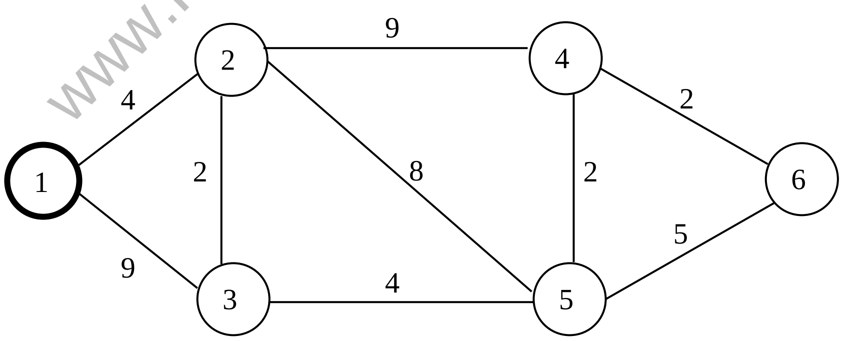


Figure-1

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