APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

JYOTHI ENGG. COLLEGE
THRISSUR EDUCATIONAL TRUST

Name: .....

Q. P. Code: **TE0821105-I** (Pages: 4) Reg. No: .....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2021

Branch: Civil Engineering **Specialization: Transportation Engineering**

08CE6205 URBAN TRANSPORTATION

Time: 3 hours **(Common to TE)** **Max. Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	What is a trip? Explain the factors affecting the trip making behaviour of a person?	3
	Answer b or c	
b	With a neat flowchart explain the traditional 4 step travel demand forecasting process.	6
c	Explain the role of transportation in society and substantiate of need of transport planning.	6

Q.no.	Module 2	Marks
2.a	Enumerate the factors to be considered for the selection of cordon line and zone boundaries for an urban transportation study.	3
	Answer b or c	
b	A small study area represented by 10 traffic analysis zones (TAZ) has the following characteristics: T(Trip productions) and C (Car Ownership).	6

Zone	1	2	3	4	5	6	7	8	9	10
T	600	630	900	850	750	290	570	600	450	450
C	500	320	710	615	280	130	400	470	250	200

Use the method of least squares to develop the regression model for predicting trip productions as a function of car ownership in a TAZ.

c The following equations were established for a study area. 6

(i) $T = 4.0 + 4.89X1 - 0.004\ X2 - 0.2\ X3 - 0.01\ X4$ ($t1=5, t2=3, t3=9, t4=1.2, R^2=0.69$)

(ii) $T = 30 + 5.9\ X1$ ($t=25, R^2 = 0.45$)

(iii) $T = 300 + 0.25\ X2$ ($t=41, R^2=0.23$)

(iv) $T = 25 + 2.4X1 + 0.15X2$ ($t1=35, t2=95, R^2=0.85$)

T= trips per household
X1= vehicle ownership (cars per household)
X2= population density (persons per acre)
X3= distance from CBD (miles)
X4 = family income (1000 dollars)
Comment on the reasonableness/validity and logic of these equations for use in this study.

Q.no.	Module 3	Marks
3.a	Discuss the advantages of Gravity Model of Trip Distribution over the growth factor methods.	3

Answer b or c

b Develop the future trip distribution matrix using Fratar method. The base year trip matrix (trip table representing 2500 trips in total) and horizon year origin and destination growth factors are given below: **6**

O/D	1	2	3	Total
1	1	4	2	7
2	6	2	3	11
3	4	1	2	7
Total	11	7	7	25

Zone	1	2	3
Origin Factor(Production)	2	3	4
Destination Factor(Attraction)	3	4	2

c A 3x 3 trip table for the base year trip is shown below. With the given horizon year trip ends, distribute the trips using Detroit method: **6**

Pi	3000	5000	4000
Aj	2000	4500	3500

O/D	1	2	3
1	200	700	500
2	600	100	800
3	400	900	300

Q.no.	Module 4	Marks
4.a	Explain the concept of utility with respect to mode split.	3

Answer b or c

b A city has a utility function for use in a logit model of the form, U= - 0.075 A – 0.5W – 0.04R – 0.02C, where A is the access time in minutes, W is the waiting time in minutes, R is the riding time in minutes and C is the out -of – pocket costs in cents. What modal distribution would you expect, for 12,000 workers, using the following values for A, W, R and C, for the four modes used in the city. **6**

Mode	A	W	R	C
Automobile	6	1	25	300
Light Rail	7	10	15	75
Bus	10	15	35	60
Bike	1	0	45	10

c A mode choice model was developed with the observable utility functions for auto, bus and train as shown below: 6

$V_{auto} = 0.10 - 0.3$ IVTT $- 0.5$ OVTT $- 0.6$ C

$V_{bus} = -0.2 - 0.3$ IVTT $- 0.5$ OVTT $- 0.6$ C

$V_{train} = - 0.3$ IVTT $- 0.5$ OVTT $- 0.6$ C

Where, IVTT = in vehicle travel time (min); OVTT = out of vehicle travel time (min); C = Cost (Rs.). The table below shows data for one individual.

Mode	IVTT(min)	OVTT(min)	Cost
Auto	14	2	6
Bus	20	5	2
Train	16	4	2.5

Using the multinomial logit model and the given data, calculate the probability that this individual will choose each mode (auto, bus, train). Also discuss the sensitivity on mode choice, if an extra parking charge of Rs. 30 is induced for car.

Q.no. **Module 5** **Marks**

5.a What is meant by traffic assignment? List out the methods of traffic assignment. **4**

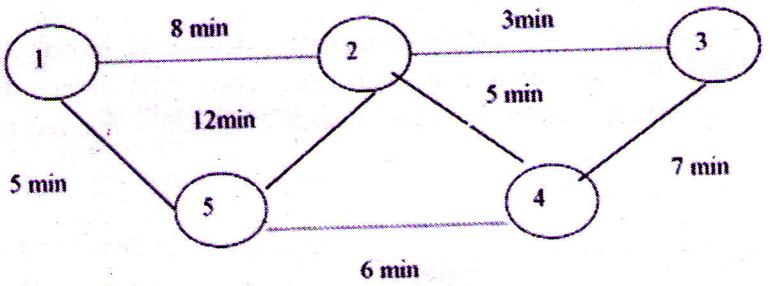
Answer b or c

b The description of a network (2-way links) is given below. Find minimum path from node A to B, C and D using minimum path algorithm. **8**

Links	Travel Time(min)
1 to 2	13
1 to A	14
1 to 4	13
2 to 3	14
2 to 5	14
3 to B	13
3 to 6	12
4 to 5	15
4 to 7	17
5 to 6	17
5 to 8	18
6 to 9	19
7 to 8	10
7 to C	15
8 to 9	12
9 to D	14

c Assign the vehicle trips shown in the following O-D trip table to the network, using the all-or-nothing assignment technique. **8**

	Trips between Zones					
From/to	**1**	**2**	**3**	**4**	**5**	**Total**
1	0	50	60	70	30	210
2	40	0	30	60	80	210
3	90	40	0	20	50	200
4	80	70	90	0	30	270
5	30	40	50	60	0	180
Total	240	200	230	210	190	1070



Module 6

6.a Explain how the use of different transportation planning software aid a transport planner in various studies. **4**

Answer b or c

b What is corridor? Elaborate the demand adjustment algorithm for segment capacity. **8**

c Explain how GIS can be used as effective tool in Transportation Planning? **8**