

Daffodil International University
School of Science and Engineering
Department of Civil Engineering
Mid Term Examination, Fall-2019
Course Title: Transportation Engineering I
Course Code: CE 351

Marks: 25

Time: 1 Hour

(Answer any *two* out of **three** questions)

1. (a) A calibration study resulted in the following utility equation for different modes in a particular city. Use Logit model. i) Estimate the number of trips taken by the different modes in a particular city. [6.5]

$$U_k = a_k - 0.13 X_1 - 0.04 X_2 - 0.05 X_3 - 0.005 X_4$$

Where, a_k = mode specific constant

X_1 = access time in minutes

X_2 = waiting time in minutes

X_3 = Line haul time in minutes

X_4 = out of pocket cost in taka

Table 1

	a_k	X_1	X_2	X_3	X_4
Automobile	-0.10	5	0	20	50
Bus	+0.22	10	15	40	60

- ii) A new mode, rapid transit is introduced between the zones. Its characteristics are as follows:

$$X_1 = 10; X_2 = 5; X_3 = 30; X_4 = 75$$

It could be estimated that the specific constant for rapid transit to be -0.41. What is the modal share between the three modes now?

- (b) The speed of overtaking and overtaken vehicles are 70km/hr and 55km/hr respectively on a two way traffic road. If acceleration of overtaking vehicle is 3.1km/hr/sec. calculate (i) safe OSD (ii) minimum length of overtaking zone. [4]
- (c) Narrate different Level of Service (LOS) as per highway capacity manual. [2]
2. (a) An urban area is divided into 4 zones for transportation demand analysis. Zone pair trip distribution is given in table 2 and zone pair travel time is given in Figure 1 below. Calculate total no. of trip assigned in each link of road. Using all or nothing assignment model. [6.5]

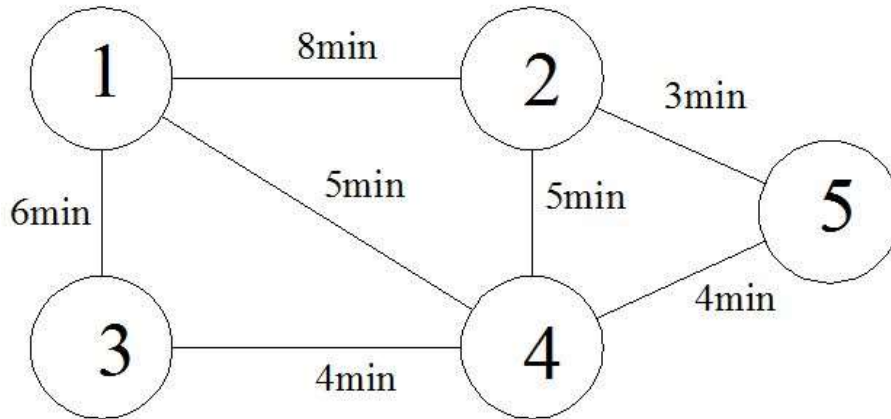


Figure 1

Table 2

OD	1	2	3	4	5
1	0	50	90	65	40
2	60	0	50	80	50
3	70	100	0	100	30
4	30	60	60	0	50
5	50	80	70	100	0

- (b) Sketch diagrammatic representation of basic movements. Write short note on: modal split, trip distribution. [4]
- (c) What are the steps of transportation planning process? [2]
3. (a) The design speed of a highway is 70kmph. There is a horizontal curve radius 100m. Calculate the super elevation needed to maintain the speed. If maximum super elevation of 1 in 12 is not exceeded. Calculate maximum allowable speed on the horizontal curve. Design value of lateral friction coefficient 0.15. [6.5]
- (b) An accident investigator estimates that a vehicle hit a bridge abutment at a speed of 15mile/hr, based on his assessment of damage. Leading up to the accident location, he observes skid marks of 150ft on the pavement ($F=0.25$) and 60ft on the grass shoulder ($F=0.3$). There is no grade. An estimation of the speed of the vehicle at the beginning of the skid marks is desired. [4]
- (c) Draw flow diagram of urban transportation planning process. [2]