

國立中央大學94學年度碩士班考試入學試題卷 共 2 頁 第 1 頁
 所別：土木工程學系碩士班 己組(一般生) 科目：運輸工程

Transportation Engineering

Total score: 100%

Note: 1. You can write your answers in Chinese. For the first three problems, please write down your calculation procedures instead of answers only.
 2. $g = 32.2 \text{ ft/sec}^2$ and 1 mile = 5280 feet.

Problem 1 (20%): Given comfortable deceleration = 8 ft/s^2 , a perception-reaction time = 1 second, an intersection of width 41 feet. If the speed limit is 30 mile/hr, and the amber duration is 5 seconds, how long is the dilemma zone for a "BUS" type vehicle (length = 40 feet) to pass the cross-section? In order to remove the dilemma zone, suppose we are changing the amber duration and the speed limit. What are the minimum amber duration and its corresponding speed limit?

Problem 2 (20%): Assume that a driver with normal vision can read a sign from a distance of 40 feet for each inch of letter height and that the "design driver" has a 20/40 vision. Determine how far away from an exit ramp a directional sign should be located to allow a safe reduction of speed from 60 mile/hour to 30 mile/hour, given a perception-reaction time of 1.5 seconds, a coefficient of friction of 0.25, a letter size of 8 inches and a level freeway.

Problem 3 (30%): This problem addresses the sequential forecasting process in predicting urban transportation demand. There are three sub-problems contained.

(a) (10%) Given the following trip generation rates for different household (HH) sizes and auto ownership for Zone 1,

Persons/HH	1	2,3	4	5+
0	0.50	2.10	4.50	7.00
1	1.40	3.10	5.50	8.00
2+	1.90	3.60	5.90	9.00

suppose that the number of each type of household in the target year is predicted as shown in the tableau below:

Persons/HH	1	2,3	4	5+
0	100	120	180	20
1	300	400	220	50
2+	150	330	150	10

Please forecast the total trips generated (Q_1) in the target year.

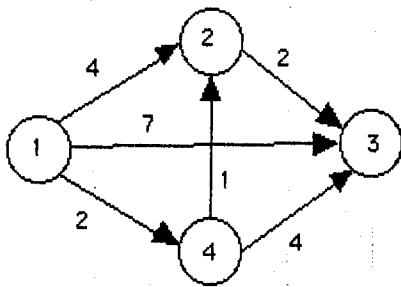
注意：背面有試題

(b) (10%) Continuing (a), apply the gravity model to calculate the interchange volume between zone 1 and each of the following zones: 1, 2, 3, and 4 (Q_{11} , Q_{12} , Q_{13} , and Q_{14}), given the following information:

zone	relative attractiveness (A)	relative impedance (W)	socioeconomic adjustment (K)
1	0	1	1.0
2	3	3	1.05
3	4	4	1.10
4	3	2	0.95

Also assume the interchange volume is inversely correlated with the square of impedance (W^2).

(c) (10%) Continuing (b), given the traffic network below, where the number on each link is the link impedance. Use the all-or-nothing approach to assign Q_{11} , Q_{12} , Q_{13} , and Q_{14} on shortest paths in the network.



Problem 4 (30%): Answer the following questions:

- (5%) What are classifications of transportation systems?
- (5%) What is the objective of phasing in determining the cycle of a signalized intersection?
- (5%) What is channelization used for? Please show two examples of channelization.
- (5%) What is "Intelligent Transportation Systems"?
- (5%) List at least three differences between domestic and international airports.
- (5%) In ocean transportation, explain what liners and non-liners are, respectively.