

# 國立中央大學八十八學年度碩士班研究生入學試題卷

所別: 土木工程研究所 己組 科目: 運輸工程 共 / 頁 第 / 頁

Note that there are six problems in this exam. You are allowed to answer in Chinese.

**Problem 1 (15%):** A driver traveling at the speed limit of 30 mile/hour was cited for crossing an intersection on red. He claimed that he was innocent because the duration of the amber display was improper and, consequently, a dilemma zone existed at that location. Using the following data, determine whether the driver's claim was correct.

- amber duration = 4 second
- perception-reaction time = 1.5 second
- comfortable deceleration = 11 ft/second<sup>2</sup>
- car length = 15 ft
- intersection width = 45 ft

**Problem 2 (10%):** The travel times shown were measured for vehicles as they traveled a 2.0-mile segment of highway. Compute the time mean speed and the space mean speed.

Vehicle	Travel Time (minute)
1	2.6
2	2.5
3	2.3
4	2.5
5	2.7
6	2.4

**Problem 3 (15%):** The relationship of speed  $u$  (mile/hr) and spacing  $s$  (mile/veh) is given as:  
 $s = 1/(200 - 4u)$

Please find the free-flow speed  $u_f$  (mile/hr), the jam concentration  $k_j$  (veh/mile) and the capacity  $q_{max}$  (veh/hr).

**Problem 4 (15%):** For intersection capacity analysis, given an ideal saturation flow (unit: passenger cars per hour of green per lane), please describe the factors and their adjustments on the ideal saturation flow in order to estimate the prevailing saturation flow for a specific lane group.

**Problem 5 (20%):** A 1000-ft vertical curve connects a +6% grade ( $G_1$ ) to a -2% grade ( $G_2$ ) at station 30+00 and elevation 800 ft for VPI (vertical point of intersection).

- (a) (15%) What are the elevations at the VPC (vertical point of curvature), VPT (vertical point of tangency) and the highest point?
- (b) (5%) Assuming driver eye and oncoming vehicle heights are 3.5 ft ( $h_1$ ) and 4.25 ft ( $h_2$ ), what is the available passing sight distance ( $S$ )?

Note: Vertical alignment:

$$A = G_2 - G_1, E = AL/800, y = 4E(x/L)^2, X = LG_1/(G_1 - G_2).$$

Where  $L$  is the length (ft) of the vertical curve,  $y$  is the curve elevation (ft) at the point with distance  $x$  from VPC, and  $X$  is the distance (ft) from VPC to the highest point.

Crest vertical sight distance:

$$L = |A|S^2/[200(h_1^{1/2} + h_2^{1/2})^2] \quad \text{for } S \leq L$$

$$L = 2S - 200(h_1^{1/2} + h_2^{1/2})^2/|A| \quad \text{for } S \geq L$$

**Problem 6 (25%):** Briefly answer the following questions.

- (a) (5%) What is the definition of a transportation system?
- (b) (5%) What is the difference between "Transportation Engineering" and "Traffic Engineering"?
- (c) (10%) Please explain what "transportation planning" means. Please discuss the issues that should be noticed in transportation planning.
- (d) (5%) Please explain the "license plate" approach for surveying origin-destination data.

參考用