

系所別: 土木工程學系 己組 科目: 運輸工程**Transportation Engineering****Total score: 100%**

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

Problem 1 (10%): A vehicle is traveling on a circular path of radius $R = 1000 \text{ ft}$ and superelevation $e = 0.08$. Determine the maximum safe speed to avoid slipping, assuming that the coefficient of side friction is 0.2.

Problem 2 (20%): A vehicular stream at $q_a = 1600 \text{ veh/hour}$ and $k_a = 40 \text{ veh/mile}$ is interrupted by a flag-person for 5 minutes beginning at time $t = t_0$. At time $t = t_0 + 5 \text{ minutes}$, vehicles at the front of the stationary platoon begin to be released at $q_b = 1800 \text{ veh/hour}$ and $u_b = 20 \text{ mile/hour}$. Assuming that the congested flow density $k_j = 240 \text{ veh/mile}$, calculate the number of vehicles in the platoon at $t = t_0 + 5$. Compute the amount of time (minutes) it will take the platoon to disappear after $t = t_0 + 5$.

Problem 3 (20%): The signals at the intersections of a one-way street have been timed and coordinated as follows:

Intersection	Green (sec)	Y+AR (sec)	Red (sec)	Offset (sec)	Distance from A (ft)
A	40	5	35	0	0
B	50	5	25	25	1760
C	45	5	30	13	4400

Given a design speed of 30 mile/hour, determine the width of the resulting through band.

Problem 4 (20%): A 1200-ft vertical curve connects a +2% grade to a -4% grade at station 30+00 and elevation 500 ft for VPI (vertical point of intersection). Please calculate the elevation of the highest point on the curve.

Problem 5 (30%): Explain the following terms:

- (5%) dilemma zone
- (5%) saturation flow
- (5%) commuter rail system
- (5%) HOV lane
- (5%) airport gate assignment
- (5%) intermodal transportation