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Highways & Transportation I (ECIV 4333)
Answer the following questions
Time Allowed 135 Minutes

FINAL EXAM

اسم الطالب/ة	الرقم الجامعي

Question No.	Mark	Max. Mark	Notes
1		**6**	
2		**8**	
3		**7**	
4		**7**	
5		**10**	
6		**12**	
total		**50**	

Question 1: **(6points)**

Study the following statements & indicate if they are (**True or False**) & **Comment**.

☐ A. The dark accident rate is much more than daylight rate.

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☐ B. It is preferred to have a T- intersection.

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☐ C. Level-of-service criteria are applied to travel during the off peak period.

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☐ D. Level-of-service designations are from A (lowest) to F (highest).

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☐ E. Traffic flow theory involves mathematical relationships between flow and density.

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☐ F. Intersections tend to have high potential for crashes.

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Question 2: **(8 points)**

A) Define

1. Space headway

2. Critical Gap time

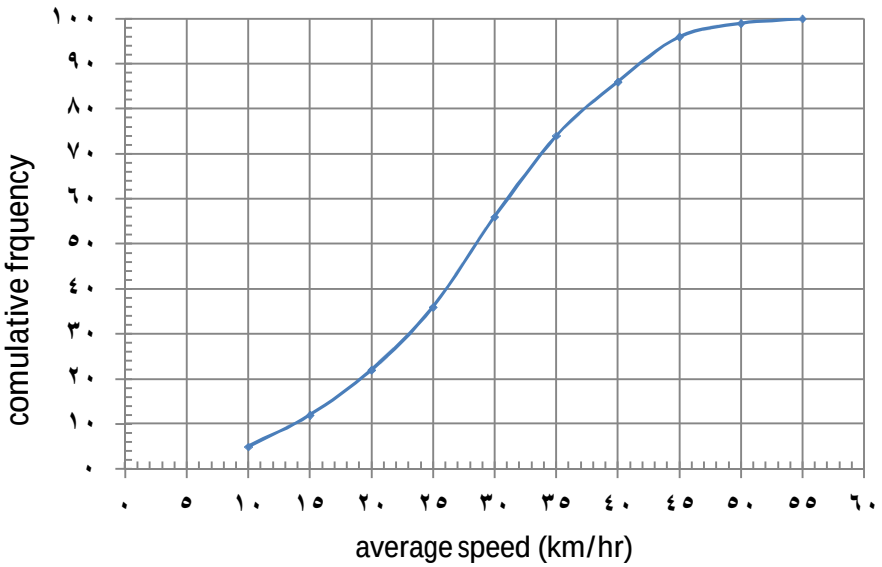
3. Pace speed

B) Compare between time mean speed and space mean speed.

C) **What** are the basic forms of at grade intersections using sketch?

Question 3: **(7 points)**

The following chart shows the cumulative frequency distribution Curve of a spot speed study on an existing freeway.



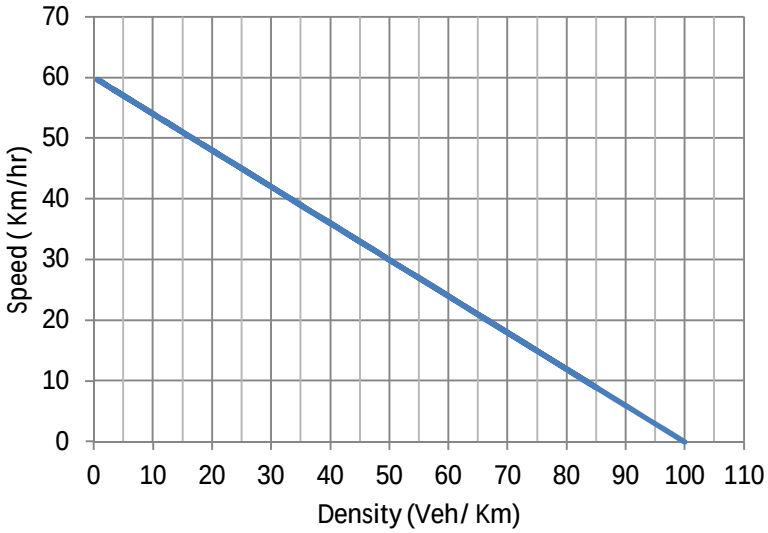
A. Complete the missing data in the following table:

Class Mid-value (km/h)	Number of vehicles	%of observation	Cum. % of observation	
10	……			
15	……			
20	……			
25	……			
30	……			
35	……			
40	……			
45	……			
50	12	3%		
55	……			

B. Determine the Median speed, Average speed, Model speed and the 90^{th}-percentile speed.

Question 4: **(7 points)**

Use the following relationship between speed and density to answer the following questions:



A. Derive the equation of speed and flow.

B. Draw the relationship between flow and density using the above chart.

C. Find the density at maximum flow.

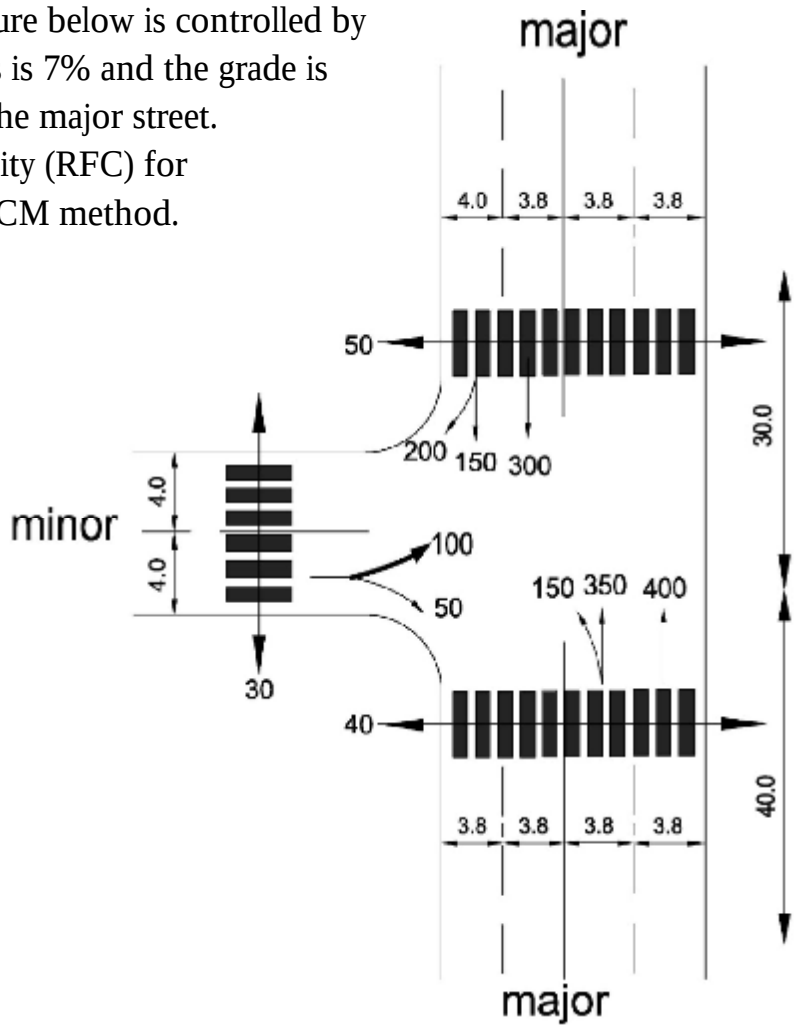
D. Calculate the speed at maximum flow.

E. Find the capacity.

Question 5: **(10 points)**

A T- intersection shown in the figure below is controlled by priority rule. The percent of trucks is 7% and the grade is 2%in the minor street and 3% in the major street.

A. Calculate Ratio of flow to capacity (RFC) for the **Bolded** movement using HCM method.



B. Using the British method, Find RFC for the same movement. Compare between the two methods and comment.

Question 6: **(12 points)**

A proposed two-way (two-lane) highway is to be designed consisting of two segments; the first segment is 3.2 km long and the second is 2.2 Km long.

Given the following information:

Traffic data:

Commuter traffic(Class I)
PHV = 800 veh/h
PHF = 0.91
55% in the peak direction
6% trucks
2% recreational vehicles
No-passing zones: 20%

Geometric data:

Rolling terrain
BFFS = 96.3 km/h
Shoulder width = 0.6 m
Lane width= 3.1m
5 access points per km

A- Determine the level of service? **(6 points)**

B- **Compute** V/C, the total number of vehicle-Kilometer traveled during the peak 15-minute and peak hour, and total travel time in peak 15 min. **(4 points)**

C- **Determine** the minimum lane width to provide Level of service C? **(2 points)**