

**Highways & Transportation I (ECIV 4333)**  
**Answer the following questions**  
**Time Allowed 120 Minutes**



**FINAL EXAM**

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Question No.	Mark	Max. Mark	Notes
<b>1</b>		<b>8</b>	
<b>2</b>		<b>8</b>	
<b>3</b>		<b>8</b>	
<b>4</b>		<b>12</b>	
<b>5</b>		<b>14</b>	
<b>total</b>		<b>50</b>	

**Question 1:****(8 points)****A) Define****1. Follow up time****2. Space mean speed****B) Draw three diagrams showing the relationship between speed, density, and flow?****C) List the categories of intersections?**

**Question 2:**

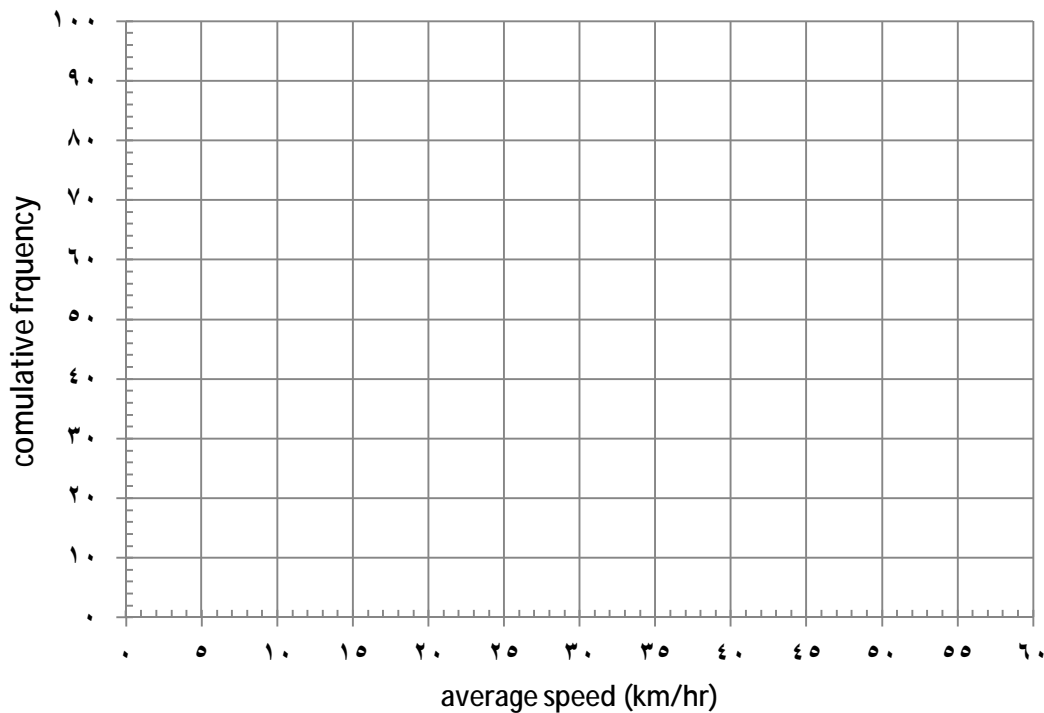
**(8 points)**

A spot speed study on an existing freeway was carried out .The collected data in the table below. If you know that the median speed is 30 km/hr.

A- Complete the missing data in table.

Average speed (km/h)	Number of vehicles	Frequency %	Cumulative Frequency %
10	.....	3.75	.....
15	.....	5.75	.....
20	.....	7.5	.....
25	.....	.....	30.5
30	78	.....	.....
35	.....	.....	69.5
40	.....	.....	83
45	.....	.....	94.75
50	.....	.....	98.75
55	.....	.....	.....

B- Draw the S-curve & Determine the speed of 90 th percentile.



**Question 3:****(8 points)**

Two sets of students are collecting traffic data at two sections, xx and yy, of a highway 450 m apart. Observations at xx show that five vehicles passed that section at intervals of 3, 4, 3, and 5 s, respectively. If the speeds of the vehicles were 50, 45, 40, 35, and 30 km/h, respectively.

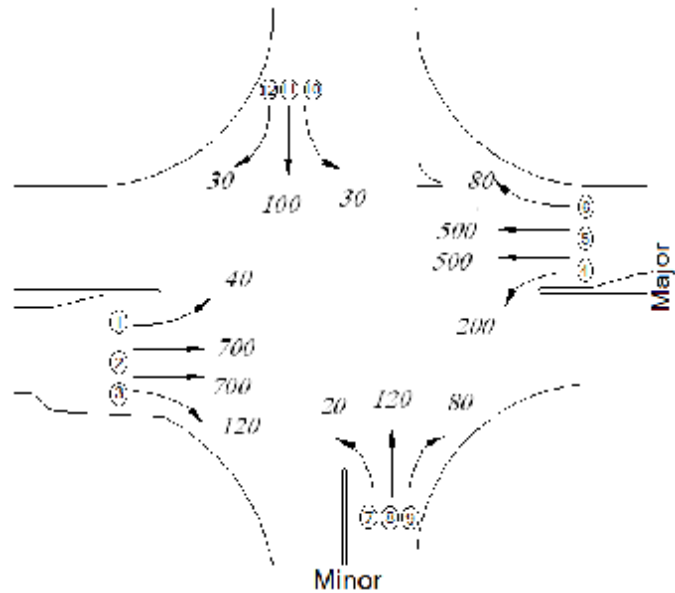
A. A-draw a schematic showing the locations of the vehicles 20 s after the first vehicle passed section xx.

B. Determine the time mean speed, the space mean speed, and the density on the highway.

**Question 4:****(12 points)**

In a four leg TWSC intersection (priority rule intersection), knowing that all cars are passenger cars and the slope of the minor road is +1%.

- Find the capacity of the minor through movement (8) and check if the ratio of flow to capacity (RFC) is accepted. Assume one stage crossing.
- Assuming two stage crossing, find the capacity of the minor through movement (8) and check if the ratio of flow to capacity (RFC) is accepted.
- Compare the results in the two cases.



**Question 5:****(14 points)**

An existing Class I two-lane highway is to be analyzed to determine the two-way level of service, given the following information:

**Traffic data:**

Commuter traffic

PHV = 800 veh/h

PHF = 0.95

50% in the peak direction

7% trucks

2% recreational vehicles

No-passing zones: 40%

Segment length is 2.5 km.

**Geometric data:**

G=2.5%

BFSS = 90 km/h

Shoulder width = 0.6 m

Lane width= 3.1m

5 access points per km

A- Determine the level of service?

**(10 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)