



Highway & Transportation (I) ECIV 4333
Answer the following questions
Time Allowed 80 minutes

Question (1):

(10 points)

Study the following statements and indicate if they are (True) or (False) and Comment

1. Highways development may have positive as well as negative impacts on the environment. ()

2. Household income does not affect the likelihood of having a car. ()

3. Inventory and condition survey is a good starting point before making traffic surveys. ()

4. Traffic flow is usually equally distributed in the opposite directions. ()

5. Moving observer method is a very useful traffic measurement method ().



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Student name:	ID:
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Question (2):

(8 points)

A. Define Highway system classification in USA for rural roads? Use sketches for more description?

B. What is the range of the Peak Hour Factor? Describe it graphically?

C. Describe the following graph?

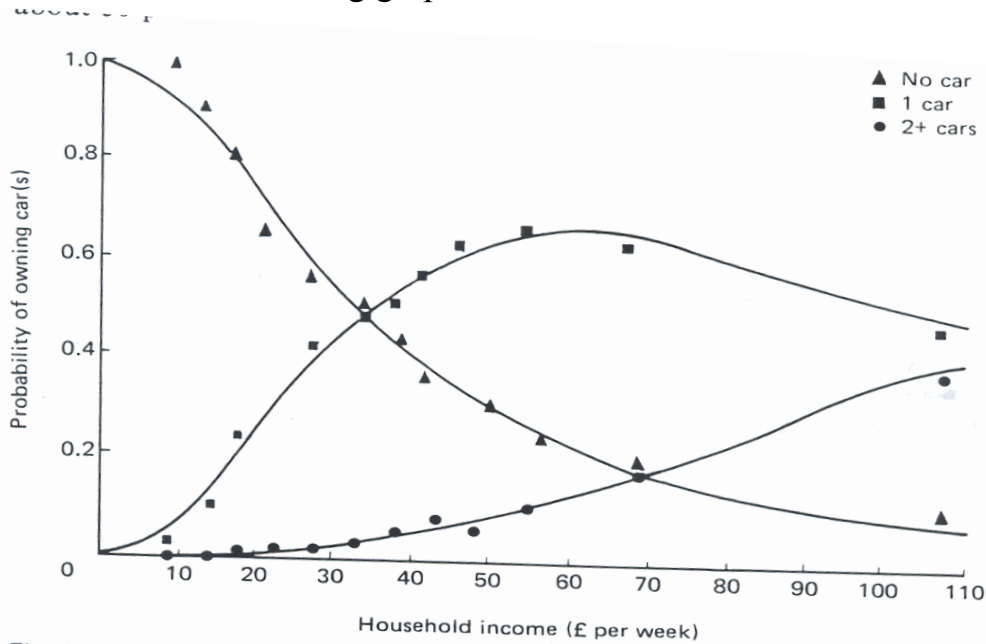


Fig. 3.3 Car-ownership functions, based on the 1972 Family Expenditure Survey⁽⁶⁾



D. Describe the roadside interview method for origin destination surveys?

Question (3):

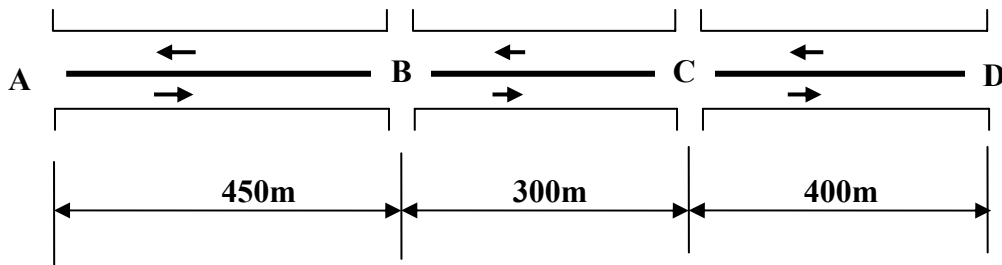
(8 points)

For the following time measurements when traveling along direction ABCD:

Section	Length m	Time required to travel the presented length (s)
AB	450	30
BC	300	18
CD	400	25

Intersection	Stopped Time at intersection (s)
B	20
C	15
D	16

Calculate the running speed and the journey speed in sections AB, BC, CD, AC, BD and AD.





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Question (4):

(6 points)

A number of 10,000 people are expected to demonstrate along a road of 10 m width and 10 km length. Estimate the queue length of the demonstrating people for the following three cases:

- The people are expected to be standing.
- The people are expected to be walking freely.
- The people are expected to be running at a speed of 10 km/hour.

Question (5):

(6 points)

The following table shows traffic flow data collected at a main road in an urban area, in two successive days during the peak period. Calculate the Peak hour factor PHF in Day one? Assume that PHF remains the same in Day 2 calculate the missing data x in the period 7:30-7:45.

Time	Day one	Day two
	Flow (veh/hr)	Flow (veh/hr)
7:30 – 7:45	900	x
7:45 – 8:00	950	900
8:00 – 8:15	1000	960
8:15 – 8:30	980	920

Determine the peak hour factor (PHF)



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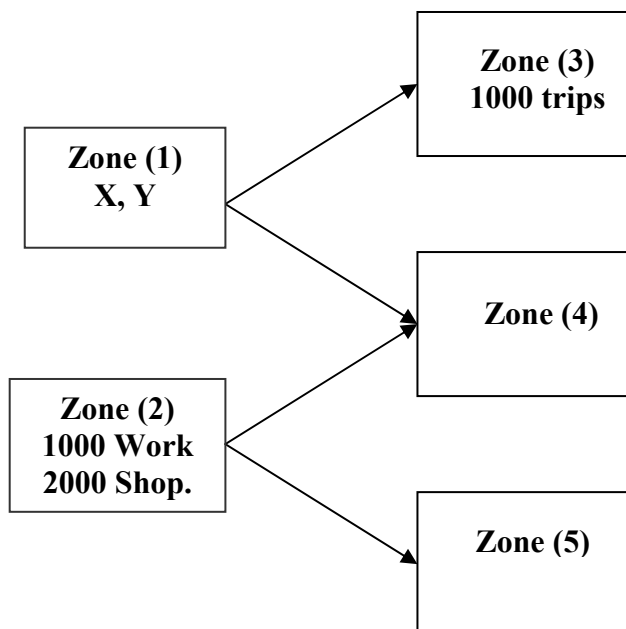
Question (6):

(12 points)

The No. of trips generated from Zone (1) for work purposes is X trips/day, and for shopping purposes is Y trips/day. The No. of trips generated from Zone (2) for work purposes is 1000 trips/day, and for shopping purposes is 2000 trips/day.

Knowing that:

- Distances from either Zone (1) or Zone (2) to any of the target Zones (3,4,5) are equal,
- The total No. of trips arrived at Zone (3) for both work and shopping purposes are 1000 trips/day.
- The total trips arrived at Zone (4) are twice the total trips arrived at Zone (5)



Zone	No. of work opportunities	Area of shopping spaces (m ²)
3	100	20,000
4	200	10,000
5	300	5,000

H

How many trips are produced from Zone (1) (for both work and shopping purposes)?



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Good Luck

Useful Formula

$$\begin{aligned}V_f &= V_0 + a t \\d &= V_0 t + \frac{1}{2} a t^2 \\V_f^2 &= V_0^2 + 2 a d\end{aligned}$$

$$F_a = C_D A \rho \frac{v^2}{2}$$

$$F_I = ma$$

$$Power = \sum R \times v$$

$$PHF = \frac{V}{4V_{15}}$$

Gravity model

$$T_{ij} = \left[\frac{\left(\frac{A_j}{(D_{ij})^n} \right)}{\left(\frac{A_1}{(D_{i1})^n} \right) + \left(\frac{A_2}{(D_{i2})^n} \right) + \dots + \left(\frac{A_m}{(D_{im})^n} \right)} \right] \times P_i$$

Logit model

$$P_{it} = \frac{e^{u_{it}}}{\sum_{All j} e^{u_{jt}}}$$