



University of Technology
Building and Construction Eng. Dept.
Final Exam - First Attempt - 2010/2011

Subject : Traffic Engineering
Branch : Highways and Bridges
Examiner : A.L. Ahmed Subhi

Class: 3rd
Time : 3 Hours
Date : 6 /6 / 2011



Answer Four Questions only

Q-1/ Traffic survey at a T- intersection given the results given in the table below. Design a suitable signal setting given that intergreen period for all phases = 5 sec. Draw the timing and movement diagrams.

Approach	Flow (pcu/hr)			Approach Width (meter)
	left	straight	right	
North	---	730	160	7.2
South	420	330	---	7.2
West	520	---	80	6.0

Note: use late start feature to handle the left turning movement from south approach

Q-2/

- Show the number of conflict points merging and diverging at a staggered intersection.
- The average rate of arrival of vehicles to a fixed point on a highway and the average time and distance between vehicles were measured to be 3 sec. and 50 m. respectively. Estimate the traffic volume, traffic density and speed on the highway. Show graphically the relationship between speed, volume and density of traffic.
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Q-3/ Design hour traffic flows at 4 - legs 3- phase intersection are given in table in next page. The intergreen period was used for phase 1 and phase 2 is (7) sec. for phase 3 the minimum intergreen period was applied. The amber period is fixed by 3 seconds. The site is very good environmental condition. The setting of the phases as follows:

Approach	Width (meter)	Flow in pcu/hr		
		Left	Straight	Right
North Approach	2*3.65	370	350	60
South Approach	2*3.65	420	330	100
East Approach	2*3.5	80	620	40
West Approach	2*3.5	60	650	32

Phase (1) North and South for straight and right turn traffic.

Phase (2) North and South left turn traffic.

Phase (3) East and West all direction movements of traffic.

Note:

- 1- Both north and south approaches consist of two lanes one for left and one for the other movements (this important in saturation flow calculations).
- 2- The saturation flow of 3.65 m. lane is 1900 pcu/hr for straight and right movements, whereas for left movements from north and south the saturation flow is 1600 pcu/hr.
- 3- Do not multiply the left turning movements by the factor 1.75.

Determine the cycle time that gives the minimum delay overall the intersection and the actual green time period per phase.

Q-4/ A field study for spot speed was performed. Table below gives the main speed ranges with the observed frequencies of each speed group. Find the following:

- ❖ Arithmetic mean speed.
- ❖ The median speed.
- ❖ The mode or modal speed.
- ❖ The pace and the percentage of vehicles in pace
- ❖ The 85 percentile speed.
- ❖ The standard deviation (S).

Speed class	10-14.9	15-19.9	20-24.9	25-29.9	30-34.9	35-39.9	40-44.9	45-49.9	50-54.9	55-59.9	60-64.9	65-69.9
frequency	0	6	8	29	60	63	74	29	19	10	2	0

Q-5/

(A) The average of six test runs were made in two - way routes as below. Calculate the flow and journey speed in a section of 1 km length.

Direction	Time (min)	Vehicles in opposite direction X count (veh.)	Vehs. Overtaking test car	Vehs. Overtaken by test car
North bound	2.587	77.83	4	2.67
South bound	2.482	76	5	2.83

(B) Compare between late start and early cut - off features that used in handling the left turning movements at signalized intersections.