Prince of Songkla University
Faculty of Engineering

Final Examination: Semester II   Academic Year: 2004

Date: February 24, 2005   Time: 13.30-16.30 hr.

Subject: 220-571 Traffic Engineering Characteristics 1   Room: R300

คำสั่งในการทำข้อสอบ

1. ข้อสอบชุดนี้มีคำถามหลัก 4 ข้อ ให้ทำทุกข้อ, แต่ละข้อมีคะแนนเท่ากัน

2. ตอบคำถามในกระดาษที่กำหนดให้

3. อนุญาตให้นำเอกสาร ตำรา และอุปกรณ์การคำนวณเข้าห้องสอบได้

1. The accompanying data show spot speeds collected at a section of highway located in a residential area.

Before	After
69	52
61	48
66	55
64	52
58	54
53	69
50	32
61	60
61	33
69	65
57	33
61	47
63	49
63	60
69	51

Before	After
66	55
61	49
53	51
53	43
66	49
67	60
61	32
63	53
59	38
58	47
55	27
63	63
61	46
58	68
67	48

Use the student's t test, determine whether there was a significant difference in the average speeds at the 95 percent confidence level.

Determine: (a) average speed, (b) 85th percentile speed, (c) mode, (d) median, and (e) pace.

2. A provincial transportation agency has established crash reduction factors shown in the table below. An Intersection has been identified as having an abnormally high right-turn crash rate (27, 30, and 28 crashes in the last three years), attributed to excessive speeds and the absence of an exclusive right turn phase. The intersection for the last three years is 9400, and the ADT for after implementation is 10500. Determine (a) possible sets of appropriate countermeasures, (b) expected reduction in crashes if all compatible appropriate countermeasures are implemented, and (c) which compatible appropriate countermeasures gives the best overall accident reduction?

Countermeasure	Reduction Factor
Retime signals	0.10
Provide right-turn signal phase	0.30
Reduce speed limit on approaches	0.35
Prohibit right turns	0.75
Provide turning guide lines	0.05
Install pedestrian crossing signal	0.15

3. Table below shows data obtained in a travel time study on a 5-kilometer section of highway using the moving-vehicle technique. Estimate (a) the travel time, (b) the speed, and (c) the volume in each direction at this section of the highway.

Run Direction/ Number	Travel Time (min.)	No. of Vehicle Traveling in Opposite Direction	No. of Vehicles That Overtook Test Vehicle	No. of Vehicles Overtaken by Test Vehicle
Northward				
1	5.08	105	2	1
2	5.30	103	3	1
3	5.15	110	1	0
4	5.51	98	2	2
5	5.38	97	1	1
6	5.41	112	2	0
7	5.12	109	3	3
Southward				
1	4.95	85	1	0
2	4.85	88	0	1
3	5.00	95	0	1
4	4.63	102	1	2
5	5.11	90	2	1
6	4.91	95	3	0
7	4.95	96	1	1

4. (a) The geometrics along a portion of roadway have been improved to provide wider travel lanes and paved shoulders. While these improvements have reduced the crash rate, the local traffic engineer is still concerned that too many crashes are occurring, particularly those involving collisions with fixed objects along the edge of pavement. Forty such crashes have occurred in the past 12 months. What countermeasure should the engineer undertake to reduce the number of crashes by at least five per year?

(b) The crash rate on a heavily traveled two-lane rural highway is abnormally high. The corridor is 28 kilometers long with an ADT of 34,000. An investigation has determined that head-on collisions are most common, with a $RMVK_T$ (Rate per 100 million vehicle kilometers of travel) of 3.0, and are caused by vehicles attempting to pass. Determine an appropriate countermeasure and calculate the estimate yearly reduction of total crashes.

Examination set by Dr. Chakkrit Kanok-kantapong