Final Examinations 2013-2014

Q1: Answer the following (five only): (25 marks)
1- Define transportation and explain the main transportation related problems.
2- What are the main elements of traffic engineering?
3- Explain how vehicles width and height may affect the geometric design of highways.
4- What kind of public transport systems could provide door to door service?
5- Why the use of separated intersections is useful?
6- Draw a figure to explain clear spacing and gap headway.

Q2) Answer the following: (25 marks)

A) Traffic volumes for each 15 minutes interval have been collected on a highway as shown in the Table below. Estimate traffic volume, peak hour factor and average time headway. (10 marks)

<table>
<thead>
<tr>
<th>Time</th>
<th>Cars</th>
<th>Buses and trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 – 7:45</td>
<td>350</td>
<td>34</td>
</tr>
<tr>
<td>7:45 – 8:00</td>
<td>345</td>
<td>30</td>
</tr>
<tr>
<td>8:00 – 8:15</td>
<td>360</td>
<td>50</td>
</tr>
<tr>
<td>8:15 – 8:30</td>
<td>300</td>
<td>20</td>
</tr>
</tbody>
</table>

B) A study of freeway flow at a particular site has resulted in the following speed-density relationship as follows:

\[ u = 120 - 1.5k \]

For this relationship, determine: (a) the free-flow speed, (b) jam density, (c) capacity and (d) the flow rate where the average speed of vehicles is 100km/hr. (15 marks)

Q3) Answer the following: (25 marks)

A) If the average vehicle headways is 2.2sec at 50 mi/h, compute the density and rate of flow for this traffic stream. (10 marks)

B) Four vehicles, as shown in the figure below, are traveling at on a section 220m length. Assuming that all vehicles have a same length of 5m. If speeds and clear spacing between vehicles are as shown in the figure, estimate the following: (15 marks)
1- Average space mean speed
2- Average time mean speed
3- Traffic density
4- Average clear spacing
5- Average gap headway
Q4) Answer the following: (25 marks)

A) Answer two only: (10 marks)
1) Explain, with the use of a graph, the elements of passing sight distance.
2) Derive speed-density and flow-density relationships.
3) What are the main parameters used to evaluate the transportation systems.

B) Estimate the design speed for a highway section with a grade of +3%. Given that the available stopping sight distance is 100m. (15 marks)

Good Luck

Examiner
Dr. Jalal T. S. Al-Obaidi