Course No: CVL 4324
Course Title: Transportation Engineering II
Date: 03/2018
No. of Questions: (3)
Time: 1.0 hr
Using Calculator (Yes)

University of Palestine

First-Exam
2017/2018
Total Grade: 15

Instructor Name: Dr. Eng. Mustafa Altayeb
Student No.: _____
Student Name: _____
College Name: Engineering
Dep. / Specialist: Civil Engineering
Using Dictionary (No)

First Question 4

1. Two commonly used techniques to determine crash patterns are expected value analysis and cluster analysis.
2. There are five different ways, in which a crash at a site can summarized, severity, contributing circumstances, driver, environmental conditions and period.
3. Each crash occurring at a site listed under one of three contributing factors human factors, environmental factors and vehicle-related factors.
4. Three main categories of environmental conditions are driver, lighting and roadway surface condition.
5. Road surveys usually involve measuring and computing horizontal and vertical angles, vertical heights (elevations) and horizontal distances.
6. When the materials excavated from cut sections are compacted at the fill sections, they fill less volume than was originally occupied.
7. A vertical line on the mass diagram defines the locations where the net accumulation between these two points is zero.
8. Recreational and scenic routes design speeds are usually low

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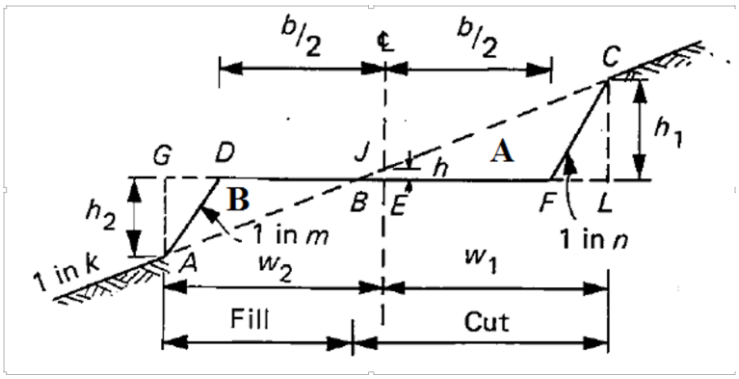
Second Question 7

A roadway section is 900 ft long (9 stations). The cut and fill volumes are to be computed between each station as in the Table. Material in a fill section will consolidate (known as shrinkage), and for this road section, is 10 percent.

Station	0	1	2	3	4	5	6	7	8	9
Cut Area (ft^2)	90	70	130	120	110	90	70	60	30	**A**
Fill Area (ft^2)	10	20	10	20	30	40	70	90	140	**B**

A) Calculate cut area **A** and fill area **B if** a road has a formation width of 20 ft and side slopes of 1 vertical to 3 horizontal in fill, and 1 vertical to 2 horizontal in cut. The original ground had a cross-fall of 1vertical to 4 horizontal. If the depth of excavation at the centerline is 1 ft, calculate the side widths and the areas of cut A and fill B.



$$w_1 = \left(\frac{b}{2} + nh\right)\left(\frac{k}{k-n}\right)$$

$$w_2 = \left(\frac{b}{2} - mh\right)\left(\frac{k}{k-m}\right)$$

$$\text{Area of cut} = \frac{1}{2}\frac{(b/2+kh)^2}{(k-n)}$$

$$\text{Area of fill} = \frac{1}{2}\frac{(b/2-kh)^2}{(k-m)}$$

B) **Determine the net accumulation** of cut or fill beginning with station 0 +00 and **Plot the results**.

C) **The free**-haul distance in a highway construction contract is 200 ft start at **station 2 +00** to **station 4+00** and the overhaul price is **$15/yd3** station. For the mass **diagram determine the extra compensation that must be paid**.

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Third Question 4

An urban arterial street segment 4 mile long has an annual average daily traffic (AADT) of 30,000 veh/day. In a two-year period, there have been 22 crashes resulting in death and/or injuries and 40 involving property damage only. The statewide average crash experience for similar types of roadway is 490 per 100 mvm for a three-year period of which 240 involved death and/or injury and 250 caused property damage only. Is the 4 mile long street segment hazardous? In identifying hazardous locations, consider that a single death/injury crash is equivalent to 5 property damage crashes. Use a 95% confidence level.

End of Questions
Good luck

The critical crash rate method involves the following expression.

$$CR = AVR + \frac{0.5}{TB} + TF\sqrt{\frac{AVR}{TB}} \qquad (5.19)$$

where

CR = critical crash rate, per 100 million vehicle-miles or per million entering vehicles
AVR = average crash rate for the facility type

TF = test factor, the number of standard deviations at a given confidence level (Z in Eq. 5.3)
TB = traffic base, per 100 million vehicle-miles or million entering vehicles