Course No: CVL 4330
Course Title: Transportation Engineering II
Date: 04/2018
No. of Questions: (3)
Time: 1.0 hr
Using Calculator (Yes)

University of Palestine

Second Exam
2017/2018
Total Grade: 15

Instructor Name: Dr. Mustafa Al-Tayeb
Student No.: _____
Student Name: _____
College Name: Engineering
Dep. / Specialist: Civil Engineering
Using Dictionary (No)

Answer All Questions

First Question 3.5/20

State if the following sentences are true (T) or false (F)

1.	Rural areas usually present more complex conditions than urban areas that must be considered in the highway location process.	
2.	Curbs used mainly on urban highways to delineate pavement edges and pedestrian walkways.	
3.	Recommended rates of cross slopes for high-type pavements are usually greater than for low-type pavements.	
4.	Steep grades affect not only the performance of heavy vehicles but also the performance of passenger cars.	
5.	The selection of maximum grades for a highway depends on the drainage conditions of the highway.	
6.	The effect of gravitational and centrifugal forces on a vehicle travels on a crest vertical curve is greater than the one travels on a sag vertical curve.	
7.	Use of a minimum stopping sight distance (SSD) used for design of a crest and sag vertical curve.	

Second Question 6/20

A horizontal curve designed for a two-lane road in mountainous terrain. Given that: The design speed 60 mi/h, side coefficient of friction is 0.12 and superelevation is 0.08. The intersection angle is 25° 15' and the PC is located at station 124 +50

a) Determine the length of the curve,
b) Determine the station of the PT,
c) Determine the deflection angles **for first two stations only**
d) Determine the chord lengths **for first two stations only**

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Third Question 5.5/20

A sag vertical curve joins a -3 percent grade and a +1 percent grade. If the PVI of the grades is at station (214 + 15) has an elevation of 215 ft, and a design speed of 40 mil/h, method determine:

(a) Determine SSD and minimum length of carve

(b) Assume minimum length of carve 370ft, determine the stations and elevations of the BVC and EVC and the elevation of each station (use station= 100 ft.)

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Thank you

Vertical Curve

$$Y = \frac{A}{200L}x^2$$

$$Y^1 = \frac{G_1 x}{100} - Y$$

$$= \frac{G_1 x}{100} - \frac{A}{200L}x^2$$

$$= \frac{G_1 x}{100} - \left(\frac{G_1 - G_2}{200L}\right)x^2$$

Stopping Sight Distance

$$SSD = ut + \frac{u^2}{2g(f \pm G)} \qquad f = 0.35$$

Crest Vertical Curve

$$L_{min} = 2S - \frac{2158}{A} \quad \text{(for S > L)}$$

$$L_{min} = \frac{AS^2}{2158} \quad \text{(for S < L)}$$

Sag Vertical Curve

$$L_{min} = 2S - \left(\frac{400+3.5S}{A}\right) \quad \text{(for S > L)}$$

$$L_{min} = \frac{AS^2}{400+3.5S} \quad \text{(for S < L)}$$

$$L_{min} = \frac{Au^2}{46.5}$$

$$L_{min} = 100A$$

Horizontal Curve

$$R = \frac{u^2}{g(e+f)}$$

$$E = R\,sec\frac{\Delta}{2} - R$$

$$C = 2R\,sin\frac{\Delta}{2}$$

$$T = R\,tan\frac{\Delta}{2}$$

$$R = \frac{5729.6}{D_a^\circ}$$

$$\frac{l_1}{\delta_1} = \frac{L}{\Delta} = \frac{l_2}{\delta_2}$$

$$L = \frac{R\Delta\pi}{180}$$