

University of Palestine
Faculty of Applied Engineering and Urban Planning

Course Name	Roads and Transportation Engineering II			Course No.	CIVL 4330
Academic Year	2018/2019	Semester	2nd	Exam Type	2nd Midterm
Exam Date	14/04/2019		Exam Time	1pm – 2pm	

اسم الطالب (بالعربي):		الرقم الجامعي:	
اسم المدرس: د. ساري أبو شرار	رقم الشعبة:	وقت المحاضرة:	الرقم المتسلسل:

Important Instructions

- *This is a closed-book exam; all related material must be placed away from your desk.*
- *Cell phone use is prohibited for any purpose: Your cell phone must be turned off and placed off of the desk. Cell phones may not be accessed during the exam. Failure to comply may be treated as a violation of the Honor Code.*
- *Headphones of any kind are not permitted.*
- *This exam is 60 minutes long.*
- *Make sure that you have 7pages including this page.*
- *This exam has 8 questions. Read each question carefully before answering.*
- *Calculators can be used but cannot be shared.*
- *When you finish, you must:*
 - *Check that you have written your information in the spaces provided.*
 - *Give the exam package (all papers) to the proctor before you leave.*

For Teacher's Use Only For Proctor's Remarks

QN	KPI/ILO	SO	DL	Mark	Weight
1		b	1		2
2		k	2		2
3		a	4		3
4		c	1		1
5		b	2		2
6		b	2		2
7		f	3		2
8		f	5		1
Total					15

KPI: Key Performance Indicator, ILO: Intended Learning Outcomes, SO: ABET Student Objectives, DL: Difficulty Level (1. Very easy, 2. Easy, 3. Moderate, 4. Somewhat hard, 5. Hard, 6. Very Hard)

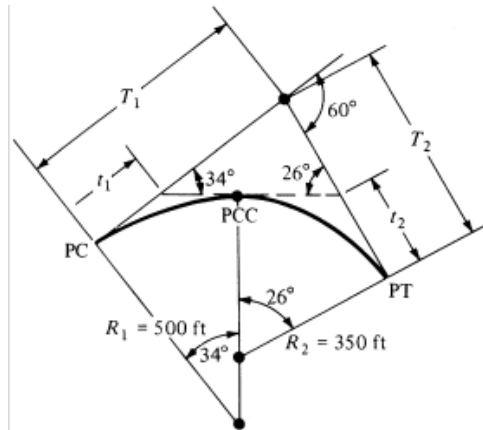
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Answer All Questions

First Part

7/15

A compound circular curve having radii of 500 ft and 350 ft is to be designed to connect two tangents that intersect at an angle of 60° . If the intersection angles of tangents of the first and second curves are 34° and 26° respectively and the PCC is located at station (565 + 35), determine:

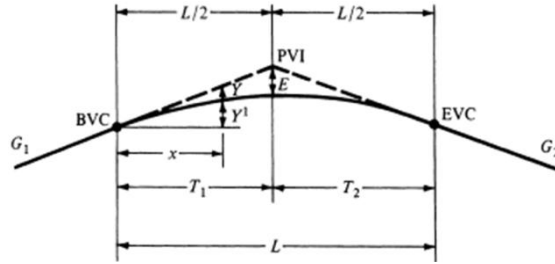


Q1. The lengths of the first and second horizontal curves. (2 points)

Q2. The stations of PC and PT. (2 points)

Q3. The deflection angles and the corresponding chord lengths for setting out the curve. (3 points)

A crest vertical curve connects a +4.44% grade and a -6.87% grade. The PVI is at station 43 + 50.00 at an elevation of 1240.00 ft. The design speed is 30 mi/h. Determine:



Q4. The length of the vertical curve using the AASHTO method (“K” factors) (1 point)

Q5. The station and elevation of the BVC. (2 points)

Q6. The station and elevation of the EVC. (2 points)

Q7. The station and elevation of the high point.

(2 points)

Q8. The elevation of station 44 + 23.23.

(1 point)

Useful Formulae

Vertical Curve

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

$$X_{high/Low} = \frac{LG_1}{(G_1 - G_2)}$$

$$Y_{high/Low}^1 = \frac{LG_1^2}{200(G_1 - G_2)}$$

$$E = \frac{AL}{800}$$

Horizontal Curve

$$R = \frac{u^2}{15(e + f)} \quad (US \text{ cust.})$$

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

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

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

$$R = \frac{5729.6}{D_a^\circ} \quad (US \text{ cust.})$$

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

Values of K for Crest Vertical Curves

US Customary			
Design speed (mph)	Stopping sight distance (ft)	Rate of vertical curvature, K ^a	
		Calculated	Design
15	80	3.0	3
20	115	6.1	7
25	155	11.1	12
30	200	18.5	19
35	250	29.0	29
40	305	43.1	44
45	360	60.1	61
50	425	83.7	84
55	495	113.5	114
60	570	150.6	151
65	645	192.8	193
70	730	246.9	247
75	820	311.6	312
80	910	383.7	384