

**Faculty of Engineering
Prince of Songkla University**

Mid-Term Examination
July 30th, 2008
221 – 361 Surveying II

1st Semester 2008
Room R200
Time: 13:00 - 16:30 (3 hours)

Instructions

1. There are 5 problems in this exam. (100 points)
2. Attempt all problems.
3. Books and lecture notes are not allowed.
4. Students can bring in a calculator and a dictionary.
5. Students can use pencil in the answer books.

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นาย รุจ ศภวิไล ผู้ออกข้อสอบ

- 1) From the control stations A and B, the horizontal angles $\angle PAB$ and $\angle PBA$ were measured respectively. Please calculate the coordinates of the unknown station P (X_p and Y_p) by using the given field data.

From	To	Face	Horizontal Circle Readings	Horizontal Angles	Remarks
A	P	L	283° 15' 21"		Angle α
	B	L	320° 54' 51"		
	B	R	140° 54' 47"		
	P	R	103° 15' 21"		
B	A	L	300° 07' 15"		Angle β
	P	L	37° 38' 43"		
	P	R	217° 38' 47"		
	A	R	120° 07' 13"		

Given $X_A = 3,300.259$ m. $X_B = 3,047.954$ m.
 $Y_A = 3,082.183$ m. $Y_B = 3,048.344$ m. (20 points)

- 2) Given the data of the three control points **L**, **M** and **R** stations with the coordinates, $X_L = 456.100$ m. $Y_L = 3,813.400$ m. $X_M = 2,482.400$ m. $Y_M = 7,722.500$ m. $X_R = 7,259.200$ m. and $Y_R = 7,643.100$ m. respectively. Angles to these control points were observed from an unknown stations P and the measured horizontal angles are $\alpha = \angle LPM = 23^\circ 22' 39''$ and $\beta = \angle MPR = 30^\circ 51' 37''$. Please calculate the coordinates of the unknown station P (X_p and Y_p) by using the resection method. (30 points)
- 3) How many types of conditions are there in triangulation? Please name the types of conditions that are available in the chain of quadrilaterals. Write down the equations of these conditions in your answers and also prove that the trigonometric condition is also valid for the center-point polygon as well. (15 points)

- 4) From the given quadrilateral ABCD, please adjust the interior angles until they satisfy both geometric conditions and trigonometric condition. (30 points)

$$\angle 1 = 32^\circ 21' 22''$$

$$\angle 2 = 41\ 29\ 54$$

$$\angle 3 = 48\ 12\ 27$$

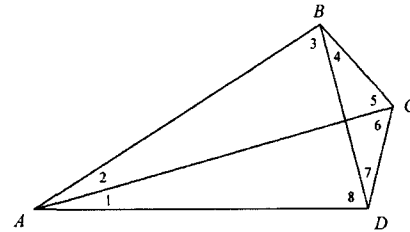
$$\angle 4 = 45\ 55\ 09$$

$$\angle 5 = 44^\circ 22' 43''$$

$$\angle 6 = 34\ 34\ 55$$

$$\angle 7 = 55\ 07\ 32$$

$$\angle 8 = 57\ 56\ 30$$



- 5) What is the condition for singularity in resection problem? Describe the situation that must be avoided in resection work and also explain the meaning in geometric details. (5 points)