



Final Exam

Surveying I (ECIV 2331)
Answer the following questions
Time allowed 140 minutes

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Question	Estimated Time	Mark	Max. Mark
1	25		20
2	25		22
3	40		22
4	30		16
Revision	20		
Total	140 min		80

Surveying I

Problem 1: (20 Marks)

A) Define the following! (8 points)

1- Tacheometry

is the surveying branch which deals with measuring the distances and angles using the theodolite device (as chapter 5) in our book

2- Precise Leveling

is the type of leveling which is done for the very important projects such as "setting out Bench Mark". its allowable error in leveling is much smaller than the ordinary leveling, with $\pm K\sqrt{L}$ K = 2.5 mm only

3- Geodetic Surveying

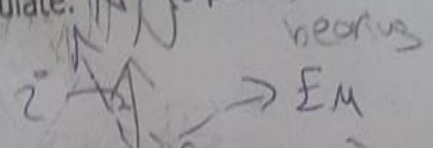
is the surveying branch according to the area size which deals with lands of Area larger than 50 km^2 and considering Earth is sphere for $[A(50 \rightarrow 500 \text{ km}^2)]$ and ellipsoid $[A \geq 500 \text{ km}^2]$

4- Vertical Angle

is the angle between the line of sight (collimation) and the horizontal plane

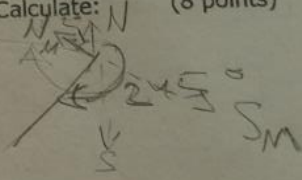
B) Given that the azimuth of AB with respect to the geographic north is 245° , and that the Magnetic north is 2°W of the true north. Calculate: (8 points)

1. The back azimuth of line AB.



B) Given that the azimuth of AB with respect to the geographic north is 245° , and that the Magnetic north is $2^\circ W$ of the true north. Calculate: (8 points)

1. The back azimuth of line AB.
2. The reduced bearing of line AB.
3. The magnetic azimuth of line AB
4. The back reduced bearing of line AB.



① = $245 - 180 = 65^\circ$

② = $S 65^\circ W$

③ = $S 67^\circ W$

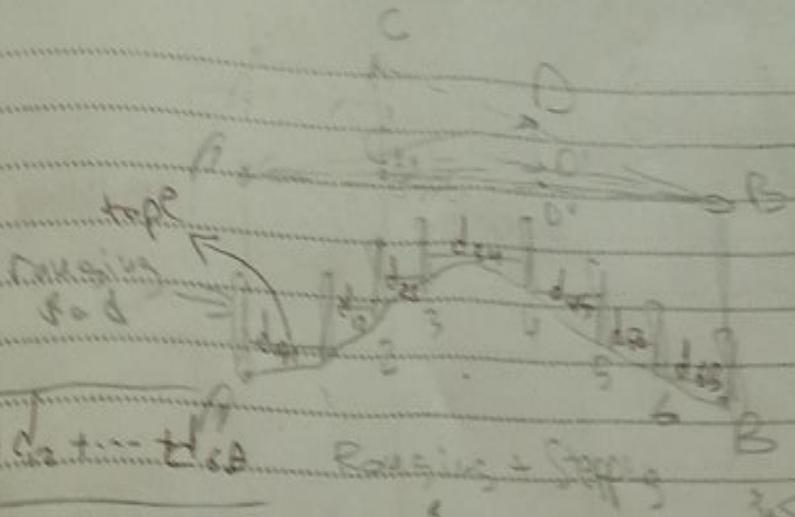
④ = $N 65^\circ E$

Answers:

Part 1	Part 2	Part 3	Part 4
65°	$S 65^\circ W$	$S 67^\circ W$	$N 65^\circ E$

c) Discuss briefly how to measure the length of line AB where vision is prevented but chaining is possible. (4 points)

Final Exam 2013



① نفوسا صريحا بين A و B ونقار الخط AB في كل مرة

② نضع نقطة مؤقتة في كل مرة نرى فيها خط A و B

③ نأخذ المسافة بين كل نقطة ونجمعها لتصبح المسافة الكلية A و B

و هكذا حتى نصل الى الخط AB

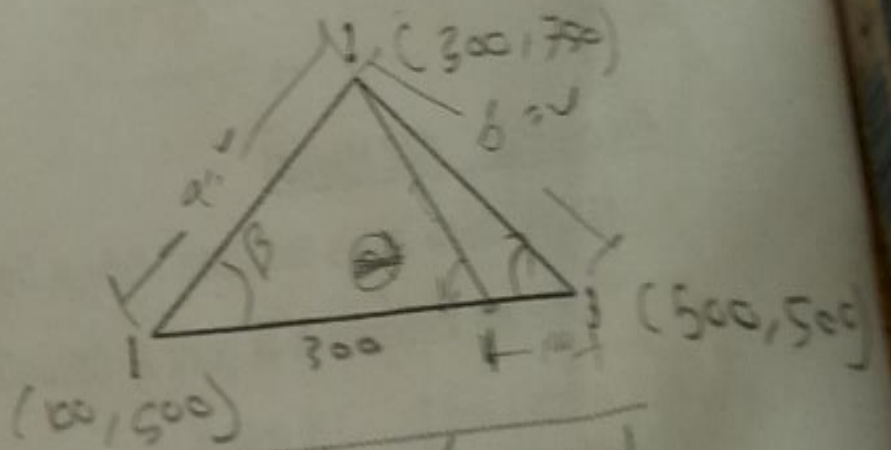
Problem 2: (22 Marks)

④ هذا المستخدم طريقة (P.P.P) ونفوسا صريحا بين A و B

Problem 2: (22 Marks)

A) Given the coordinates of the triangle corners (1, 2, 3) and that horizontal distance (d34) = 100 m, calculate the horizontal distance (d24) and angle (241). (10 points)

Corner	X(m)	Y(m)
1	100	500
2	300	750
3	500	500



$$X = d_{24} = ? \quad \theta = \hat{4} = ?$$

$$d_{12} = a, \quad d_{23} = b, \quad d_{13} = c$$

$$d_{13} = c = 400 = 300 \text{ m}$$

$$a = \sqrt{dx^2 + dy^2}$$

$$a = \sqrt{200^2 + 250^2} = b = \sqrt{200^2 + 1750^2} = 320.156 \text{ m}$$

$$c = 500 - 100 = 400 \text{ m}$$

$$\cos \beta = \frac{a^2 + b^2 - c^2}{2ab}$$

$$320.156^2 = 320.156^2 + 400^2 - 2(320.156)(400) \cos(\beta)$$

$$\therefore \beta \approx 51^\circ 29' 25'' = \hat{4}$$

$$X^2 = 100^2 + (320.156)^2 - 2(100)(320.156) \cos(51^\circ 29' 25'')$$

$$\rightarrow X = 269.258 = d_{24} \checkmark$$

$$\cos(\hat{4}) = \frac{269.258^2 + 300^2 - 320.156^2}{2(269.258)(300)}$$

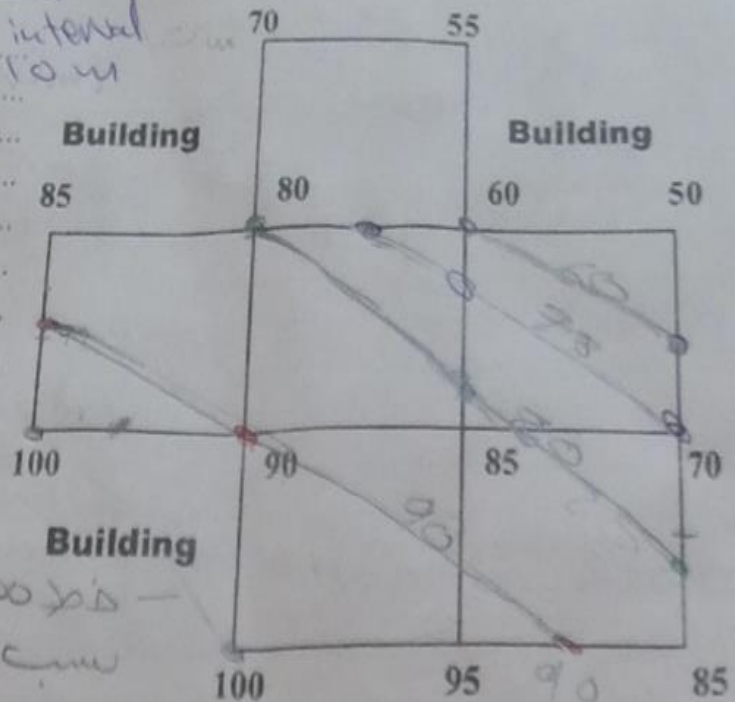
$$\rightarrow \theta \approx 68^\circ 11' 55'' = \hat{4} \checkmark$$

$$\sin \theta = \frac{\sin \beta}{320.156} \Rightarrow \theta = \hat{4}$$

B) The following fig. shows the heights AMSL of some grid points in meters. draw the contour lines starting from 60 m contour line and using 10 m interval. (12 points)

$E_{max} = 100$ Contour interval = 10 m
 $E_{min} = 60$

Cont. Lines = $\frac{100 - 60}{10} = 4$

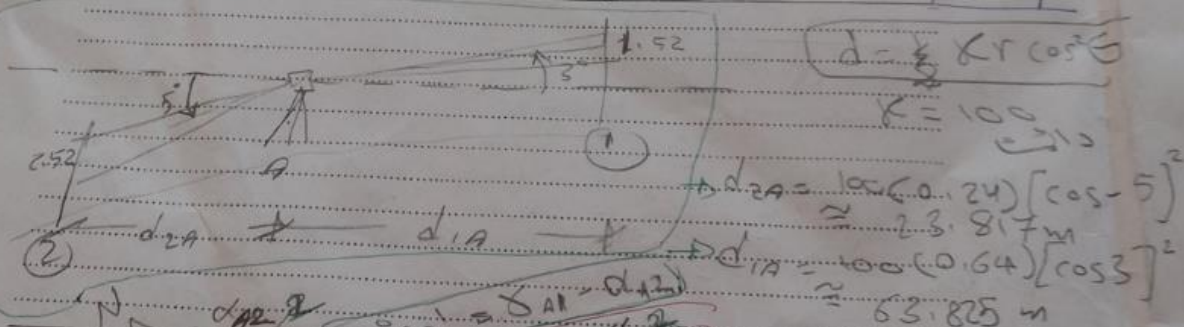


خطوط 100 م
 سب وجوب ان يكون

Problem 3: (22 Marks)

A) Table below shows the stadia readings from two sideshots (point 1 and point 2) while the theodolite is at point A. Calculate the horizontal distance between the points 1 and 2. (10 points)

Point	Azimuth	Zenith Angle	Stadia Readings			
1	320° 50'	87°	1.20	1.52	1.84	0.64
2	60° 30'	95°	2.40	2.52	2.64	0.24



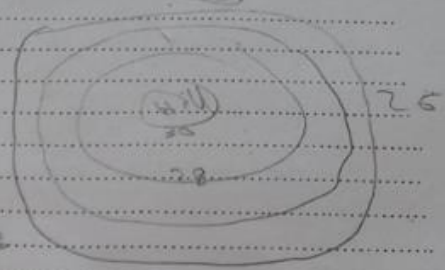
$d_{12} = \sqrt{63.825^2 + 23.817^2 - 2(63.825)(23.817)\cos(99^\circ 40')}$
 $= 71.773 \text{ m}$

cosine law تكملة التعويض في القانون قانون جيب التمام

$2(63.825)(23.817)\cos(99^\circ 40')$

- B) The areas enclosed by contour lines which represent a hill is calculated on a map of scale 1:1000 and found as in the following table. If the hill is to be leveled to a constant level of 20 m., calculate the volume of cut using AEA and Prismoidal methods. (12 points)

Contour line	16	18	20	22	24	26	28	30
Areas (cm ²)	5.00	4.50	4.00	3.60	3.40	3.00	2.80	2.50



A)

$$V = \frac{2}{3} \left[2.5 + 4 + 2(2.8 + 3 + 3.4 + 3.6) \right]$$

$$= 32.1 \text{ cm}^3 = 32.1 \times 10^9 \text{ m}^3$$

B)

$$V = \frac{2}{3} \left[3.6 + 4 + 2(3.2) + 4(2.8 + 3.4) \right] + \frac{2}{3} [4 + 3.6]$$

$$= 32.2 \text{ cm}^3 = 32200 \text{ m}^3$$

Problem 4: (16 Marks)

- A) What are the conditions needed to enhance the accuracy of mapping a building while selecting chain lines using chain surveying equipment. (6 points)

① اختيار ممكن يعطي جميع التفاصيل المساحة

Chain lines

② أن يكون الخط مستقيم ولا يقل حدته

③ أن يكون الخط موازاً للخط المستقيم Chain lines محصورة

④ أن تكون هذه الخطوط الرجعية رأسية كواثف

⑤ أن يكون الخط موازاً للخط المستقيم chain line أكبر

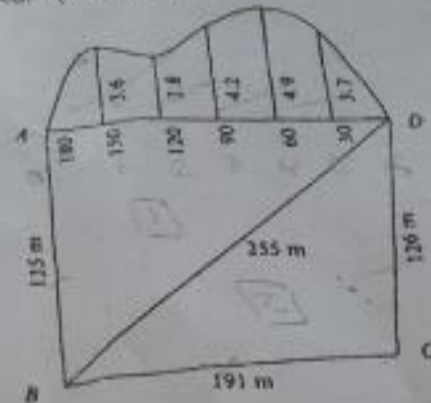
⑥ أن تكون هذه الخطوط وتقع على أرض مسطحة حيث لا يكون لها انحناء كبير

انتبهو هنا في خطأ في حساب أول مساحة أما مساحة
المثلثين صحيحة ان شاء الله

Surveying I

B) A tract of land has three straight boundaries AB, BC, and CD. The fourth boundary AD is irregular. Determine the tract area. (10 points)

$$A_{AD} = \frac{3.2}{3} [0 + 5.7 + 2.7 + 1.0 + 4.2 + 4.8 + 3.7] \\ = 48.415 \text{ m}^2$$



$$S_1 = \frac{180 + 125 + 255}{2} = 285$$

$$A_1 = \sqrt{285(285-180)(285-125)(285-255)} \\ = 11604.417 \text{ m}^2$$

$$S_2 = \frac{255 + 126 + 191}{2} = 285$$

$$A_2 = \sqrt{285(285-255)(285-126)(285-191)} \\ = 11608.755 \text{ m}^2$$

$$A_{\text{tract}} = A_{AD} + A_1 + A_2$$

$$\approx 2369.67 \text{ m}^2$$

تم بحمد الله

ادخولكم في الله : حازم غازي حامد الفراء

أتمنى لكم كل نجاح وتوفيق