



THE KENYA POLYTECHNIC

SURVEYING & MAPPING DEPARTMENT

DIPLOMA IN LAND SURVEYING

END OF YEAR I EXAMINATIONS

NOVEMBER 2006

SURVEYING INSTRUMENTS

3 HOURS

INSTRUCTIONS TO CANDIDATES:

You should have the following for this examination:

Answer booklet

Calculator/Mathematical tables

Answer any FIVE of the following EIGHT questions.

All questions carry equal marks and the maximum marks for each part of a question are as shown.

This paper consists of 2 printed pages.

1. (a) Draw a labeled diagram of a surveyor's compass. (8 marks)
 (b) Outline the permanent adjustments of a surveyor's compass. (12marks)
2. (a) Describe a dumpy level. (6 marks)
 (b) Outline the permanent adjustments of a dumpy level. (10 marks)
 (c) State the difference in permanent adjustment of a dumpy level and a tilting level. (4 marks)
3. (a) Explain the field procedure of determining the bubble tube sensitivity. (12 marks)
 (b) Draw a labeled diagram showing the bubble tube mounting. (8 marks)
4. (a) List ELEVEN parts of an optical theodolite. (11 marks)
 (b) Outline geometrical relationships of the parts of an optical theodolite. (9 marks)
5. (a) Explain the test of a dumpy level for collimation error. (10 marks)
 (b) When testing a dumpy level for collimation error, the instrument was set up mid-way between two points, A and B 150m apart. Staff readings at A and B were 1.40m and 2.75m respectively. The instrument was moved 10m away from A in line and direction staff readings from positions A and B were 2.34m and 3.64m respectively.
 (i) Determine whether the instrument was in adjustment.
 (ii) If not in adjustment, compute the collimation error present at A and B. (10 marks)
6. (a) Describe a box sextant stating its operation. (12 marks)
 (b) Outline the permanent adjustment of the box sextant stating the objective of each. (8 marks)
7. (a) Draw a labeled diagram of a surveyor's chain. (8 marks)
 (b) Describe FOUR methods by which a right angle may be set out using a chain and tape only. (12 marks)
8. (a) Explain the following as applied in an optical theodolite:
 (i) Eccentricity of the horizontal axis
 (ii) Eccentricity of the vertical axis (10 marks)
 (b) Explain how an optical theodolite is leveled in readiness to sighting to a signal. (10 marks)