



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE
IN CIVIL ENGINEERING

ECE 2314: ENGINEERING SURVEYING IV

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions

Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**

Maximum marks for each part of a question are clearly shown

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1 (30 marks)

- Define parallax (2 marks)
- What is relief displacement? With an aid of a sketch, derive the expression for relief displacement (8 marks)
- State **FOUR** advantages and any **TWO** disadvantages of remote sensing (6 marks)
- A vertical photograph contains images of three ground points, A, B and C at a, b and c respectively. The elevations of these points and their coordinates measured on the photograph with a micro rule and corrected for film shrinkages, given the following tabulated data, determine distances AB, BC and CA

Table 1

Point	X (mm)	Y (mm)	Elevation (m)
a	-51.63	-90.95	994
B	-80.89	+60.15	450
c	+56.52	+72.49	690

Other details include; flight height of 19,000.00 and 152.4mm (14 marks)

SECTION B (Answer any TWO questions from this section)

Question 2 (20 marks)

- a) With an aid of a sketch, derive the expression for a scale over a variable terrain. The highest average and lowest terrain points are 710,470 and 350m above sea level respectively. Calculate the maximum scale, minimum scale and average scale if the flying height above mean level is 2400m and the camera focal length is 150.0mm (6 marks)
- b) With an aid of a diagram, explain parts of an aerial camera (8 marks)
- c) Make short notes on the following (6 marks)
- (i) Horizontal control
 - (ii) Vertical control
 - (iii) Flight planning

Question 3 (20 marks)

- a) Given the following quantities, compute the flying height over a variable terrain using iterative method.

$$\begin{aligned}
 X_1 &= 69'' ; y_1 = -174'' \\
 X_2 &= -28'' y_2 = -19'' \\
 Z_A &= 287.80\text{m}; Z_B = 298.64\text{m} \\
 f &= 152.99'' \\
 X_A &= 3910451.51 \text{ m}; Y_A = 244219.6\text{m} \\
 X_B &= 3909949.05 \text{ m}; Y_B = 243987.10\text{m}
 \end{aligned}$$

(14 marks)

- b) Describe the major elements of interior orientation that are useful during the calibration of an aerial camera. (6 marks)

Question 4 (20 marks)

- a) Discuss the **SEVEN** elements of visual interpretation of a photograph (7 marks)
- b) A vertical photograph was taken from a 545m above datum. The elevation of the base of the tower was given as 260m and had a relief displacement of 54.4 mm. The radial distance to the top of the tower is 121.7. what will be the height of the tower? (1 mark)
- c) Discuss various stages that must be undertaken in the processing of aerial film. (12 marks)

Question Five (20 marks)

- a) Discuss the importance of hydrographic surveying (4 marks)
- b) Define remote sensing (2 marks)
- c) In a pair of overlapping photographs whose mean base length was 89.84 mm and the mean ground was given as 100m above the datum. Two points are observed and the following information obtained:

Point	height above datum	parallax bar reading (mm)
X	55m	7.34
Y	?	9.46

In the flying height 2000m above datum and the focal length of the taking camera was 152.4mm, compute the height of Y above the datum (6 marks)

- d) With an aid of a sketch, explain how mirror stereoscope work. What are the advantages of mirror stereoscopes over lens stereoscope? (8 marks)