



## TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR:**  
**BACHELOR OF SCIENCE IN CIVIL ENGINEERING**

ECE 2314 : ENGINEERING SURVEY IV

END OF SEMESTER EXAMINATION

**SERIES:** DECEMBER 2016

**TIME:** 2 HOURS

**DATE:**

### **Instructions to Candidates**

You should have the following for this examination

-*Answer Booklet, examination pass and student ID*

-*Drawing instruments.*

This paper consists of five questions.

Attempt any THREE questions.

**Do not write on the question paper.**



### Question ONE (Compulsory)

- a). Differentiate between the following pairs as used in photogrammetry
- i). Metric and Interpretive Photogrammetry (2 Marks).
  - ii). Terrestrial and Extra – terrestrial Photogrammetry (2 Marks).
- b). A vertical photograph contains images of three ground control points A, B, and C at a, b and c respectively. The elevations of these points and their coordinates measured on the photograph by using a microrule and corrected for film shrinkage were recorded as follows:

| Point | x (mm) | y (mm) | Elevation (M) |
|-------|--------|--------|---------------|
| a     | -51.64 | -90.95 | 5000          |
| b     | -80.89 | +60.15 | 550           |
| c     | +56.52 | +72.49 | 710           |

- Given that the flying of the area was 6000 m and the focal length of the taking camera was 152.98 mm. Determine the horizontal distances AB, BC and CA in Kilometers (10 Marks).
- c). Discuss the elements of interior orientation of a camera (6 Marks).
- d). Discuss different types of shutters and their functions (10 Marks).

### Question TWO

- a). Define parallax. In a pair of overlapping photographs (mean photo base length 89.84 mm) the mean ground level was given as 80 m above the datum. Two nearby points were observed and the following information obtained:

| Point | Height above datum | Parallax bar reading |
|-------|--------------------|----------------------|
| X     | 55 m               | 7.84 mm              |
| Y     | ?                  | 10.46 mm             |

- If the flying height was 2230 m above datum and the focal length of the camera was 152.2mm, determine the height of point Y above the datum (Assume a direct reading stereo meters). (8 Marks).
- b). Outline the stages that are followed during the development of an aerial film of a mapping camera (12 Marks).

### Question THREE

- a). Define the term relief displacement. With an aid of a sketch, derive the expression of the same given by the following formula

$$d = \frac{rh}{H}$$

where :  $d$  = length of the displaced object on the photograph

$H$  = is the flying height above the datum of the area in question

$r$  = is the radial distance from the principal point to the top of the displaced object

**(10 Marks).**

- b). Explain the conditions that must be fulfilled in order to achieve stereoscopic viewing of photographs **(10 Marks).**

### Question FOUR

- a). With an aid of a sketch, describe the basic parts of an aerial camera **(12 Marks).**

- b). Discuss any FOUR applications of photogrammetry **(8 Marks).**

### Question FIVE

- a). Derive the expression of a scale for a vertical photograph taken under a variable terrain. To determine the maximum, minimum and average scales of an aerial photograph, three points A, B and C were selected. These elevations were obtained from a contour map as 1400, 900 and 1100 m being the highest, average and lowest terrain points respectively. If the flying height of the aircraft

above the mean sea level was given as 3500 m and the focal length of the taking camera as 151.98 mm, determine the highest, minimum and the average scale of the aerial photograph **(13 Marks).**

- b). Discuss factors that make it difficult to achieve stereoscopic viewing **(4 Marks).**

- c). Briefly explain factors that must be considered with respect to exposure **(3 Marks).**

