



TECHNICAL UNIVERSITY OF MOMBASA

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: JULY 2017

TIME: 2 HOURS

DATE: 2017

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.



QUESTION ONE (COMPULSORY)

- 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 **(8 Marks).**

- c). 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 micro rule and corrected for film shrinkage were recorded as follows:

Point	x (mm)	y (mm)	Elevation (M)
a	-66.64	-96.95	3500
b	-85.89	+70.15	750
c	+56.52	+72.49	810

Given that the flying of the area was 5000 m and the focal length of the taking camera was 153.0 mm. Determine the horizontal distances AB, BC and CA **(12 Marks).**

QUESTION TWO (20 Marks)

- a). Discuss six elements of interior orientation of a camera which are useful for the calibration process **(12 Marks).**
- b). To determine the average scale of an aerial photograph, three points A, B, and C were selected. Their elevations were determined from a contour map as 610 m, 310m and 460m, if the flying height of the aircraft above mean sea level was 3000 m and the focal length of the camera lens was given as 152.4 mm, determine the average scale and the scales for points A, B and C **(6 Marks).**
- c). What is a vertical photograph? **(2 Marks).**

QUESTION THREE (20 Marks)

- a) Discuss the main application of hydrographic survey (8 Marks).
- b) Derive the expression of a scale over variable terrain of a vertical photo (10 Marks).
- c) The datum scale of a photo taken with a 6” focal length lens is 1:12,000. A hilltop lies at an elevation of 1,600’ above the datum, and the image of the hilltop is 2.822” from the principal point. Compute the relief displacement of the hilltop (2 Marks).

QUESTION FOUR (20 Marks)

- a). With an aid of a sketch, describe the basic parts of an aerial camera (14 Marks).
- b). In a pair of overlapping photographs (mean photo base length 90.84 mm) the mean ground level was given as 70 m above the datum. Two nearby points were observed and the following information obtained:

Point	Height above datum	Parallax bar reading
X	55 m	7.63 mm
Y	?	10.25 mm

If the flying height was 2200 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 meter) (6 Marks).

QUESTION FIVE (20 Marks)

- a). Outline the stages that are followed during the development of an aerial film of a mapping camera (12 Marks).
- b). Discuss ANY four elements of flight planning (8 Marks).