



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

THIRD YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL
ENGINEERING**

COURSE CODE: CSE 344

COURSE TITLE: ENGINEERING SURVEYING IV

DATE: WEDNESDAY 20TH APRIL 2022 TIME: 3.00 – 5.00 PM

INSTRUCTIONS:

1. This paper contains **FOUR** questions
2. Answer any **THREE** questions
3. Marks for each question are indicated in the parenthesis.
4. Examination duration is **2 Hours**

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION 1. (25 Marks)

- (a) Explain what you understand by the following terms
 (i) Underground surveying (ii) Hydrographic surveying
 (ii) Shaft (iv) Tunnel (6 Marks)
- a) Two plumb lines A and B in a shaft are 8.24m apart and it is required to extend bearing AB along a tunnel. A theodolite can only be set up at C , 19.75m from B and a few centimeters off the line AB produced. If angle $BCA = 09^{\circ} 54''$, what is the offset distance of C from AB produced. (9 marks)
- b) A and B are two points on a shoreline and are 2100 m apart. The bearing of the AB is $26^{\circ} 20' 45''$. The horizontal angles at the points A and B at the point of sounding P are $50^{\circ} 20' 40''$ and $55^{\circ} 20' 00''$ respectively. Calculate the coordinates of P , if those of point A are (500.00 m N, 200.00 m E). (10 marks)

QUESTION 2 (25 Marks)

- (a) Differentiate between the following terms as used in photogrammetry
 ▪ Stereopair and Neat model
 ▪ Endlap and side lap
 ▪ Crab and drift (6 Marks)
- (b) Why is photogrammetry defined as “an art, science and technology”? (6 Marks)
- (c) Give step-by-step procedure for orienting photographs for stereoscopic Viewing. Use sketches where necessary (6 Marks)
- (d) Aerial photography is to be taken from a flying height of 1828m above average ground with a camera having 152.4mm focal length and 23cm format. Overlap will be 60% and sidelap will be 30%. What is the ground area covered by a single photo and by the stereoscopic neat model? (7 Marks)

QUESTION 3 (25 Marks)

- a) What do you understand by the term “Camera Calibration” (4 Marks)
- b) A proposed settlement scheme covering 220km^2 is to be mapped by use of aerial photographs. The scale of the photography is 1:8000 from air using a camera of focal length 150mm with a format of 230mm square. A longitudinal overlap of 60% and lateral overlap of 25% must be provided. If the operating speed of the aircraft is 225km/hr:

- (i) Sketch the outline of the flight line if the flying strip is 16km long, why do you recommend this flight plan? (4 Marks)
- (ii) Calculate the flying height above datum if the average terrain elevation is 1600m above sea level (3 Marks)
- (iii) Calculate the number of photographs required to cover the area, adding two to each end of the strip to ensure coverage (6 Marks)
- (iv) Calculate the spacing between flight lines on a flight map of scale 1:50,000 (4 Marks)
- (v) Calculate the time interval between successive exposures (2 Marks)
- (vi) If the terrain is hilly with many tall structures, what would be your choice of camera lens and why (2 Marks)

QUESTION 4 (25 Marks)

- a) Using an appropriate diagram, describe briefly the elements of the overall remote sensing process. (9 marks)
- b) Differentiate between three types of scattering which occur before radiation used for remote sensing reaches the Earth's surface (9 Marks)
- c) A typical workflow to put up a GIS application has four **general** steps to be performed. List the steps and outline the work that has to be done in each step. (7 marks)