(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

**UNIVERSITRY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**SECOND YEAR FIRST SEMESTER
SUPPLIMENTARY/SPECIAL EXAMINATIONS**

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

COURSE CODE: CSE 241

COURSE TITLE: ENGINEERING SURVEYING I

DATE: 27/07/2022   TIME: 11 – 1PM

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 4 Printed Pages. Please Turn Over.

QUESTION 1 (25 Marks)

a) Define engineering surveying and state its main role.

(3 marks)

b) Explain the main purposes of engineering surveying by dividing the surveying process into three basic stages.

(9 marks)

c) Differentiate between the following terms as used in surveying:
   (i) a plan and a map
   (ii) precision and accuracy
   (iii) true north and magnetic north
   (iv) Topographic surveying and Hydrographic surveying   (8 marks)

d) The two sides of a rectangle were measured as x = 32.543 ± 0.010 m and y = 17.298 ± 0.020 m. calculate the area of the rectangle and its standard error.   (5 marks)

QUESTION 2 (25 Marks)

(a) Describe with the aid of diagrams any three methods of dropping a perpendicular from a given point to a chain line when setting out off-sets   (6 marks)

(b) List SIX types of corrections that are normally applied to a distance measurement in catenary, quoting the equation used in each case.

(9 marks)

(c) With a tape hanging in catenary at a tension of 90 N, temperature of 24 °C and an angle of slope of 3° 10' 20" the recorded measurements for a bay was 76.241 m.
   Determine the actual length of the bay.

   The following are the particulars of the band:

   Length at 21.4 °C and 70 N tension is 100.007 m. Mass of the tape is 1.585 kg or 0.01585 kg/m. Young's Modulus of Elasticity = 20 x 10^{10} N/ m² = 2 x 10^5 N/ mm². Coefficient of linear expansion = 12 x 10^{-6} per °C. Cross-sectional area = 2.5 mm².

Assume mean radius of earth = 6367.3 km and height of measurement above sea level is 250

(12 marks)

QUESTION 3   (20 Marks)

(a) Explain the difference between the following terms as used in used in levelling:
   (i) "Level surface" and "Level line"
   (ii) "Horizontal plane" and "Horizontal line"
   (iii)"Backsight" and "Foresight"
   (iv) "Intermediate Sight" and "Change Point"

(8 marks)

(b) Using neat sketches describe how you would perform level tube adjustment in a dumpy level.

(7 Marks)

(c) Levelling was done down the centre line of a road for the purpose of production of a longitudinal section and this is shown schematically below with the level readings marked thereon.
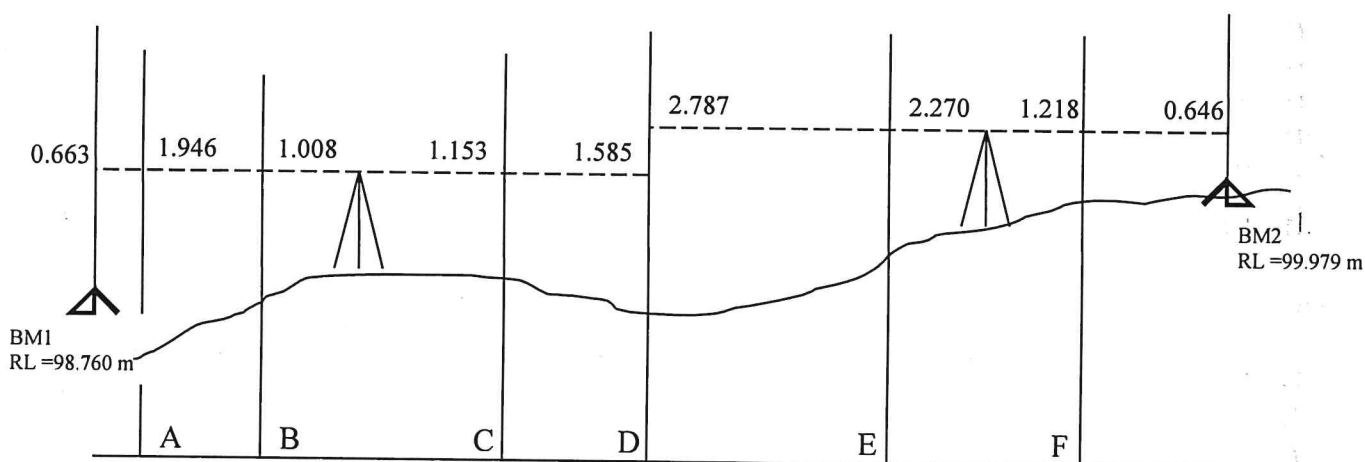

Determine the reduced levels at the various staff stations by the Rise and Fall Method, applying the necessary arithmetical checks.

(10 marks)

QUESTION 4   (25 Marks)

(a) Why is it necessary to try and keep sight lengths as equal as possible when leveling?

(2 marks)

(b) The under noted readings in meters on a leveling staff were taken a long a roadway AB with a dumpy level, the staff being held in the 1st case at a starting point A and then at 20m intervals: 0.765, 1.064, [0.616], 1.835, 1.524. The level was then moved forward to another position and further readings were taken. These were as follows; the last reading being at B: 2.356, 1.378, [2.063], 0.677, 2.027. The level of A is 41.819m. Set out the readings and complete the bookings using the Height of Collimation method. Calculate the gradient from A to B. (Figures in brackets denote inverted staff readings).

(11 Marks)

(c) Figure below shows a closed circuit of levels with difference of levels between different points and the length between them given. Compute values of the levels of the different points. The reduced level of point A is 100.00m (12 marks)
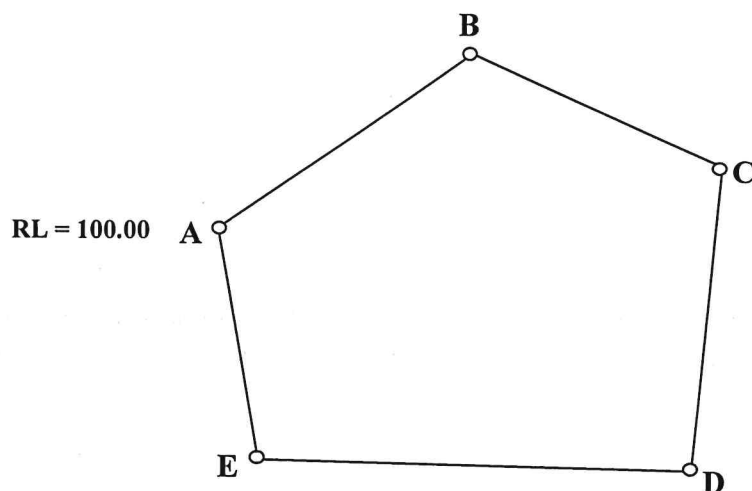
Line	Difference in Levels	Distance
A-B	+3.52m	1.6 km
B-C	+2.15m	1 km
C-D	-1.05m	1.25 km
D-E	-2.67m	1.4 km
E-A	-2.10m	0.8 km