



KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR**

**SECOND YEAR FIRST SEMESTER
MAIN EXAMINATIONS**

**FOR THE DEGREE OF
B.SC RENEWABLE ENERGY AND BIOFUELS TECHNOLOGY**

COURSE CODE: REN 216

COURSE TITLE: ENGINEERING SURVEYING

DURATION: 2 HOURS

DATE: 22/06/2021

TIME: 8-10AM

INSTRUCTIONS TO CANDIDATES

- (i) Answer Question 1 (Compulsory) and any other TWO questions
- (ii) All symbols have their usual meaning

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

QUESTION ONE (Compulsory) – 30 MARKS

- a) Differentiate between the following.
- (i) Leveling and Traversing (4 Marks)
 - (ii) Latitude and Departure (4 Marks)
 - (iii) WCB and RB (4 Marks)
- b) Differentiate between the following.
- i. Backsight and Foresight (2 Marks)
 - ii. Accuracy and Error of closure (5 Marks)
- c) Give the formulae and define the terms therein for the following steel tape corrections.
- i. Sag (4 Marks)
 - ii. Tension (4 Marks)
- d) State three uses of leveling (3 Marks)

QUESTION TWO

A steel tape is 30m long between end graduations at a temperature of 18⁰C and under a pull of 45N when lying on the flat. Its cross-sectional area is 5.5mm², its mass is 1.6kg, and its coefficient of linear expansion is 0.000011/⁰C. The tape is stretched over three supports between which it records 30.000m and is supported at three intermediate supports equally spaced, all supports being on the same level and the tape being allowed to sag freely between the supports. The temperature at observation is 24⁰C and the pull at the tape is 72N. The measurement is done at an altitude of 1800m above msl, E is 20×10¹¹ N/m², and R is 6370km.

Calculate:

- a) The actual length between the end graduations (16 Marks)
- b) The equivalent length at mean sea level (4 Marks)

QUESTION THREE

The groups of figures below refer to staff readings taken with a level from instrument stations: A, B, C, D, and E. The first and last readings in each group are backsight and foresight respectively. The backsight from station A was taken with the staff held on a bench mark at 204.110m Above Ordnance Datum (A.O.D.).

A: 2.680, 0.875, 0.980, 0.430; B: 1.665, 1.440, 0.625; C: 1.010, 1.690, 1.225; D: 2.445, 3.575, 3.880, 2.880; E: 2.735, 2.005, 2.390

- a) Book the readings by the rise-and-fall method (10 Marks)
- b) Determine the reduced level of each staff station (7 Marks)
- c) Make all the checks you think necessary (3 Marks)

QUESTION FOUR

A closed traverse ABCDEA has the following readings.

Line	Length (m)	Bearing
AB	189.53	S06° 15' W
BC	175.18	S29° 38' E
CD	197.78	N81° 18' W
DE	142.39	N12° 24' W
EA	234.58	N42° 29' E

- a) Compute and tabulate the latitudes and departures of all sides (16 Marks)
- b) Determine the linear error of closure (2 Marks)
- c) Determine the accuracy with which the work was done (2 Marks)