



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 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: 03/02/2022

TIME: 8-10AM

INSTRUCTIONS TO CANDIDATES

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

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QUESTION ONE (Compulsory) – 30 MARKS

- a) Differences between a Change Point and an Azimuth. (5 Marks)
- b) The condition under which reciprocal leveling is applied. (5 Marks)
- c) Define the following terms.
- i. Datum (3 Marks)
 - ii. Bench mark (3 Marks)
 - iii. WCB (3 Marks)
 - iv. Profile leveling (3 Marks)
- d) Give the condition under which reciprocal leveling is applied (4 Marks)
- e) State any two methods of measuring linear distances (4 Marks)

QUESTION TWO

Five bays of line AB were measured under a tension of 53N and the following data was recorded.

Length of span (m)	Rise between ends of span (m)
29.149	0.027
29.944	0.196
29.474	0.126
29.514	0.055
29.690	0.336

Field temperature is 10°C

The tape was standardized on the flat under a pull of 89N and at a temperature of 20°C .

Tape details: Coefficient of thermal expansion = $0.000011/^\circ\text{C}$; Young's Modulus = 207 kN/mm^2 ; Density = 7700 kg/m^3 ; Cross sectional area = 6 mm^2

How long is line AB?

(20 Marks)

QUESTION THREE - 20 MARKS

Given below are the field notes made during a leveling for the construction of a road. Certain figures have been obliterated from the booking. However, sufficient data remains to make it possible to complete the booking.

B.S.	I.F.S.	F.S.	Rise	Fall	R. L. (m)	Distance (m)	Remarks
2.84 1					60.000	0.00	At A
			0.236		60.236	15.00	
	2.872					30.00	
			0.553			45.00	
		2.810		0.491		60.00	
	1.021			0.115		75.00	At B
	0.378					90.00	
				1.599		105.00	
1.42 6		2.773		0.796	58.164	120.00	
			0.689		58.853	135.00	
	2.103					150.00	
			0.866			165.00	At C
5.173		6.820					

a) Copy the figures to your answer and insert the missing values

(17 Marks)

b) Calculate the gradient from A to C which is a straight line

(3 Marks)

QUESTION FOUR – 20 MARKS

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 both the unadjusted latitudes and departures of all sides

(8 Marks)

b) Adjust the latitudes and departures in (a) using the Bowditch method

(12 Marks)