

**JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY**

UNIVERSITY EXAMINATION 2015/2016

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN LAND RESOURCE PLANNING AND MANAGEMENT

SECOND SEMESTER

ECE 2218: ENGINEERING SURVEYING I

DATE: APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS

Answer QUESTION ONE and ANY OTHER TWO QUESTIONS.

Question 1 (30 marks)

- a) Explain the purpose of engineering survey at various stages of an engineering project. (8 marks)
- b) Identify three observational errors in leveling and explain the type, source and how it may be eliminated. (6 marks)
- c) Distinguish between Surveying and setting out. (6 marks)
- d) The following staff readings were recorded along the centerline of a proposed road starting from benchmark 1 (BM1) to benchmark 2 (BM2). The instrument position was changed after the fifth reading. The staff readings were 0.663, 1.946, 1.008, 1.153, 1.585, 2.787, 2.270, 1.218 and 0.646.

Tabulate the staff readings and reduce them using rise and fall method to compute the reduced levels of all staff stations and apply the necessary arithmetic checks.

Reduced level of BM1 is 1098.760m and that of BM2 is 1099.979m.

(10 marks)

Question 2 (20 marks)

(a) Define the following terms used in Mass Haul Diagrams

- (i) Station metre
- (ii) Average haul distance
- (iii) Limit of economic haul

(6 marks)

(b) Outline the steps followed in construction of Mass Haul Diagrams. (70 marks)

(c) Determine the area of the land parcel enclosed by the given coordinates. (40 marks)

Point	N (m)	E (m)
A	450.65	577.22
B	578.87	804.19
C	420.15	495.55
D	185.83	820.25
E	294.78	624.12

Question 3 (20 marks)

a) Differentiate between the following

- (i) Backsight and foresight (2 marks)
- (ii) Inverse and reciprocal leveling (2 marks)
- (iii) Level line and horizontal line (2 marks)

b) Describe two methods you can use to convert sloping distance to horizontal distance. (4 marks)

c) With the aid of a diagram, describe the components and operation of an electro-optical EDM instrument. (70 marks)

Question 4 (20 marks)

(a) The record of a leveling made some years ago has become of current importance. Some of the data are undecipherable but sufficient data remain to enable all the missing values to be calculated.

- (i) reproduce the leveling notes
- (ii) calculate the missing values (X) and
- (iii) apply all the arithmetic checks.

(70 marks)

BS	IS	FS	RISE	FALL	REDUCED LEVEL	REMARKS
0.719					36.99	1m BM
	0.42			0.591	36.401	100m
1.234		2.22		0.12	37.285	200m
2.669				1.359	35.926	300m
	1.31			0.8	35.126	400m
	2.11					500m
					34.54	600m
		2.37				715m
1.56	0.98		0.48			800m
					34.141	900m
	1.99					1000m
					34.603	1100m
		1.79				1200m
2.135				0.945		1236m BM
$\Sigma = 4.560$						

- (b) Using suitable and relevant examples, explain five applications of engineering survey in your field of study. (10 marks)

Question 5 (20 marks)

- (a) Explain the two main basic principles in surveying. (6 marks)
- (b) Explain how longitudinal and cross-sections are created by levelling. (6 marks)
- (c) Outline
- (i) Four areas of applications of contouring in engineering works. (4 marks)
- (ii) Four Characteristics of Mass haul diagrams. (4 marks)

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