ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION, INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

NATIONAL CERTIFICATE

IN

CIVIL ENGINEERING

MODULE: Engineering Survey **PAPER NO: 313/22/M04**

DURATION: 3 hours

JUNE 2023 EXAMINATION

REQUIREMENTS

Scientific calculator

INSTRUCTIONS TO CANDIDATE

Answer all questions.

This paper consists of 3 printed pages.

QUESTION 1

a) A point Q is on line P_1P_2 produced. Given the coordinates of P_1 and P_2 as:

Point	Y	X
P_1	+4732.24	+71631.41
P_2	2181.32	+71832.94

and distance P_2Q as $30.451m$ calculate:

i) Coordinates of Q
ii) Coordinates of D midway point between P_1 *and* P_2 (19 marks)

b) Explain the three (30 types of traversing that can be employed in traversing. (6 marks)

QUESTION 2

a) Explain briefly the difference between gross errors and systematic errors as they occur in linear measurements. Give examples where necessary. (8 marks)

b) A steel tape of normal length $30m$ was used to measure line AB by suspending it between supports. The following measurements were recorded:

Line	Length measured	Slope angle	Mean temp	Tension
AB	$29.871m$	3°40′00"	5°C	120N

Coefficient of expansion = 0.000112/°C

Young modulus = $200 \times 10^9 MN/m^2$

The standardisation length of the tape against a reference tape was known to be $30.014m$ at 20°C and 50N. If the tape weigh 0.17N/m and has a cross sectional area of $2mm^2$, calculate the horizontal length AB. (17 marks)

QUESTION 3

a) Briefly explain the following:

i) Idea figures in triangulation (4 marks)
ii) Well conditioned triangle (4 marks)
iii) Intervisibility (4 marks)
iv) Basic procedure of triangulation (4 marks)

b) Adjust the following extract from a field book.

Arc	CL	CR
Mar	180.00.10	360.00.16
Lion	229.48.36	49.48.32
Heard	243.35.55	63.35.60
Break	273.37.16	93.37.20
Berg	39.34.40	219.34.47
RO	180.00.15	360.00.20

(9 marks)

QUESTION 4

a) Outline the features of a locality sketch. (8 marks)

b) What are the parameters for identifying a site on a base map. (6 marks)

c) Outline the equipment used in traversing. (5 marks)

d) Briefly explain the types of errors found in surveying. (6 marks)

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