TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2202: ENGINEERING SURVEYING I

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2013
TIME ALLOWED: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions. Answer question **ONE (Compulsory)** and any **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One (Compulsory)

a) Define the following terms as used in engineering survey:
   (i)   Reconnaissance survey
   (ii)   Preliminary survey
   (iii) Control survey
   (iv)   Location survey
   (v)   Topographical survey   **(10 marks)**

b) Briefly discuss types of tapes used in Engineering Survey   **(6 marks)**

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c) Differentiate between direct and indirect ranging elaborating each by an appropriate illustration.

(8 marks)

d) While measuring the distance on a slope, it was found that the ground vises by 3:2 for each 20m chain length. Find the angle of slope and the hypoteneural allowance per chain length. **(6 marks)**

Question Two

a) The area of the plan of an old survey plotted to a scale of 10m to 1cm new measures as $90.5cm^2$ as found by a planimeter. The plan is found to have shown so that a line originally 10cm long now measures 9.5cm only. A note on the plan also state that the 20m chain used was 9cm too short. Find the area of the survey **(6 marks)**

b) A 100m tape is suspended between the ends under a pull of 200N. The weight of the tape is 30N. Find the correct distance between the tape ends. **(4 marks)**

c) The following staff reading are taken from a level book. Reduce the levels by the rise and fall method and carry out the routine arithmetical checks on the complete entries:

BS	IS	FS	Remarks
1.32			Page A
	2.43		Page B
	1.15		Page C
	1.72		Page D
5.06		1.22	Page E
	4.79		Page F
	4.47		Page G
	3.25		Page H
		1.84	Datum of R.L 30.0

(10 marks)

Question Three

a) By the use of a well labeled illustration, differentiate a level line at a horizontal line. Although they are often assumed to mean one and the same thing and hence shown:
(i) Correction for curvature
(ii) Correction for curvature and refraction **(10 marks)**

b) In a reciprocal leveling operation across a river the following staff readings were recorded as follows:

Level at A	Reading on Staff	C = x = 2.46m
Level A	Reading on Staff	D = x1 = 1.28m
Level B	Reading on Staff	C – y1 = 3.45m
Level B	Reading on Staff	D = y = 2.23m

Use an appropriate illustration for reciprocal leveling operation mentioned above. **(10 marks)**

Question Four

a) The following table gives ground levels and invert levels taken on the line of a proposed drain from a building to an existing sewer. **(20 marks)**

Chainage (m)	Ground Level (m)	Insert (m)	Remarks
0	20.90	20.00	Manhole 1
20	20.30	19.50	
40	20.30	19.00	Hedge
60	19.70	18.50	Fence
80	18.80	18.00	Manhole 2
100	17.90	17.00	Existing sewer

  (i) Draw a longitudinal section through the line of the trench showing ground levels, invert levels and manholes (Use the following scale horizontal scale 1:400 and vertical scale 1:10)
  (ii) Calculate the gradient of the drain between manhole 1 and 2
  (iii) Calculate the gradient of the drain between MH2 and the existing sewer.

Question Five

a) Draw a well labeled illustration of a dumpy level explain briefly how it works. **(10 marks)**

b) Define the following terms as used in leveling:
  (i) Levelling
  (ii) Trigonometric leveling
  (iii) Horizontal line
  (iv) Direct leveling
  (v) Level line **(10 marks)**

Question Six

The following readings have been taken from a page of an old level book. It is required to reconstruct the page. Fill up the missing quantities and apply the usual checks **(20 marks)**

Station	BS	IS	FS	Rise	Fall	R.L	Remarks
1	3.12		?	1.325		?	BM
2	?					125.505	T.P
3		2.320			0.055		
4		?				125.850	
5	?		2.655				T.P
6	1.620		3.205				T.P

7		3.625					
8			?			123.090	TBM