THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

CERTIFICATE IN CONSTRUCTION TECHNICIAN I
(CT 109A)

SEMESTER II EXAMINATIONS

APRIL/MAY 2010 SERIES

EB 1116 : LEVELLING SURVEYING

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:-

- Answer Booklet
- Scientific Calculator

This paper consist of **FIVE** Questions.
Question **ONE** is **COMPULSORY.**
Answer **ANY** other **TWO** Questions.
Maximum marks for each question are as shown.

SECTION A – COMPULSORY

Question ONE

(a). State the aid of the two-peg test. **(2 Marks)**

(b). Outline the procedure of carrying out a two-peg test. **(10 Marks)**

(c). On testing for collimation error, an instrument was set up midway between two points and staff readings obtained were 1.408 and 1.646. The instrument was then moved to another collinear point outside the two points and staff readings taken on the same staff points were 1.362 and 2.009 consecutively.

(i). Deduce the mean height difference between the two points. **(4 Marks)**

(ii). Calculate collimation error. **(3 Marks)**

(iii). State any other way of eliminating collimation error other than the two-peg adjustment. **(1 Mark)**

(d). (i). Apart from the collimation error, curvature and refraction are errors incurred in a leveling task due to atmospheric conditions.

Show then that the combined effect of curvature and refraction is given by:-

$$e_{c+r} = \frac{3d^2}{7R}$$

(7 Marks)

(ii). During a leveling task, a staff reading of 3.042 was obtained at a distance 320m from the instrument station. Compute the error due to curvature and refraction. (take radius of earth as 6.37×10^6m).

(3 Marks)

Question TWO

(a). State the functions of the following parts of a leveling instrument;

(i). Footscrews
(ii). Inclined mirror
(iii). Slow motion screw (tangential screw)
(iv). Tilting screw

(4 Marks)

(b). Outline the procedure of performing a plate-bubble test and necessary permanent adjustment one has to perform to eliminate the plate bubble error. **(10 Marks)**

(c). Distinguish the following:-

(i). A folding staff
(ii). Telescopic staff
(iii). Single-length staff

(6 Marks)

Question THREE

(a). Define the term contour. **(2 Marks)**

(b). Name any **FOUR** uses of contour maps. **(4 Marks)**

(c). The figure 1 shows a layout of grids on a construction site. Interpolate and plot, on the graph paper provided, contours at 0.5m interval starting with 10.0m contour. **(14 Marks)**

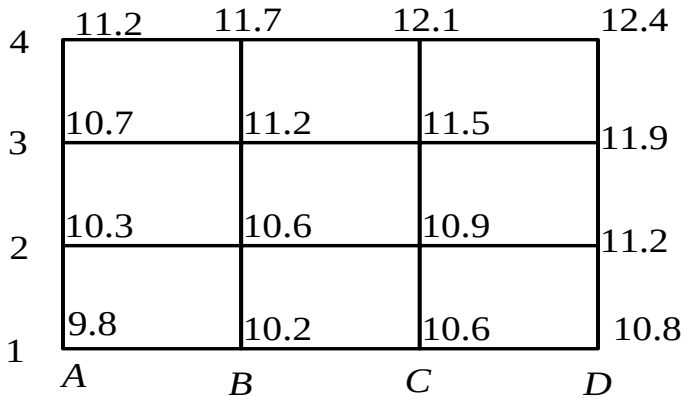

Fig. 1

Question FOUR

(a). Define the following terms as used in leveling:

(i). Backsight
(ii). Change point
(iii). Flying levels
(iv). Mean sea levels
(v). Bench mark

(5 Marks)

(b). Below is an extract of a leveling field notebook, of a survey carried out at a construction site. By use of the height of collimation method, make the necessary reductions and find the reduced levels. Make the necessary checks.

Back sight	**Inter. sight**	**Foresight**	**H.O.C**	**Reduced levels (m)**	**Remarks**
0.431				300.000	
	0.204				
	0.314				
	0.040				
2.149		0.013			
	2.343				
	3.831				
		2.048			

(10 Marks)

(c). Outline any **FIVE** sources of errors one should avoid or minimize when carrying out a levelling task. **(5 Marks)**

Question FIVE

(a). List **THREE** methods of contouring. **(3 Marks)**

(b). Outline **FIVE** characteristics of contours. **(5 Marks)**

(c). With aid of a sketch explain how grid contouring is carried out in the field and how contours are obtained from the field data. **(12 Marks)**