THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

DIPLOMA IN CIVIL ENGINEERING AND CAD

DCC 07 (A & B)

SEMESTER I EXAMINATIONS

APRIL/MAY 2010 SERIES

SURVEYING

TIME: 3 HOURS

Instructions to Candidates

You should have the following for this examination:
- Answer booklet
- Calculator

This paper consists of **EIGHT** Questions.
Answer any **FIVE** Questions.
The maximum marks for each part of a question are all shown.

Question ONE

(a).   Differentiate between Geodetic and Plane surveying.   **(4 Marks)**

(b).   Define the following terms as used in chain surveying:

   (i).   Check line
   (ii).   Offset
   (iii). Triangulation
                                                                      (3 Marks)

(c).   With the aid of a sketch, describe the measurement of an angle of slope with
        all an abney level.   **(6 Marks)**

(d).   With the aid of a sketch, explain the measurement procedure of a line
        across a wide road.   **(7 Marks)**

Question TWO

Briefly explain the following chain surveying procedures:

(i).   Setting out a right angle from a point to a survey line.
(ii).   Setting out a right angle by the 3:4:5 method.
(iii). The repeated alignment techniques.
                                                                     (20 Marks)

Question THREE

Inorder to control the excavation of the bottom of a sewer trench sight
rails are to be positioned at three manhole positions M, N and P such that
MN=80m, NP=100m. A was set up nearby and a reading of 1.28m
obtained on a BM of reduced level 170.96m. The ground reduced levels
of M, N and P being 167.85, 168.35 and 165.91m respectively.
A sewer is to be laid of falling gradients of 1:120 and 1:125 between
Manholes M-N and N-P respectively. If the invert reduced level at
manhole M is 166.05m and a 3.75m traveler is available, calculate:

(a).   The invert reduced levels at N and P.
(b).   The staff readings necessary at A, B and C to position sight rails at these
        points.
(c).   The depths of dig at M, N and C.
(d).   The height of the sight rails above the ground at M, N and P.
                                                                     (20 Marks)

Question FOUR

The following staff readings were obtained along the bottom of a drain excavation, at 20m intervals; 2.852, 2.580, 2.953, 3.222, 1.592, 1.792, 2.553, 1.953, 2.070, 1.962, 1.778, 2.525 and 2.955 all in metres. The underlined figures denote foresights. If the trench is to have a constant falling gradient of 1:100, starting and ending from the first and last point respectively; calculate the amount by which the ground is to be adjusted to attain this uniform gradient. Take the reduced level of the first point as 107.581m. **(20 Marks)**

Question FIVE

Shown in table 1 are the stadia tacheometric observations with the staff held vertically. Given the reduced level of BM as 100.00m and that the theodolite was first made level when observing to the Bench mark, calculate:
(a). Distance KJ, JL and KL.
(b). Area JKL in hectares.
(c). The reduced levels of points KJ and L.
(d). The difference in height between K and L.
(20 Marks)

Table 1

Inst Stn.	To Stn	Staff Readings	Height of Instrument	Vertical Angles	Whole Circle Bearings
L	B.M	2.809		0° 0′ 0″	-
L	J	3.315, 2.732, 2.150	1.52	1° 50′	301° 45′
J	K	2.101, 1.906, 1.710	1.46	2° 45′	185° 30′

Question SIX

Fig. 1 shows the information of a closed polygonal fraverse J K L J. Given the whole circle bearing of line JK as 134° 25′ 20″ and the co-ordinates of point J as J`. 1500.00mE, 1400.00mN, calculate the total co-ordinates of the other stations by the Bowditch's method.
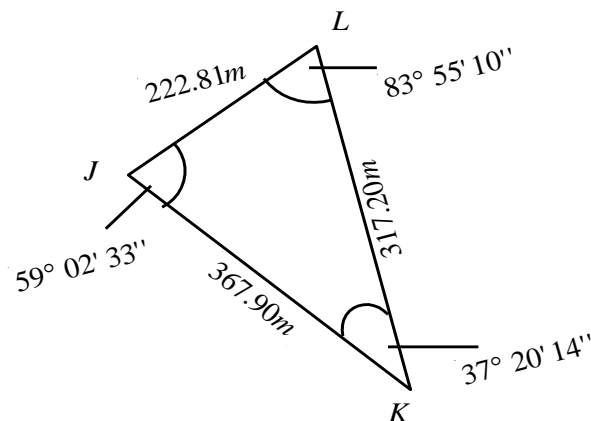
Fig.1

Question SEVEN

(a).   Define the following terms as used in mass-haul diagrams:-
    (i).   Mass-haul diagram
    (ii).   Borrow
    (iii).   Waste

(3 Marks)

(b).   State any **THREE** properties of a mass-haul diagram.   **(3 Marks)**

(c).   Fig. 2 shows a three level road cutting section. Calculate the following for the section using the rate of approach method:-

    (i).   Side width
    (ii).   The cross-sectional area   **(14 Marks)**

Question EIGHT

(a).   Derive expressions for the following elements of a circular curve:

    (i).   Long chord
    (ii).   Any offset from the long chord.

(8 Marks)

(b).   A circular curve 15m radius is to be set out by offsets from the long chord to connect two intersecting straights deflecting at an angles 82°. Given that offsets are required at 2m intervals, calculate the setting out data for the curve.   **(12 Marks)**

Fig.2