THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

University Examination 2010

THIRD YEAR/FIRST SEMESTER EXAMINATION
FOR THE DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2306: SURVEYING III

SERIES: APRIL/MAY 2010   **TIME:** 2 HOURS

Instructions:

Answer Question **ONE** and any other **TWO** questions.

QUESTION ONE

(a)   A straight road is to be cut along a hillside having a transverse slope
        of 1:s such that the depth of the formation level at the centre-line is
        h, the formation wideth b and side slopes 1:n. Derive expressions for
        calculating the road plan width, w, and cross sectional area, A.   (6 marks)

(b)   A road embankment is to be constructed between chainages 0+100
        and 0+200. The ground surface is horizontal in transverse section,
        but sloping downwards between two chainages at 1:30 The formation
        level is horizontal both cross-section and longitudinally directions
        with the width 13m and side slopes 1:2. If the height of fill at chainage
        0+100 is 1m, calculate the volume of earthworks, using cross-section
        areas at 25m intervals. Use End-area Method.   (14 marks)

QUESTION TWO

The following data refers to a section of a proposed road construction.
Embankments are to be built with side slopes 1:2 and cuttings with slopes 1:3.
The road formation width is 13m and the ground horizontal across the section.

Chainage	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
Centre height (m)	-3.0	-2.0	-2.0	4.0	3.0	-1.0	-2.5	-3.5	-4.0	-2.5	-1.0	3.0	3.5	5.0	5.5	6.5

Plot the longitudinal section of the road and construct a Mass haul diagram for the section. Assume the formation level is horizontal over the whole section at a reduced level of 30m. Take shrinkage factor as 0.8. (20 marks)

QUESTION THREE

(a)   To find the area of a pond situated near a straight road perpendicular offsets at 10m intervals were measured from the centre-line of the road to the near and far boundaries of the pond. The results were as follows:-

Chainage	0	10	20	30	40	50	60	70	80
Offset to near boundary (m)	20	16	4	12	18	23	17	15	20
Offset to far boundary (m)	20	30	34	48	58	63	54	32	20

Compute the area of the pond using:

(i)   Trapezoidal Rule
(ii)   Simpson's Rule   (10 marks)

(b)   In a proposed hydroelectric project a storage reservoir is required to provide a storage of 4.5 million m^3 between the lowest draw down (LDD) and the top water level (TWL). The areas contained within the stated contours and upsteam face of the dam were as follows:

Contour	100	95	90	85	80	75	70	65
Area ($x10^4 m^2$)	30	25	23	17	15	13	7	2

If the LDD is to be 68 metres, calculate the TWL for full storage capacity.
Hint: Use the End-area method for calculating volumes. (10 marks)

QUESTION FOUR

(a)   Describe the procedure of locating the point of intersection of the straights of a simple circular curve in case of obstacles. (10 marks)

(b)   Two straights AI and BI meet at I on the side of a river. On the near side of the river, two points E and F were situated on the straights AI and BI respectively. The distance EF was measured as 90.00 Metres. Angles AEF and BFE were found to be 170°52` and 163° 32` respectively. The radius of the circular curve is 600m. Determine the location of the tangent points with respect to the points E and F.
(10 marks)

QUESTION FIVE

(a)   Describe the method of setting out simple circular curves by taking
       offsets from the long chord.   (10 marks)

(b)   A simple circular curve has n external deflation angle of 23°04`21``.
       The radius of the curve is 250m. Calculate the ordinates at 10m
       intervals on the long chord.   (10 marks)