



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD & BCEBD 214: ENGINEERING SURVEYING III

Date: 5/8/2016

Time: 8:30 – 10:30 AM

INSTRUCTIONS:

- *This paper comprises of five questions*
- *Question one is compulsory and carry 30 marks*
- *Answer question one and any other two questions*

- 1 a) List five instruments used in setting out in survey work (5 marks)
- b) Explain five characteristics of a mass haul diagram. (10 marks)
- c) The areas between the consecutive contours measured with the help of a planimeter were recorded as follows;

Contour (m)	200	195	190	185	180
Area (m ²)	3850	3450	2600	800	450

Estimate the capacity of the reservoir taking datum level at 180m using;

- i) Prismoidal formula
- ii) Trapezoidal formula (8 marks)
- d) Explain the degree of curve according to the arc definition in curve ranging (3 marks)

- e) Derive an expression for calculating the tangent length in terms of the radius and the angle of deflection of the curve (4 marks)
- 2 a) Determine the length of the long chord for a 300m radius curve connecting two straights deviating at $47^{\circ}50'$ (4 marks)
- b) A 320m radius curve is to be set out to connect two straights deflecting at $52^{\circ}00'40''$. The chainage at the intersection is 620.00m and the pegs are to be placed at 30m intervals on through chainage basis. Compute and tabulate the setting out data using offsets from chords produced. (16 marks)
- 3 a) Explain the general stages of setting out in surveying (6 marks)
- b) An embankment is made on a ground having a transverse slope of 1 in 10. The width of the bank at the formation level is 10m. The side slope of the embankment is 2:1. The heights of the bank at the centre-line of the formation level are 3m, 3.5m, and 4m respectively. The consecutive cross-sections are spaced at 25m apart. Find;
- The side widths
 - The cross-sectional areas
 - The volume of earthwork assuming the centerline to be straight using the prismoidal rule (14 marks)
- 4 a) Show that the area of a polygonal plot whose rectangular coordinates are known is given by the expression;
- $$A = \frac{1}{2} \sum_{r=0}^{r=n} N_r (E_{r+1} - E_{r+1}) \quad (10 \text{ marks})$$
- b) The following observations were recorded from a survey traverse exercise on a plot whose points were 100m apart from a fixed reference meridian.

POINTS		P	Q	R	S	T	U	V	W	X
CO-	NORTH(Y)	1000	750	620	900	220	800	240	815	1000
ORDINATES	EAST (X)	820	800	850	915	950	1005	1020	1100	1100
(m)										

Calculate the area of the plot in hectares using;

- The coordinate method
- Trapezoidal formula (10 marks)

- 5 a) Define the following terms as used in Mass Haul Diagrams.
- i. Haul
 - ii. Free haul distance
 - iii. Over haul volume
 - iv. Overhaul (4 marks)
- b) The formation width of two cross-sections of a road 50m apart is 10m, and the side slope for cutting is 1:1 and for filling is 2:1. The transverse slope of the ground is 1 in 5. The depths of excavations at the centerline of the two cross-sections are 0.50m and 0.70m respectively. Find the volume of cutting and filling using the end areas formula.
- Apply prismoidal corrections for the computed areas (16 marks)