



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA
FIRST SEMESTER EXAMINATIONS, NOV/DEC 2017

COURSE NO: GM 379
COURSE NAME: Engineering Surveying
CLASS: BSc II **TIME:** 3 hrs

Name: _____ Index Number: _____

Answer all questions in Section A and any other two in Section B

Section A

Q1

- a) (i) With the aid of a well labeled diagram of a vertical curve, show the following:
- Back and forward Tangent Grades
 - Point of Vertical Tangent
 - Point of Vertical Curve
 - Point of Vertical Intersection
- (ii) Show that the rate of change of grade on a parabolic vertical curve is constant throughout the curve. [10 Marks]
- b) Two straights along a section of a road deflect at an angle of $26^{\circ}40'$. If a simple circular curve of radius 600 m is to be fitted at the intersection of the road, compute the length of the curve, the mid-ordinate and the external distance of the curve. [10 Marks]
- c) Describe a procedure for setting out a curve by the traditional using two theodolites only? If a simple circular curve to be fitted between two straight has radius 600 m and deflects through angle $26^{\circ}30'$, provide data required to set out the curve using only two theodolites? [10 Marks]
- d) The following offsets, 12 m apart, were measured at right angles from traverse line AD to the irregular boundary.
0m, 1.4 m, 2.6 m, 4.5 m, 6.9 m, 7.6 m, 6.6 m, 7.3 m, 6.2 m, 4.8m, 2.1 m, 1.1 m, 0.3 m
- Calculate the area bounded between the traverse line AD and the irregular boundary using:
- The Trapezoidal Formula
 - The Simpson's formula
- [10 Marks]

Section B

Q2.

- a) Distinguish between the following pairs of terms:
 - i. *Free haul distance* and the *overhaul distance*
 - ii. *Bulking factor* and *shrinkage factor*

- b) An embankment is designed to be constructed along a section of a road with horizontal ground. If the height of the filling at the centre line of that chainage is 1.24 m and the formation width (2b) equals 8.2 m determine the cross sectional area and the plan width of the embankment at that chainage if the side slope is 1:3.

- c) If the cross sectional area of five successive chainages (100-500 m) along the highway are provided in the Table 1, compute the volume of material required to form that section of the road level using the End Area method.

Table 1

Chainage (m)	100	200	300	400
Cross sectional Area (m ²)	13 500	675	2 045	3 220

[30 Marks]

Q3.

- a) Two grades g_1 and g_2 , which intersects at chainage 2200 m have gradients -1.75% and 2.25% respectively. If the reduced level at the intersection point is 78.40 m above datum, compute the chainages and elevations of all the full chainages (50 m) along the curve, given a designed curve length of 600 m is to be used.
- b) Determine the chainage and elevation of the minimum point along the curve. What engineering structure is likely to be fitted at this point? [30 Marks]

Q4.

- a) Describe briefly the grid method of determining approximately the area of land bounded by an irregular boundary? What measures could be adopted to improve upon the accuracy of the area determine by this method?
- b) The polygon traverse PQRSTP shown in Figure 1 is to be divided into two equal areas by a straight line that must pass through point R and which meets line TP at Z. The coordinates of the points are given in table 2. Calculate the coordinates of point Z.

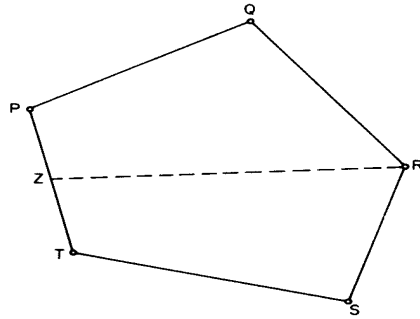


Figure 1: Division of an area

TABLE 2

<i>Point</i>	<i>m E</i>	<i>m N</i>
P	1613.26	1418.11
Q	1806.71	1523.16
R	1942.17	1366.84
S	1901.89	1203.18
T	1652.08	1259.26

[30 Marks]

Dr C. B. Boye/Yakubu?