GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

ENGINEERING SURVEYS

EGS5202

Final Examination Paper

This examination paper consists of 4 pages

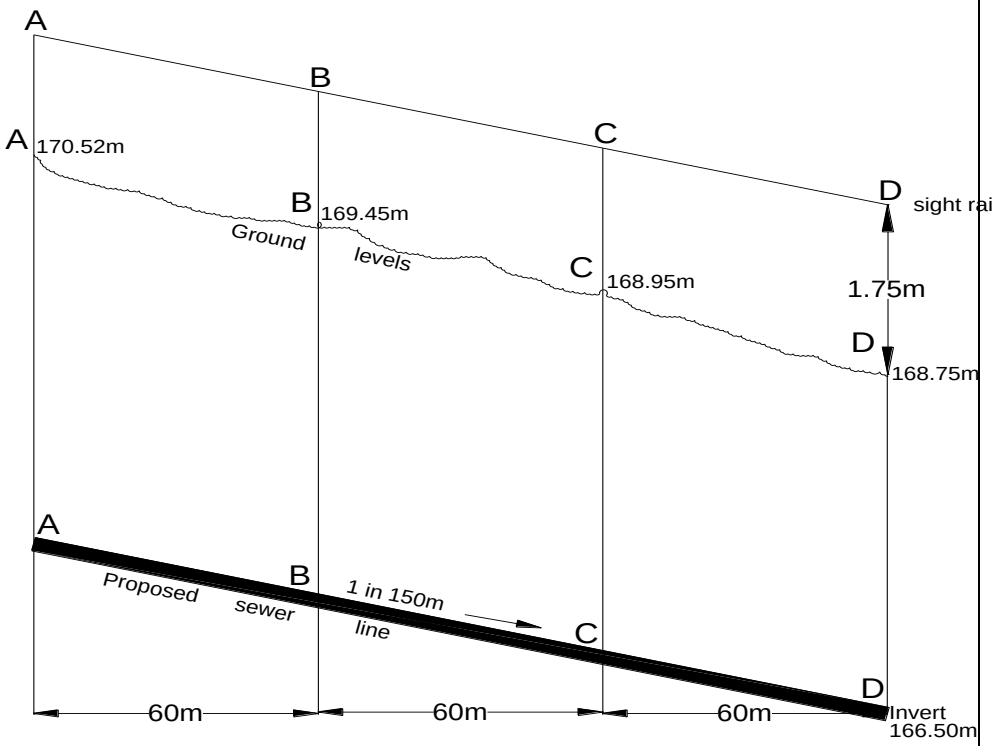
Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: Mr. T. Mathe

INSTRUCTIONS

1. Answer ALL Questions.
2. Scientific Calculators may be used.
3. Programmable calculators **are not allowed**

QUESTION 1: ROUTE LOCATION				**[20]**
1	a		Outline the procedure of locating the point of intersection by traditional methods when the point of intersection is inaccessible.	8
	b		A parabolic vertical curve having equal tangent lengths is to connect a falling gradient of 2.40% to a rising gradient of 2.10% on a road designed for a speed of 100 kph. The length of the curve used must at least be enough to ensure that the minimum K value is 26. In order to ensure there will be sufficient clearance, the curve must pass through point Z of through chainage 2781.92m and RL 113.56m. The RL and through chainage of the intersection point Q are 110.98m and 2815.63m respectively. Calculate the length of the curve that will meet these requirements.	12
QUESTION 2: SETTING OUT, AREAS AND VOLUMES				**[20]**
2	a		A road has a formation width of 9.5m, side slopes 1 in 1 in cut and 1 in 3 in fill. The original ground has a cross fall of I in 5, if the depth of fill is 0.512m at the centreline. Calculate the side widths and the area of cut and fill.	6
	b		With the aid of a well annotated sketch to illustrate the concept of using triple profiles for controlling camper during road construction.	6
	c		A contractor has asked you to set out a trunk sewer grades and has supplied you with the trace of working drawing as shown in the diagram below. Determine a suitable length of the boning rod and calculate the heights of the sight rails above surface pegs A, B and C.  	8
QUESTION 3: CONSTRUCTION SURVEYS				**[20]**

3	a		Spatial data is often presented using different coordinate systems. Using well annotated sketches and the attached graph paper, describe the principle behind the 7 parameter transformation which is applied to align two coordinate systems which are not parallel and rotated and scaled.	10
	b		Use a diagram describe survey, site and structural grids on a building site and to show the relationship between these grids.	6
	c		State and describe the elements of the formula that is used to translate the coordinates of the site grid to those of the survey grid.	4
QUESTION 4: DEFORMATION SURVEYS [20]				
4	a		You have been assigned to come up with a deformation monitoring plan for a proposed dam. Prepare, with the aid of well annotated sketches, the survey plan to be used for both the construction and monitoring of the dam wall. Justify the location of reference marks and monitoring points in your proposed survey plan.	
	b		Outline the essential characteristics of following instruments used for deformation monitoring of civil structures:	8
		i	Theodolites	3
		ii	Electronic Distance Measurer (EDM)	3
		iii	Tapes	3
		iv	Levels	3
QUESTION 5: MINING ENGINEERING SURVEYS [20]				
5	a		Describe the methods of mine orientation using gyro-theodolite	5
	b		Discuss the method of correlation using the ‘’Weisbach Triangle’’ stating its advantages and disadvantages and giving the ideal conditions for such a system	5
	c		The coordinates of two surface stations E and F were determined by means of a connecting survey to the nearest geodetic control network. Underground traversing procedure were then carried out between the vertical wires plumbed at E and F. The coordinates of E, F and the underground traverse measurements were as follows. It is required to calculate the coordinates of the traverse.	10

St.	Line	Length(m)	Horizontal angle	Coordinates	
				E(m)	N(m)
A			— — —		
	AB	152.89			
B			240° 14' 48"		
	BC	163.18			
C			144° 15' 16"		
	CD	161.23			
D			— — —		
	DE	144.54			
E			125° 10' 28"	214.62	429.21
	EF	—			
F			279° 59' 12"	388.23	98.17
	FA	132.64			

END OF EXAMINATION