GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

ENGINEERING SURVEY

EGS 2107

Examination Paper

Semester I 2023

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: **Mr. V Mlilo**

INSTRUCTIONS

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

1	a		Zimbabwe in recent years commissioned continuous operating reference stations (CORS), explain the concept of CORS giving its advantages and disadvantages over terrestrial reference stations.	*[10]*
	b		What error sources would you expect to encounter carrying out engineering kinematic surveys.	*[5]*
	c		Briefly describe how to establish a control network for an engineering surveying project through statis GNSS baseline observations in terms of network design, baseline observations, baseline processing and baseline network adjustment.	*[10]*

2	a		What is a mass haul diagram and state four of its characteristics	*[4]*
	b		Compute the area of cross-section if the formation width is 12 m, side slopes are 1 to 1, average height along the centreline is 5 m, and the transverse slope of the ground is 10 to 1.	*[6]*
	c		With the aid of illustrations, discuss the use of the following instruments for providing vertical control during setting out.	
		i	Sight rails	*[3]*
		ii	Slope rails	*[3]*
		iii	Profile boards	*[3]*
		iv	Travellers	*[3]*
		v	Offset pegs	*[3]*

3	a		A grade g1 of +3.00 % intersects grade g2 of at a vertex whose station and elevation are 46 + 70 and 853.48 m, respectively. An equal-tangent parabolic curve 600 m long has been selected to join the two tangents. Compute and tabulate the curve for stakeout at full stations.	*[16]*
	b		The reduced level at the intersection of a rising gradient of 1.5 per cent and a falling gradient of 1.0 per cent on a proposed road is 1193.60 above mean sea level. Given that the K-value for this road is 50, the through chainage of the intersection point is 2 +671.34m and the vertical curve is to have equal tangent lengths, Calculate:	
		i	The through chainages of the tangent points of the vertical curve.	*[6]*
		ii	The position and level of the highest point on the curve	*[3]*

4	a)		Outline the essential characteristics of following instruments used for deformation monitoring of engineering structures:	
		i	Theodolites	*[3]*
		ii	Electronic Distance Measurer (EDM)	*[3]*
		iii	Real Time Kinematic GPS	*[4]*
	b		Describe what field procedures can an engineering surveyor take to improve the reliability of deformation measurements.	*[8]*
	c		Explain 3 factors that you will consider in survey system design when carrying out a building deformation survey.	*[7]*

THE END