



**GWANDA STATE UNIVERSITY**  
**FACULTY OF ENGINEERING AND THE ENVIRONMENT**  
**DEPARTMENT OF GEOMATICS AND SURVEYING**

**SURVEY I**

**EGS 1108**

**Examination Paper**

**Semester II 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 in chronological order.
2. Scientific Calculators may be used.
3. Programmable calculators are **not** allowed

1	a)		List any five disciplines of Geomatics and Surveying	5																																																																
	b)		Briefly outline the tasks undertaken by either an engineering surveyor or a cadastral surveyor in their professional capacity.	5																																																																
	c)		Describe the importance of reconnaissance during survey process.	4																																																																
	d)		Explain the difference between direct and indirect observations in surveying. Give two examples of each.	4																																																																
	e)		Given that $\alpha$ is $1^\circ$ and $R = 6371$ kilometres, compute the length, $s$ , subtended at the surface of the earth. Give your answer in metres.	2																																																																
2	a)		State and briefly discuss any 4 basic fundamental surveying methods/techniques.	4																																																																
	b)		What do you understand by the term 'central meridian.'	1																																																																
	c)		Describe what is meant by the phrase 'field-to-finish' in the context of any surveying discipline of your choice.	4																																																																
	d)		List any 5 software which are commonly used to process geo-spatial data within the geomatics and surveying field.	5																																																																
	e)		With the aid of a sketch, describe each of the three primitives of spatial data.																																																																	
		(i)	Point	2																																																																
		(ii)	Line	2																																																																
		(iii)	Polygon	2																																																																
3	a)	(i)	Define the following levelling terms: (a) vertical line, (b) level surface, (c) change point, (d) parallax, (e) collimation error.	10																																																																
		(ii)	With the aid of a sketch, describe the procedure for carrying out <b>series levelling</b> .	4																																																																
		(ii)	State 3 types of levels used in levelling and briefly state their differences.	6																																																																
4	a)		<p>The surveyor took the following measurements from a Trig 123/T</p> <p>Coordinates: 123/T      + 42 340      + 44 670</p> <hr/> <table border="1"> <thead> <tr> <th rowspan="2">Station</th> <th rowspan="2">Observed point</th> <th colspan="3">Horizontal Reading</th> <th rowspan="2">Slope Distance (m)</th> <th colspan="3">Zenith Reading</th> <th rowspan="2">Description</th> </tr> <tr> <th>dd</th> <th>mm</th> <th>ss</th> <th>dd</th> <th>mm</th> <th>ss</th> </tr> </thead> <tbody> <tr> <td>123/T</td> <td>B</td> <td>45</td> <td>0</td> <td>30</td> <td></td> <td></td> <td></td> <td>9 mm iron peg in concrete</td> </tr> <tr> <td></td> <td>C</td> <td>90</td> <td>0</td> <td>20</td> <td></td> <td></td> <td></td> <td>9 mm iron peg in concrete</td> </tr> <tr> <td></td> <td>D</td> <td>245</td> <td>33</td> <td>25</td> <td>144.54</td> <td>89</td> <td>23</td> <td>47</td> <td>12 mm iron peg and cairn</td> </tr> <tr> <td></td> <td>E</td> <td>315</td> <td>44</td> <td>50</td> <td>205.31</td> <td>95</td> <td>51</td> <td>43</td> <td>12 mm iron peg and cairn</td> </tr> <tr> <td></td> <td>B (R.O)</td> <td>45</td> <td>0</td> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Station	Observed point	Horizontal Reading			Slope Distance (m)	Zenith Reading			Description	dd	mm	ss	dd	mm	ss	123/T	B	45	0	30				9 mm iron peg in concrete		C	90	0	20				9 mm iron peg in concrete		D	245	33	25	144.54	89	23	47	12 mm iron peg and cairn		E	315	44	50	205.31	95	51	43	12 mm iron peg and cairn		B (R.O)	45	0	10						
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		(i)	Reduce the slope distances to horizontal distances	4																																																																
		(ii)	Calculate the coordinates of beacons D and E	6																																																																

	b)	(i)	With the aid of sketch, outline the detailed procedure for undertaking the two-peg test for an automatic level.	10																
5	a)	(i)	Compare and contrast between a graticule and a grid.	5																
		(ii)	Briefly discuss Gauss Conformal as a coordinate system used in surveying and mapping within the southern Africa region.	5																
	b)		Given the following data, in Gauss Conformal Projection  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Point</th> <th style="text-align: center;">Y-Coordinate (m)</th> <th style="text-align: center;">X-Coordinate (m)</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">500</td> <td style="text-align: center;">500</td> <td>12 mm iron peg in concrete</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">600</td> <td style="text-align: center;">600</td> <td>12 mm iron peg in concrete</td> </tr> <tr> <td style="text-align: center;">Z</td> <td style="text-align: center;">600</td> <td style="text-align: center;">500</td> <td>12 mm iron peg in concrete</td> </tr> </tbody> </table>	Point	Y-Coordinate (m)	X-Coordinate (m)	Description	X	500	500	12 mm iron peg in concrete	Y	600	600	12 mm iron peg in concrete	Z	600	500	12 mm iron peg in concrete	
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			Compute the following:																	
		(i)	Join XY	2																
		(ii)	Join XZ	2																
		(iii)	Area bound by XYZX from the given coordinates, give your answer in Hectares.	6																

**END OF PAPER**

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