GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

Satellite Geodesy

ESG 3207
Final Examination Paper

Time Allowed: **3 hours**
Total Marks: **100**
June, 2026

Examiner's Name: **Mr T.T Chigova.**

INSTRUCTIONS

1. **Answer all questions**
2. **Each question carries 25**
3. **Total marks 100**

This Examination paper consists of 3 pages

Copyright: GWANDA STATE UNIVERSITY, 2026.

1a)	With the aid of diagram describe the following terms:	
	(i) Troposphere	**3**
	(ii) Ionosphere	**3**
b)	With reference to your **answer and diagram in question (1a**); explain how the varying atmospheric conditions affect the satellite signal propagation behaviour, stating clearly the implications of these two distinctive layers?	**14**
c)	The perturbing forces are believed crucial elements in describing the size, shape and location in satellite orbital motion. With reference to clearly labelled diagram; explain what are the responsibilities of these forces?	**5**

2a)	Explain the concept of Doppler effect, and how can a geomatician substantially reduce its effects?	**8**
b)	List the limitations in the process of differencing data, and how can geomatician substantially reduces their effects?	**7**
c)	Distinguish between double and triple differencing when carrying data manipulation and cleaning.	**10**

Copyright: GWANDA STATE UNIVERSITY, 2026.

3a)	As a leading surveyor, you have been tasked to draft a survey methodology on how the survey solution are best provided for rehabilitation on Bulawayo - Victoria Falls Road. Clearly, specify the **equipments' of your choice**, for various stages and justify how it achieves **sustainable land survey practices** over the traditional accessories that has been used in the field of geomatics and surveying.	**15**
b)	The orbital motion/constellation of satellites is believed to have been determined by multiple variables, of which the Keplerian laws have proven to be valid to some extent. If so, distinguish between these GNSS Systems: the GPS and GLONASS, on space segment establishment characteristics, and justify what was the need for such different variables when launching and establishing the satellites.	**10**

4a)	Differentiate between GPS observables: the L1 and L2 signals.	**6**
b)	As a leading Surveyor, give a detail account of how do you substantially solve the integer ambiguity number in your GPS observables.	**7**
c)	Briefly describe the characteristics structure of GPS navigation data stream.	**5**
d)	As a consultant Geomatician, justify the benefits of integrating satellite geodesy observation data with terrestrial deformation monitoring surveys and precision farming.	**7**

Copyright: GWANDA STATE UNIVERSITY, 2026.