GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING

ESG 1112/NGE 1105

Final Examination Paper

JUNE 2026

This examination paper consists of 3 pages

Time Allowed: 3 hours

Examiner's Name: Mr A Sibanda

INSTRUCTIONS

1. This paper consists of **six (6) questions**.
2. **Answer any four (4) questions only.**
3. Each question carries **25 marks**.
4. Start each question on a new page.
5. Write clearly and show all workings where necessary.
6. Use diagrams and examples to support your answers where applicable.

Total Marks: 100

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QUESTION 1: Introduction to Remote Sensing				**[25]**
	a		Define remote sensing and explain how it is utilised in GIS.	5
	b		Explain the difference between active and passive remote sensing systems	6
	c		Distinguish between multispectral and hyperspectral remote sensing images.	6
	d		Give an example of how and when Ground Control Points (GCPs) are used.	4
	e		State the three main types of electromagnetic radiation used in remote sensing	4
QUESTION 2: Remote Sensing Components & Energy Flow				**[25]**
	a		Discuss the following sensor platforms:	
		i)	Ground-based	3
		ii)	Aircraft	4
		iii)	Space shuttle	4
		iv)	Satellite	4
	b		Describe the key steps involved in the remote sensing process (energy flow), using diagrams.	10
QUESTION 3: Principles of GIS				**[25]**
	a		Define GIS and explain its role in geography and related fields.	5
	b		Explain the major GIS functions	5
	c		Discuss the fundamental components of GIS and their significance	5
	d		Analyse challenges and possible solutions in integrating GIS with IoT, mobile devices, and AI.	10
QUESTION 4: Geographic Representations & Projections				**[25]**
	a		Define a map projection. (2)	2
	b		Describe the process and types of map projections.	10
	c		Differentiate between large-scale and small-scale maps	3
	d		Discuss the advantages and disadvantages of GIS in spatial analysis	10
QUESTION 5: GIS Data Models & Structures				**[25]**
	a		Define geographic representation.	3
	b		With illustrations, describe raster and vector data models	10
	c		Explain georeferencing and its importance.	5
	d		Define topology and explain its role in GIS.	7

QUESTION 6: Electromagnetic Concepts in Remote Sensing				[25]
	a		Define an electromagnetic wave.	6
	b		Explain the relationship between electromagnetic waves and remote sensing	6
	c		Describe wavelength, frequency, and electromagnetic spectrum.	6
	d		Explain spectral resolution and spatial resolution with examples.	7

END OF EXAMINATION