GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

GIS Data Structures and Algorithms

ESG 2110

Examination Paper

November 2023

This examination paper consists of 2 pages

Time Allowed: **2 hours**

Total Marks: **100**

Examiner's Name: Mr N.S. Maphosa

<u>INSTRUCTIONS</u>

1. Choose and Answer any 4 questions

1. Write a Python script to determine Vegetation Vigor at Gwanda State University cattle paddocks. Include the necessary steps, functions, and libraries required for data processing, analysis, and visualization. (25 marks)

2. Classify and explain spatial data models that best explain GIS data structures. Provide examples to illustrate each model and discuss their advantages and limitations [25].

3. Discuss the pros and cons of using raster data models in mining surveys. Explain how raster data models are applied in mining-related analysis and decision-making processes [25].

4. (a) Explain the basic steps involved in georeferencing a scanned map. Include the key considerations and techniques used to align the scanned map with a spatial reference system [20].
(b) State and briefly explain two techniques commonly used in digitizing spatial data. Discuss their applications and limitations [5].

5. (a) Propose an innovative approach that combines GIS data structures, algorithms, and real-time sensor data to monitor and predict the spread of forest fires [15].
(b) Discuss how your proposed solution can improve forest fire management and response strategies [10].