



# **GWANDA STATE UNIVERSITY**

**FACULTY OF ENGINEERING AND ENVIRONMENT**

**DEPARTMENT OF MINING ENGINEERING**

**MINING SURVEY AND GIS/ MINING SURVEY**

**EMN 2208/EMI 3101**

**Examination Paper**

**April 2025**

This examination paper consists of 2 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Examiner's Name: Mr N.S. Maphosa**

## **INSTRUCTIONS**

- 1. Choose and Answer any 4 questions**

1. Discuss the integration of mine surveying and remote sensing technologies in mining operations. Explain the applications of aerial and satellite imagery, LiDAR, and other remote sensing data in mine planning, monitoring, and environmental assessment. (25 marks)
2. Describe the kriging method and its application in mining grade estimation. Explain the difference between ordinary kriging and simple kriging, and discuss the assumptions and limitations of kriging. Provide an example of using kriging to estimate the grade of a mineral deposit in a mining area. Include the steps of variogram modeling, kriging estimation, and assessing the estimation uncertainty. (25 marks)
3. Compare and contrast Differential GPS (DGPS) and Real-Time Kinematic (RTK) surveying techniques. Explain the principles behind these methods and their advantages and limitations in mining surveying. Discuss the use of base stations, correction signals, and rover receivers in DGPS and RTK surveying. Provide an example of using DGPS or RTK for precise location measurements in a mining operation. (25 marks)
4. Describe the principles of geophysical methods used in mining exploration. Discuss the main applications of geophysical techniques in identifying mineral deposits, mapping subsurface structures, and characterizing rock properties. Provide examples of geophysical methods commonly employed in mining surveying, mining exploration and explain how they contribute to the understanding of the subsurface geology. (25 marks)
5. Describe and explain key components that makeup an exploration model. [25 marks]