



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENVIRONMENTAL SCIENCE

DEPARTMENT OF GEOSPATIAL SCIENCE

**BACHELOR OF SCIENCE (HONOURS) DEGREE IN GEOGRAPHICAL INFORMATION SYSTEMS (GIS) AND
REMOTE SENSING IN NATURAL RESOURCES MANAGEMENT**

TOPOGRAPHIC BASE MAPPING AND DIGITAL TERRAIN MODELLING

EGR 2106

Regular Examination Paper

December 2024

This examination paper consists of 2 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: Nil

Internal Examiner: Mr Bukhosi Ngqabutho Khumalo

External Examiner: Dr M. Shekede

INSTRUCTIONS

1. Answer **QUESTION ONE** and any **THREE** others
2. Each question carries 25 marks

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6	25
TOTAL	100

1. Using a simple flow chart, describe the process of Digital Terrain Modelling.
- 2(a) Briefly describe Flow Direction and Flow Accumulation. (10 marks)
- (b) Explain in detail the process of watershed delineation. (15 marks)
- 3(a) Compare and contrast Grid and Triangulated Irregular Networks (TIN) data models of modeling Terrain surfaces. (10 marks)
- (b) Describe the following elements of a Triangulated Irregular Network
- i. Nodes (3 marks)
 - ii. Edges (3 marks)
 - iii. Facets (3 marks)
 - iv. Topology (6 marks)
- 4(a) Describe the different sources of data for Digital Terrain Modelling. (10 marks)
- (b) Discuss the following Global Digital Elevation Models
- i. TanDEM-X (3 marks)
 - ii. ASTER GDEM 1 arc-second (3 marks)
 - iii. STRM (3 marks)
 - iv. GTOPO30 (3 marks)
 - v. ALOS World 3D (3 marks)
- 5(a) Describe and explain the key features of topographic maps. (10 marks)
- (b) Identify and explain five topographic attributes used in cartography. (15 marks)
- 6(a) Explain the principle of Lidar technology and how it is used in digital terrain modeling. (10 marks)
- (b) Discuss the benefits and challenges of using Lidar for terrain modeling. (15 marks)

END OF EXAMINATION