NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENVIRONMENTAL SCIENCE

DEPARTMENT OF GEOSPATIAL SCIENCE

SPATIAL DATABASE DESIGN AND IMPLEMENTATION (EGR 5110)

Main Examination Paper

November 2024

This Examination Paper consists of 2 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: Nil

Internal Examiner: Ms R Chikutye

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. Explain the following basics of a relational model:

   (a) Attributes **[5 marks]**

   (b) Schema **[5 marks]**

   (c) Tuple **[5 marks]**

   (d) Domain **[5 marks]**

   (e) Instance **[5 marks]**

2. "Spatial Databases are special". Discuss.

3. Successful implementation of spatial database technology demands that systems designers and developers carefully consider and plan for the needs of end users. Explain any five (5) inherent difficulties in conducting a User Needs Analysis.

4. "Predicting global climate change has been identified as a premier challenge for the scientific community". Describe the contribution of Spatial Database Management Systems in this endeavor.

5. Express the following queries in SQL'

   (a) Count the number of countries whose population is less than 25 million. **[5 marks]**

   (b) List all the countries in Southern Africa or whose capital cities have a population of more than 2.5 million. **[7 marks]**

   (c) Use a nested query to find the country in Southern Africa with the smallest GDP. **[8 marks]**

   (d) Find the country with the third highest GDP **[5 marks]**

6. Discuss the ethical and security issues in Spatial Database design and implementation