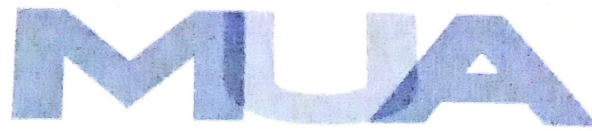


The
Management
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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF EDUCATION ARTS

GEO 223: TECHNIQUES IN GEOGRAPHY III: STATISTICAL METHODS

DATE: 11TH AUGUST 2025

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. Write all your answers in the Examination answer booklet provided.

QUESTION ONE

Read the Case Study below carefully and answer the questions that follow:

The term "remote sensing" is a relatively new term and was first used to describe the field in the 1960s. While the term remote sensing wasn't coined until the mid-twentieth century, remote sensing first began nearly 150 years ago. Aerial photography is the earliest form of remote sensing. This began with the invention of the camera in the 1800s. The first successful photographs were produced in the early 1800s by French inventor Nicéphore Niépce. Soon after the development of photography, people became interested in taking aerial photographs. The earliest aerial photographs were taken from balloons.

In 1850 Gaspard-Félix Tournachon, more commonly known by his pseudonym Nadar, captured the first aerial photograph. Using a hot air balloon, Nadar produced the first successful aerial photograph of a French village in 1858. Unfortunately none of these early aerial photographs exist today. The oldest aerial photograph that has survived was taken in Boston in 1860 by James Wallace Black. Nadar's earliest surviving aerial image was taken from a balloon above Paris in 1866.

In the early 20th century remote sensing images were captured using kites and even with cameras mounted on pigeons. In Europe carrier pigeons were already being used in military communication and aerial reconnaissance was an appealing application. Small light weight cameras were attached to the birds and photos were automatically taken using a timing mechanism. The pigeon photography was successful but didn't become widely used due to the rapid development of aviation technology.

Remote sensing technologies in general and hyperspectral remote sensing technology in particular have emerged as an important new source of data for environmental applications over the past few years. Hyperspectral remote sensing applications have gained significant momentum. From early multispectral sensors flown in the 1960s by NASA which gave birth to many other remote sensing satellites, including hyperspectral satellites such as Hyperion, PRISMA, HySI, and others by United States of America, Italy, and India, among others. This unparalleled

rapid progress in sensors and their platforms has provided a major impetus for the use of hyperspectral applications in many fields such as, but not limited to, geology, agriculture, water quality, forestry, urban, biodiversity, and so forth. The results of these applications have been spectacular as many researchers have made interesting observations about environmental phenomena, and decision makers have considered these data for sustainable environmental management.

Required:

- a) Describe any five forms of remotely collected data. (10 marks)
- b) Asses five sources of error in image detection. (10 marks)
- c) Discuss five types of interaction that occur when energy strikes an object. (5 marks)

QUESTION TWO

- a) Describe five elements of a remote sensing system. (10 marks)
- b) Write short notes in the two types of remote sensing. (5 marks)

QUESTION THREE

- a) Assess five ways in which statistics can be abused. (10 marks)
- b) Evaluate the importance of using remote sensing technology in Kenya. (5 marks)

QUESTION FOUR

- a) Analyze five methods students can use to collect geographic data. (10 marks)
- b) Distinguish between remote sensing and remote surveying. (5 marks)

QUESTION FIVE

- a) Describe basic processes that help in the collection of information about the properties of objects and phenomena of the earth's surface. (10 marks)
- b) Assess five applications of remote sensing in the world today. (5 marks)

QUESTION SIX

- a) Describe four types of resolution. (8 marks)
- b) Assess three advantages of related to remote sensing that use electromagnetic spectrum in sensor systems over other systems. (6 marks)
- c) Distinguish between geo stationary and polar orbiting satellites. (1 mark)