

**UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING**

**FINAL EXAMINATION: MAY, 2010
B.Sc. III, HUM III, BAS III, AND B.Sc.ed III**

TITLE OF PAPER : INTRODUCTION TO REMOTE SENSING

COURSE NUMBER : GEP 313

TIME ALLOWED : THREE (3) HOURS

**INSTRUCTIONS : SECTION A IS COMPULSORY
ANSWER ANY TWO QUESTIONS FROM
SECTION B
ILLUSTRATE YOUR ANSWERS WITH
APPROPRIATE DIAGRAMS**

**MARKS ALLOCATED : QUESTION 1 CARRIES 40 MARKS THE
OTHER QUESTIONS CARRY 30 MARKS
EACH**

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BY THE INVIGILATOR**

SECTION A: COMPULSORY QUESTION

QUESTION 1

Use a diagrammatical illustration of the pathways of electromagnetic radiation from the sun to a satellite sensor and explain these pathways and processes.

(40 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) When we take an image through the steps to derive reflectance, we have the choice of deriving “surface” reflectance or “at-sensor” reflectance. Explain the difference between the two, and provide at least one reason why we might choose one versus the other. (10 marks)
- b) Briefly explain the differences in the spatial, spectral and radiometric resolutions of the Landsat and Quickbird sensor. (15 marks).
- c) Explain why thermal sensors typically have lower spatial resolution than sensors that measure shorter wave reflected radiation. (5 marks).

(30 marks)

QUESTION 3

- a) Briefly explain the difference between an information class and a spectral class as implemented in image classification. (10 marks)
- b) Explain the process that causes a clear sky to appear blue. (8 marks)
- c) Briefly describe pixel and object-oriented approaches to image classification.

(10 marks).

(30 marks)

QUESTION 4

- a) Briefly explain atmospheric windows and the processes that are responsible for not allowing electromagnetic radiation to pass through the atmosphere as well as what ranges of the electromagnetic spectrum are principally affected by these processes. (20 marks)
- b) Differentiate, with illustrations and examples, between multispectral and hyperspectral sensors. (10 marks)
- (30 marks)**

QUESTION 5

- a) Explain thermal remote sensing be used to monitor changing patterns related to global climate warming. (15 marks)
- b) Briefly describe an example of something that could be monitored that would provide basic information to support studying the potential impact of climate warming. (10 marks)
- c) Define remote sensing. (5 marks)
- (30 marks)**