UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

FINAL EXAMINATION: MAY 2006

TITLE OF PAPER	:	**INTRODUCTION TO REMOTE SENSING**
COURSE NUMBER	:	**GEP 313**
TIME ALLOWED	:	**THREE (3) HOURS**
INSTRUCTIONS	:	**SECTION A IS COMPULSORY** **ANSWER ANY TWO QUESTION S 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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SECTION A: COMPULSORY QUESTION

QUESTION 1

a) Triffid weed (*Chromolaena odorata*) is a noxious weed that is invading many areas of grazing land in Swaziland, making them unsuitable for livestock and wildlife. There is also some evidence that run-off water into water bodies from triffid weed-infested hillsides can affect the quality of drinking water, leading to various socio-economic problems. You have been employed as a consultant with a remote sensing company to monitor triffid weed spread in Swaziland and assess any impact on grazing lands over several years. Describe the process you would follow to reach your conclusion including, but not limited to, the methods of interpreting your data, and choice of platforms. (30 marks)

b) Synthetic Aperture Radar (SAR) is one of the 'fastest growing' areas of remote sensing due to its all weather capability and ability to penetrate cloud. Briefly describe the principles of SAR. Draw a diagram to assist your answer. (10 marks)

(40 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 2

a) 'Interpretation of aerial photography and analogue satellite imagery is based on a number of spectral and spatial variations that vary over time'.

   i) Identify the key interpretive elements that are utilised to assist / describe features. (12 marks).

   ii) Explain how these can be used in interpretation keys to assist less experienced interpreters to make correct identification. (8 marks)

b) Define an atmospheric window (4 marks).

c) Explain the significance of atmospheric windows to satellite remote sensing. (6 marks)

(30 marks)

QUESTION 3

a) Discuss the advantages and disadvantages of using aerial photography for geological mapping and terrain analysis as compared to Landsat imagery. (15 marks)

b) Radial and tangential relief displacements are experienced in aerial photographs and scanned images respectively. With the aid of diagrams, explain the cause and nature of each type of relief displacement. (15 marks)

(30 marks)

QUESTION 4

a) List the three primary colours (3 marks)

b) Define precision agriculture (3 marks)

c) Briefly discuss hyperspectral remote sensing (5 marks)

d) What do the following stand for:

   i. LIDAR (2 marks)

   ii. SLAR (2 marks)

e) Distinguish between panchromatic, multispectral and hyperspectral sensors. In your answers also briefly discuss their usefulness in remote sensing. (15 marks)

(30 marks)

QUESTION 5

Scientists have observed that there is a likelihood of increase in the frequency and intensity of natural disasters such as droughts and hurricanes or floods. As an officer employed by the Swaziland National Disaster Task Force and with reference to remote sensing principles, outline a policy brief on the use remote sensing for providing early warning and for post-disaster assessment in the case of floods. **(30 marks)**