

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

**FINAL EXAMINATION, MAY 2018**

**BSc., B.A. (Social Science), B.A. (Humanities), B.Ed. (Science) Secondary**

**TITLE OF PAPER:           ADVANCED GIS, REMOTE SENSING AND**  
**CARTOGRAPHY**

**COURSE NUMBER:        GEP312**

**TIME ALLOWED:         THREE (3) HOURS**

**INSTRUCTIONS:**

- 1. ANSWER THREE QUESTIONS**
- 2. SECTION A IS COMPULSORY**
- 3. ANSWER ANY TWO QUESTIONS FROM SECTION B**
- 4. ILLUSTRATE YOUR ANSWERS WITH EXAMPLES AND USE APPROPRIATE TERMINOLOGY**

**ALLOCATION OF MARKS:   QUESTION 1 (COMPULSORY) CARRIES 40**  
**MARKS, WHILE THE REST CARRY 30**  
**MARKS EACH**

**THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION IS GRANTED**  
**BY THE INVIGILATOR**

**GEP312: ADVANCED GIS, REMOTE SENSING AND CARTOGRAPHY - MAY  
2018**

**SECTION A  
COMPULSORY**

**QUESTION 1**

You are employed by the Swaziland National Remote Sensing Centre as a remote sensing specialist. The Centre has received funding to design a satellite remote sensing platform (or platforms) that will be used to quantify the loss of forest and woodlands to sugarcane plantations, which are typically several to many hundreds of hectares in size. It is key that the system is able to observe a given area more than once during any month in order to monitor intra-annual changes. Outline a proposal for this new system with careful considerations of the mission requirements including, but not limited to, the resulting trade-offs that may be required in sensor type(s), wavelength(s), spatial resolution and orbit.

**(40 marks)**

**SECTION B  
ANSWER ANY TWO QUESTIONS**

**QUESTION 2**

(a) Discuss THREE (3) types of scattering that occur in the Earth's atmosphere, giving any possible wavelength and directional dependencies of each. (24 marks)

(b) Briefly describe three (3) crucial elements that must be included in GIS metadata (6 marks)

**(30 Marks)**

**QUESTION 3**

- (a) Define the following terms:
- (i) Radiometric correction (3 marks)
  - (ii) Apogee (3 marks)
  - (iii) Sun-synchronous orbit (3 marks)
  - (iv) Atmospheric windows (3 marks)
- (b) Detail the role of contrast stretches in the raster (image) processing process. In your explanation, specifically address why an analyst would choose a particular type of stretch and some of the dangers in selecting an inappropriate stretch for a given raster data. (18 marks)
- (30 Marks)**

**QUESTION 4**

Discuss the key components of a fully functional "Geographic Information System".

**(30 Marks)**

**QUESTION 5**

Describe in technical detail the Lo31 Projection System used by the Surveyor-General's Office of Swaziland.

**(30 Marks)**