



UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER

PROGRAMME: BSc. AGRICULTURAL AND BIOSYSTEMS ENGINEERING YR 2  
& YR 3

COURSE CODE:                    ABE210/ ABE 307

TITLE OF PAPER: REMOTE SENSING AND GIS

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER  
QUESTIONS

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CHIEF INVIGILATOR

**QUESTION 1: COMPULSORY QUESTION**

- a. Calculate the cost of Landsat ETM satellite data for a farm that is 20 km by 30 km in size. The spatial resolution of the ETM data is 10m by 10m, and the price of the data is E60 per MB. (20 marks)
- b. Calculate the spectral reflectance for land features if the reflectance for feature A was 80 units, while that for feature B was 40 units. The incident energy was 120 units. (10 marks)
- c. Which of the land features in (b) above should be considered to be green vegetation if the sensor used was operating at NIR waveband? Give reason for choice of answer. (10 marks)

**Total marks - 40**

**QUESTION 2**

- a. Describe how the Normalised Difference Vegetation Index (NDVI) is calculated, and how it can be used to differentiate landscape features. (20 marks)
- b. Using examples, discuss how the energy of quanta is related to the wavelength of electromagnetic energy. (10 marks)

**Total marks - 30**

**QUESTION 3**

- a. Using examples to illustrate your answer, discuss how wavelength of maximum spectral radiant exitance can be determined for an object of known temperature. (15 marks)
- b. Discuss the difference between user's accuracy and producer's accuracy as used in GIS and Remote Sensing. (15 marks)

**Total marks - 30**

**QUESTION 4**

- a. Describe the following terms as applied in remote sensing, using examples to illustrate your answers:
  - i) Spatial resolution (10 marks)
  - ii) Temporal resolution (10 marks)
- b. Describe three sources of data that can be used in vector GIS, highlighting the format at which the data is sourced. (10 marks)

**Total marks - 30**