



UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME; BSc. AGRICULTURAL AND BIOSYSTEMS ENGINEERING III

COURSE CODE: 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) Using illustrations, discuss how binary masking can be used show the presence and absence of water bodies from digital satellite data. (10 marks)
- b) Discuss three sources of data that can be used in GIS, specifying how the data can be used in land and water management. (18 marks)
- c) Calculate the total radiant exitance from the surface of a material that has a temperature of 26°C. (*Stefan-Boltzmann constant is $5.6697 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$*) (12 marks)

QUESTION 2.

- a) Define spectral reflectance and use an example to illustrate how spectral reflectance of water would compare with that of green vegetation in the Red band. (15 marks)
- b) Discuss the following terms in relation to remote sensing:
- i. Overall accuracy (5 marks)
 - ii. Producer's accuracy (5 marks)
 - iii. User's accuracy (5 marks)

QUESTION 3.

- a) Using an example, discuss how water content will affect the reflectance of a soil. (12 marks)
- b) Discuss how the Normalised Difference Vegetation Index (NDVI) can be used to assess the biomass of dense vegetation cover. (18 marks)

QUESTION 4.

- a) Discuss how the following can be used to present attribute data in vector GIS:
- i. Ranks (5 marks)
 - ii. Categories (5 marks)
 - iii. Proportions (5 marks)
- b) Discuss three applications of a GPS in remote sensing and or GIS. (15 marks)