UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME; BSc. AGRICULTURAL AND BIOSYSTEMS ENGINEERING YR 3

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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QUESTION 1: COMPULSORY QUESTION

a. Using examples, discuss the difference between spatial resolution and spectral resolution of satellite data. (10 marks)

b. Discuss how the size of a satellite image can be determined when the rows and columns of the satellite data are known. (5 marks)

c. Determine the total radiation (W m^{-2}) from a surface that has a temperature of 27 °C. The Stefan-Boltzmann constant is 5.6697 * 10^{-8} W m^{-2} K^{-4}. (15 marks)

d. Using an example, discuss how organic matter of a soil would affect its reflectance.

(10 marks)

QUESTION 2

a. Using illustrations, discuss how binary masking (also called level thresholding) can be used to prepare a map showing presence and absence of water bodies from satellite data. (15 marks)

b. Using results from a hypothetical image classification, illustrate how the overall accuracy can be determined. (15 marks)

QUESTION 3

a) Discuss three constraints in using GIS in Swaziland, highlighting how such constraints can be overcome. (15 marks)

b) Describe three sources of data that can be used in vector GIS, highlighting the format at which the data is sourced (15 marks).

QUESTION 4

a. Describe how the Normalised Difference Vegetation Index (NDVI) is calculated, and how it can be used to differentiate landscape features. (15 marks)

b. Discuss three uses of GPS in land and water management. (15 marks)