



UNIVERSITY OF SWAZILAND
FACULTY OF POSTGRADUATE STUDIES

FINAL EXAMINATION

DECEMBER 2011

PROGRAMME: MSC IN ENVIRONMENTAL RESOURCES MANAGEMENT

COURSE CODE: ERM 602

TITLE OF PAPER: GIS AND SPATIAL ANALYSIS

ALLOWED TIME: THREE (3) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY
THE CHIEF INVIGILATOR

Question 1

- a) Discuss the following, highlighting situations under which each of them can be used:
- i. Level slicing (6 marks)
 - ii. Binary Masking (6 marks)
- a) Discuss the steps to be followed when developing a GIS from data that has been collected from the field with coordinates for sites that have been collected using a GPS. (13 marks)

Question 2

- a) Compare the following:
- i. Spectral resolution for Landsat ETM data and NOAA AVHRR data. (6 marks)
 - ii. Temporal resolution for ETM data and NOAA AVHRR data. (6 marks)
- b) Using an example, discuss how the moisture content of a soil affects the amount of energy reflected. (7 marks)
- c) Discuss how overall accuracy can be obtained for a product of satellite image classification. (6 marks)

Question 3

- a) Discuss the concept of spectral reflectance, illustrating how it can be used to distinguish between water and vegetation in remote sensing. (13 marks)
- b) Discuss four applications of GPS (12 marks)

Question 4

- a) Discuss how Normalised Difference Vegetation Index (NDVI) can be determined, highlighting how it can be used to assess biomass yield of sugarcane. (13 marks)
- b) Discuss four methods that can be used to capture data in vector GIS. (12 marks)

Question 5

- a) Discuss the steps followed when undertaking image enhancement, illustrating how the resultant digital number can be obtained from known digital number of a pixel in input image. (13 marks)
- b) Discuss the following concepts can be used to present attribute data in vector GIS:
- i. Categories (4 marks)
 - ii. Ranks (4 marks)
 - iii. Densities (4 marks)