

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF GEOGRAPHY
THEORY EXAMINATION: MAY/JUNE 2012
MODULE NAME & CODE: ANALYTICAL GIS AND ADVANCED SPATIAL
MODELLING, ENV5712

DURATION: 3 HOURS

TOTAL MARKS: 200

INTERNAL EXAMINER: DR M GEBRESLASIE

EXTERNAL EXAMINER: PROF S GRAB, UNIVERSITY OF WITWATERSRAND

INSTRUCTIONS: THIS PAPER CONSISTS OF TWO PAGES.

ANSWER QUESTION 1 OF SECTION A AND ANY OTHER
QUESTION FROM SECTION A AND ANSWER TWO QUESTIONS
FROM SECTION B

SECTION A: (Question ONE is compulsory)

1. You are provided with the following raster maps.

A.

Agric	Mining
Mining	Agric

B.

500 m	400 m
300 m	700 m

a. Using the two maps, draw and shade the cells that meet the following conditions:

- (i) $(B \geq 300 \text{ m})$
- (ii) $(A = \text{"Agric"}) \text{ AND } (B < 400 \text{ m})$
- (iii) $(A = \text{"Agric"}) \text{ OR } (B < 700 \text{ m})$
- (iv) $(A = \text{"Mining"}) \text{ XOR } (B < 700 \text{ m})$
- (v) $(A = \text{"Mining"}) \text{ AND NOT } (B < 400 \text{ m})$ [50]

(i)

(ii)

(iii)

(iv)

(v)

2. Kriging is regarded by many scientists as the optimal method of spatial interpolation. Outline and explain the main features of kriging and discuss its strengths and weaknesses relative to other local interpolation techniques. [50]
3. Using application examples, discuss in detail a typical application of GIS in an area of your choice/interest. [50]

SECTION B:

1. As an Environmental analyst working for SRK consulting company, you have been tasked to carry out an EIA for the establishment of a dumping site for EThekwini Municipality. Outline and discuss the role of GIS in each stage of the EIA process for the dumping site development. [50]
2. Using real world examples, critically examine the utility of GIS in quantifying the frequency, character and magnitude of hazardous events in an area, as a means to mitigate natural disasters. [50]
3. Malaria disease distribution pattern can be achieved by integrating environmental factors in a spatially explicit context. Discuss the role of GIS in modeling and explaining temporal and spatial malaria transmission pattern. [50]