



FACULTY OF SCIENCE

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT & ENERGY STUDIES

MODULE **GGR 0067/GGFRS17/GGR8X67**
Geo-Informatics 2: Remote Sensing

CAMPUS **APK**

EXAM **SSA 2014**

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SESSION

ASSESSOR(S)

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DURATION **3 HOURS**

MARKS **200**

NUMBER OF PAGES: 4 PAGES

INSTRUCTIONS:

1. Answer any **FOUR** questions

QUESTION 1

- (i) The analysis of hyperspectral data is an advanced remote sensing technology that enables accurate spectral characterization of features. Discuss the utility of the technology to classify or map the following features.

- soil type
- forest type
- grass species

(15)

- (ii) Discuss in detail the difference between object-based and pixel-based classification.

(10)

SUB-TOTAL [25]

QUESTION 2

- (i) Explain in detail the principle of lidar remote sensing.

(5)

- (ii) Discuss the application of lidar in the following areas of interest:

- vegetation biomass assessment
- urban structural characterization

(20)

SUB-TOTAL [25]

QUESTION 3

- (i) Discuss, by referring to appropriate examples, the application of hyperspectral remote sensing for water quality assessment. The discussion must include and justify the:

- data selection
- data analysis method
- accuracy assessment

(15)

- (ii) Discuss, by referring to appropriate examples, why hyperspectral data is better than multispectral data.

(10)

SUB-TOTAL [25]

QUESTION 4

- (i) Explain the importance of a spectral library. (10)
- (ii) Discuss how you would build a spectral library of the following features that are found on the Auckland Park Campus of the University of Johannesburg
- dominant soil types
 - dominant vegetation types
 - major geological minerals
- (15)
- SUB-TOTAL [25]**

QUESTION 5

- (i) Explain in detail the difference between supervised and unsupervised classification. (10)
- (ii) Accuracy assessment is an essential part of a remote sensing analysis. Discuss how the accuracy of a land cover map can be assessed. Your discussion must include references to:
- exploration of various sampling methods
 - representativeness of samples
 - calculation of various indices of accuracy
- (15)
- SUB-TOTAL [25]**
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QUESTION 6

Assume that a vegetation cover classification has been performed using Landsat imagery. Subsequently, an accuracy assessment was conducted to evaluate the success of the classification. The following are observations of the evaluation process.

- Out of 30 000 open canopy forest pixels, 22 000 were classified correctly as open canopy forest, 4 500 as grassland, and 3 500 as bushland.
- Out of 40 000 grassland pixels, 35 000 were classified correctly as grassland, 2000 as open canopy forest, and 3 000 as bushland.
- Out of 30 000 bushland pixels, 23 000 were classified correctly as bushland, 4 500 as grassland, and 2 500 as open canopy forest.
- Construct an error matrix depicting the above results.
- Calculate the overall producer's and user's accuracy levels.
- Describe the accuracies.
- Discuss three reasons why the accuracy levels were not better.

(25)

SUBTOTAL [25]

QUESTION 7

Suppose the Department of Forestry and Fisheries intends to assess deforestation and forest degradation in the Eastern Cape Province over the past 40 years. Discuss a remote sensing approach to achieve this objective. Use the following aspects in your discussions:

- data selection
- data analysis method
- accuracy assessment
- temporal resolution

(25)

SUB-TOTAL [25]

TOTAL [200]

