



ZIMBABWE EZEKIEL GUTI UNIVERSITY

FACULTY OF SCIENCE, TECHNOLOGY, AGRICULTURE AND FOOD SYSTEMS DEVELOPMENT

DEPARTMENT OF INFORMATION SYSTEMS

EXAMINATION PAPER

DIPLOMA IN GEOGRAPHICAL INFORMATION SYSTEM

COURSE CODE : GISRS211
COURSE TITLE : IMAGE CLASSIFICATION
SPECIAL REQUIREMENTS : None
DURATION : 2 Hours
LEVEL : 2.1
DATE : 2024

29 NOV 2024

INSTRUCTIONS TO CANDIDATES:

Answer ALL questions

Section A: Answer ALL Questions (40 Marks)

- a. Define image classification in the context of remote sensing and explain its importance in geospatial applications. [8 Marks]
- b. Differentiate between supervised and unsupervised classification techniques. [8 Marks]
- c. List and briefly explain three common preprocessing techniques applied to remote sensing images. [6 Marks]
- d. What is the purpose of accuracy assessment in image classification, and how is the confusion matrix used in this process? [8 Marks]
- e. Briefly describe the role of machine learning in advanced image classification techniques. [10 Marks]

Section B: (60 Marks)

(Answer any THREE questions out of FIVE)

(Each question carries 20 marks)

Question 2:

- a. Compare and contrast image classification techniques performed using desktop GIS software, such as QGIS, with those executed on cloud-based platforms like Google Earth Engine (GEE). [10 Marks]
- b. Discuss the advantages and limitations of each approach in **Question 2a**, particularly in terms of scalability, data availability, and computational efficiency. [10 Marks]

Question 3:

Answer the following questions related to image classification techniques:

- a. Briefly explain the difference between radiometric and geometric corrections in image pre-processing. **[5 Marks]**
- b. What is the purpose of training data in supervised classification, and how is it used in the classification process? **[5 Marks]**
- c. List three advanced classification techniques and briefly describe their role in improving classification accuracy. **[10 Marks]**

Question 4:

Describe the steps involved in accuracy assessment of a classified image and explain the importance of the Kappa coefficient in this process. **[20 Marks]**

Question 5:

Explain the process of performing unsupervised classification using K-Means or ISODATA algorithms. Provide a practical example of how unsupervised classification could be applied in urban area classification. **[20 Marks]**

Question 6:

Discuss the significance of Object-Based Image Analysis (OBIA) in remote sensing and how it differs from traditional pixel-based classification. Provide examples of its application in environmental monitoring. **[20 Marks]**

******END OF EXAMINATION******