THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF CIVIL ENGINEERING
Diploma in Technology (Civil Engineering)

Final Examination - 2008/09

024

CEX4237 - Remote Sensing & Introduction to GIS

Time Allowed: Three Hours

Date: 12th March 2009   Time: 0930-1230 hrs.

Paper consists of 3 sections A, B and C

Answer 5 questions selecting at least one question from each section.

Section A

Q1.

(i)   Compare and comment on the 'information contained in an image' when you sense an object with your eye and if you use a camera/a sensor on a satellite to sense an object. Explain the difference between the 'Analogue format' and the 'Digital format' of recording information in an image.

(06 marks)

(ii)   Explain the major differences between Optical, Thermal and Radar sensing.

(06 marks)

(iii)   State the basic feature characteristics used in identification of features in 'Analogue' interpretation of satellite images and explain giving suitable examples.

(08 marks)

Q2.

(i)   Explain the contrast between daytime and night time thermal images of water bodies and surrounding areas.

(05 marks)

(ii)   Given below are the spectral characteristics of common inorganic materials (non vegetated land-areas) in figure 1 and vegetation types in figure 2. .
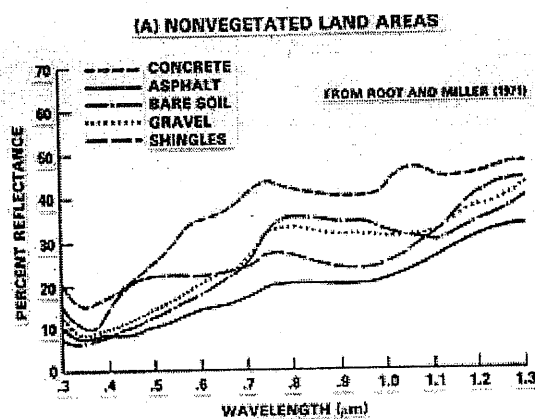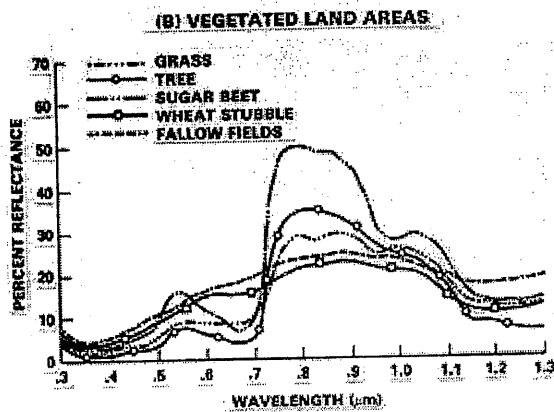

Figure 1

Figure 2.

Make a detailed comparison and comment on how to identify features using the spectral reflectances based on the information contained in the above diagrams.

(10 marks)

(iii) Images/photos containing feature information of a forest and a field crop with plants closely spaced are measured for their spectral values. Both features display quite similar reflectances at three chosen wavelengths. Indicating the tools/characteristics to be used describe how these features can be separated and identified.

(05 marks)

Q3.

You have been hired by the Environmental Authority to study the effect of industrial waste water on crop failure. You have been commissioned to use a remote sensing process to perform a baseline study within an area totaling 40 square miles.

(i) State the *problem* using a remote sensing system and methodology of your choice.

(05 marks)

(ii) Identify *data* requirements.

(05 marks)

(iii) Discuss the role of *resolution* (spectral, spatial, and temporal) in your study.

(05 marks)

(iv) Discuss the advantages/disadvantages of *analog (visual) image processing* vs. *digital image processing* techniques in your study.

(05 marks)

Section B
Q4.

i.)   Describe in detail what you understand by the term 'Navigation'.

(05 marks)

ii.)   Describe two commonly used Global Coordinate Systems for navigation and positioning.

(05 marks)

iii.)   Explain the working principle of the rudimentary navigation instrument known as 'Kamal', used by ancient mariners.

(05 marks)

iv.)   Clearly describe what is known as a 'Geoid Model' of the Earth. You may use an analogy to express your answer.

(05 marks)

Q5.

i.) Describe the technical theory behind the functioning of a satellite based Global Positioning System.

(05 marks)

ii.) Discuss general and special features of NAVSTAR GPS constellation.

(05 marks)

iii.) Describe and discuss the three major segments of the NAVSTAR GPS system.

(05 marks)

iv.) Discuss the technique known as Differential GPS (DGPS)

(05 marks)

Section C

Q6.

(i) Explain the essential functions of a Geographical Information System (GIS) and compare with past methods of maintaining such information.

(05 marks)

(ii) What are the five generic questions that a (GIS) can answer?

(05 marks)

(iii) Explain the significance of these questions on a GIS, in relation to 'planning & maintenance' of a water supply system for irrigation.

(10 marks)

Q7.

(i)
Explain what is a 'map' and describe the types of maps the average citizen is likely to encounter in everyday life. Explain what 'attributes' are.

(05 marks)

(ii)
Name at least four other types of specialized thematic maps you will need for the following problem.

You are required to identify the problems you might encounter when building a house on a piece of land you have never yet seen.

Explain how the maps will help you to make decisions.

(10 marks)

(iii) Explain the difference between 'vector' and 'raster' data forms in a GIS. Give examples of the use of each type explaining the advantages.

(05 marks)