THE OPEN UNIVERSITY OF SRI LANKA
Department of Civil Engineering
Diploma in Technology (Civil)/Bachelor of Technology (Civil) - Level 4

CEX4237 – Remote Sensing & Introduction to GIS

FINAL EXAMINATION - 2009

Time Allowed: Three (03) Hours

Date: 2010 - 03 - 05 (Friday) Time: 0930 - 1230 hrs.

Paper consist of 3 sections A, B and C
Answer Five (05) questions with at least One (01) question from each section.

Section A

Q1.

i.) Explain the connection between 'radiation' and 'remote sensing'. Describe in brief how satellite imagery can be used in five areas of civil engineering. (06 marks)

ii) Explain the 'electromagnetic spectrum' using a sketch and indicate the major areas of the spectrum used for remote sensing applications. (06 marks)

iii) Why do our eyes perceive healthy vegetation as green in color? What is the standard spectral reflectance curve for almost all healthy green vegetation? (08 marks)

Q2.

i) Explain why the 'energy content' is lower when long wavelengths are involved and the need for large areas to be viewed in order to detect a signal from microwave emission. (06 marks)

ii) Images from 'Landsat' are most appropriate for land classification. Justify this statement and explain in detail the functions of the Landsat satellites in providing the relevant information. (08 marks)

iii) Convolution is an image processing operation used for spatial feature manipulation. Explain its theory in creating an image with sharper features. (06 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.) Develop a clear definition for 'Navigation' based on your understanding.

(05 marks)

ii.) For navigation, the possition relative to earth should be accurately described. For this purpo coordinate systems have evolved. Discuss two such commonly used Global Coordinate System

(05 marks)

iii.) Describe the working principle of the rudimentary navagation instrument known as 'Kama used by ancient navigators.

(05 marks)

iv.) 'Sextant' is an instrument used for navigation through several centuries. Describe the workin principle of the sextant clearly explaning the phusical measurements that could be obtained.

(05 marks)

Q5.

i.) Discuss the technical theory that enables the satellite based GPS system.

(05 marks)

ii.) Why is the **'GPS Reciever'** known as a passive component of the GPS system?

(05 marks)

iii.) Discuss the reason for the need of highly accurate timing devices (clocks), for the operation the NAVSTAR GPS system.

(05 marks)

iv.) Describe the technique known as "Differential GPS" (DGPS).

(05 marks)

Section C

Q6.

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

(05 marks)

ii) Name at least four other types of specialized thematic maps you will need to guess the problem you might encounter in building a house on a piece of land you have never yet seen. Explain hor the maps will help you to make decisions.

(10 marks)

iii) Explain the difference between 'vector' and 'raster' data forms in a GIS. From a data handlin viewpoint, particularly involving computer manipulations, explain which method of geocoding 'vector' or 'raster' would be easier to process.

(05 marks)

Q7.

i) A Geographical Information System (GIS) constitutes of five key components:
Hardware
Software
Data
People
Method
Explain each component. (10 marks)

ii) Explain the use of GIS in the following areas of study.
GIS in environment
GIS in geology
GIS in hydrology
GIS in land use planning

(10 marks)