W1-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS 2014/2015

YEAR 3 SEMESTER II EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN SOIL, WATER AND ENVIRONMENTAL ENGINEERING

ASE 2307: REMOTE SENSING AND GIS

DATE: APRIL 2015 **TIME: 2 HOURS**

INSTRUCTIONS:

Answer QUESTION 1 and ANY OTHER TWO questions. Question one carries 30 marks. Other questions carry 20 marks each.

The following constants may be useful:

Speed of light	2.998×10^5 km/s
Planck's constant	6.626×10^{-37} kJ/s
K	2898 μm K

QUESTION ONE (30 marks)

a) Describe or define the following terms (10marks)
   i) GIS
   ii) DGPS
   iii) Photon
   iv) LIDAR
   v) Spectral resolution

b) Differentiate between the following terms as used in GIS and Remote Sensing (10marks)
   i) Data accuracy and data precision
   ii) Small-scale and large scale
   iii) Geostationary satellites and sun-synchronized satellites
   iv) Passive and active sensor
   v) Spatial resolutions and temporal resolutions

c) Describe, with examples how the following institutions apply GIS and Remote Sensing in their daily activities. Limit the examples to at least one from the;
   i) Private sector
   ii) Government bodies
   iii) Universities
   iv) Local Non-Governmental Organizations
   v) International Non-Governmental Organizations (10marks)

QUESTION TWO (20 marks)

a) If the distance between point A and C on a map is 20 cm and that point B is midway between the two points, determine the scale of the map and the distance between points A and C if the actual distance between points A and B is 200 kmm. (8marks)

b) Discuss how electromagnetic radiation interacts with the atmosphere. Use sketches and, cite any relevant laws and effect on direction, wavelength and frequency. (12marks)

QUESTION THREE (20 marks)

a) Describe at least six (6) measures of GIS data quality (12marks)

b) A stadium lamp produces an energy charge in its electrons measured at 3.76×10^{-22} kj. What is the frequency and colour of the light produced by this excitation? (8marks)

QUESTION FOUR (20 marks)

a) The human eye has an IFOV of 0.2 mrads. Can two objects that are 10 cm apart be discriminated from each by someone standing 5 m from the objects? (5marks)

b) Explain at least five (5) advantages of using remote sensing for acquisition of spatial data for GIS (5marks)

c) With the aid of a neat sketch, describe the effect target and path radiance on radiation measured by a sensor (10marks)

QUESTION FIVE (20 marks)

a) While citing relevant sources of data and analysis techniques, describe how remote sensing can be used to map land use characteristics in a watershed (10marks)

b) Determine the dominant wavelength of an object whose temperature is 800 K and describe why it is important to know the dominant wavelength of an object in thermal infrared remote sensing? (10marks)