EGERTON UNIVERSITY

UNIVERSITY EXAMINATIONS

NJORO CAMPUS

FIRST SEMESTER 2012/2013

FIFTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN WATER AND ENVIRONMENTAL ENGINEERING

AGEN 354: PHOTOGRAMMETRY AND REMOTE SENSING

STREAM: 2008 (Y5) B. SC. WEEN   **TIME:** 2 hours

DAY/TIME: Friday, 03.00 – 05.00 pm   **DATE:** 11-01-2013

INSTRUCTIONS:

1. The paper contains questions in **FIVE (5)**

2. Attempt **QUESTION ONE** and **any other THREE (3)**

3. Shown in parenthesis are marks for each question.

4. Use neat and clear sketches where necessary

5. **EACH QUESTION SHOULD BE STARTED ON A NEW PAGE**

6. **Observe examination regulations as outlined on the answer booklet.**

QUESTION ONE (Compulsory)

(a) Explain the principles of stereo–photogrammetry.   **(8 marks)**

(b) Describe the portion of electromagnetic spectrum that is useful in remote sensing

         (4 marks)

(c) What is the purpose of acquiring stereo pairs of image data?   **(1 mark)**

(d) In photogrammetry, aerial photographs can be used to create maps. Give the similarities and differences of maps and aerial photographs.   **(4 marks)**

(e) Describe the major functions of a GIS.   **(8 marks)**

QUESTION TWO

(a) Describe how one can recognize a road on an aerial photo or satellite imagery. **(9 marks)**

(b) Briefly describe the operating principles of GPS. **(4 marks)**

(c) Multispectral scanners measure reflected electromagnetic energy by scanning the earth's surface. Name and differentiate between the two types of scanners used in remote sensing.

(6 marks)

(d) What are the advantages of using GIS over the traditional methods of handling data

(3 marks)

(e) State the different forms of image processing **(3 marks)**

QUESTION THREE

(a) In a task assigned to you to classify the digital image, give the different steps that you will follow in the process of image classification. **(6 marks)**

(b) Electromagnetic radiation experiences scattering. What is scattering and discuss the different types of scattering experienced? **(8 marks)**

(c) A photograph was taken with a 152.4-mm focal length camera from 3800 m above MSL. Four points, A, B, C, and D were identified on the photograph and their ground elevations were found to be A = 460 m, B = 510 m, C = 395 m, and D = 615 m. Find the scale at each point and the average scale of the photograph. Comment on your results. **(6 marks)**

(d) Image interpretation is mostly based in offices/indoors using the respective hardware and software but field observation cannot be discarded completely. Give **three** reasons for field observations in the process of image interpretation. **(3 marks)**

(e) In image processing, image enhancement is undertaken. List the different enhancement techniques. **(2 marks)**

QUESTION FOUR

(a) Define the following terms as used in remote sensing

    (i) Atmospheric window

    (ii) Ground control points

    (iii) Classification algorithm **(3 marks)**

(b) Define electromagnetic spectrum and give the two models used to describe electromagnetic energy explaining the symbols and interrelationship of the models. **(8 marks)**

(c) Briefly discuss the specific energy interactions that take place when EM energy from the sun hits the earth surface. **(4 marks)**

(d) In aerial mission the decision to use a camera with focal length of 152.4 mm was changed to use a camera with a focal length of 308 mm but maintaining the same flying height of 3000 m. With an aid of a sketch discuss the effect of focal length change. **(6 marks)**

(e) What are the advantages and disadvantages of hyper spectral remote sensing in comparison with multispectral scanning systems? **(4 marks)**

QUESTION FIVE

(a) Discuss the satellites orbit characteristics which are relevant in remote sensing. **(13 marks)**

(b) Distinguish between active and passive remote sensing. **(6 marks)**

(c) List **six** areas of GIS application and **six** applications of Low earth observation satellite imagery. **(6 marks)**

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