

To the Students_GEE 3622,

DISCLAIMER!

The following revision questions are not intended to replace your course study obligations but merely to guide you on some of the obvious knowledge you are expected to have understood in your course work.

REVISION KIT GEE 3622

Question 1

A film in a camera with a 40-mm-focal-length lens is properly exposed with a lens-opening diameter of 5 mm and an exposure time of $1/125$ sec (condition 1). If the lens opening is increased to 10 mm and the scene brightness does not change, what exposure time should be used to maintain proper exposure (condition 2)?

Question 2

An aerial camera with forward-motion compensation and a 152.4mm focal length is carried in an airplane travelling at 280 km/h. if flying height above terrain is 3200 m and if the exposure time is $\frac{1}{250}$ s, what distance (in millimetres) must the film be moved across the focal plane during exposure in order to obtain a clear image?

Question 3

The images of the top and bottom of a utility pole are 113.6 mm and 108.7mm respectively, from the principal point of a vertical photograph. What is the height of the pole if the flying height above the base of the pole is 834m?

Assume that the random error in each measured photo distance is ± 0.10 mm and that the error in the flying height is ± 2.0 m, what is the expected error in the computed height of the utility pole?

Question 4

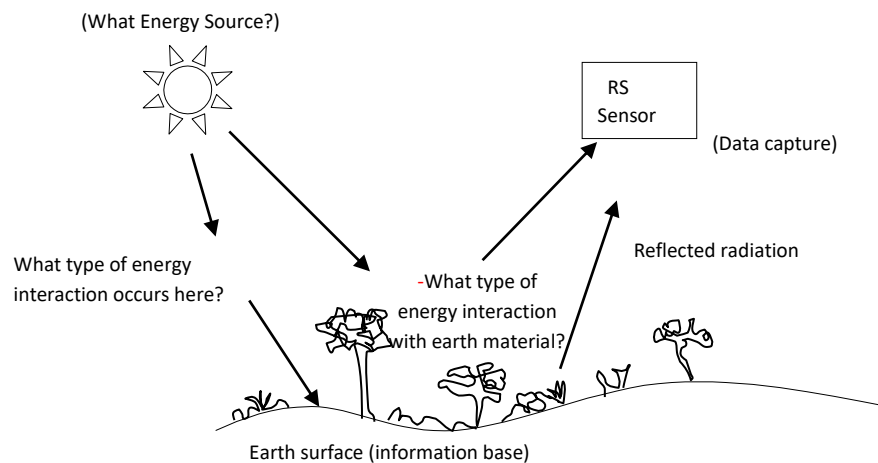
- What do you understand by the term Aerial Triangulation?
- Describe the planimetric block adjustment by independent models
- Formulate the observation equations for a tie point and for the control point using the plane similarity transformation

Question 5

Describe how the "flight line" axis system is created. What are the causes of y-parallax? Describe the principle of the floating mark.

Question 6

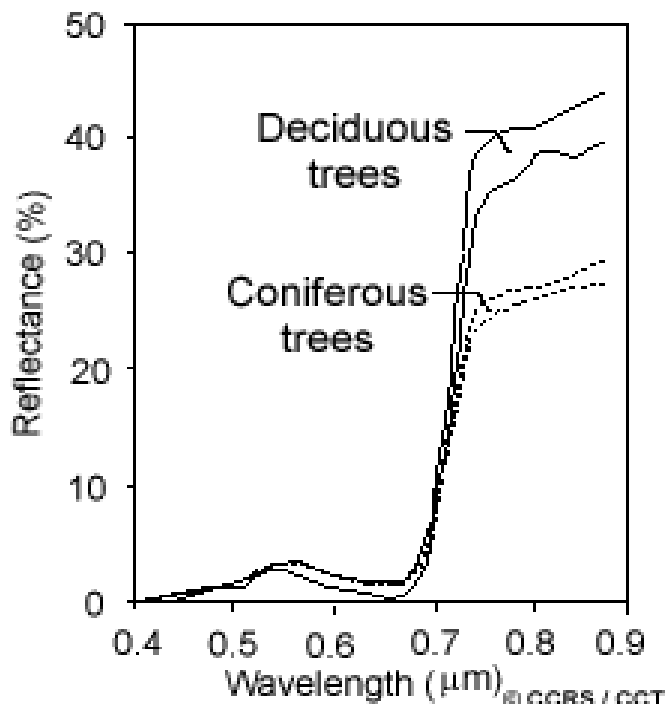
- Explain what is meant by “Remote Sensing” and give two examples of it’s application in Geomatic engineering? [5]
- Explain the operation of the passive Remote Sensing system with the aid of the incomplete diagram below and the questioned posed thereon and then clearly draw and label the diagram. [10].



Question 7

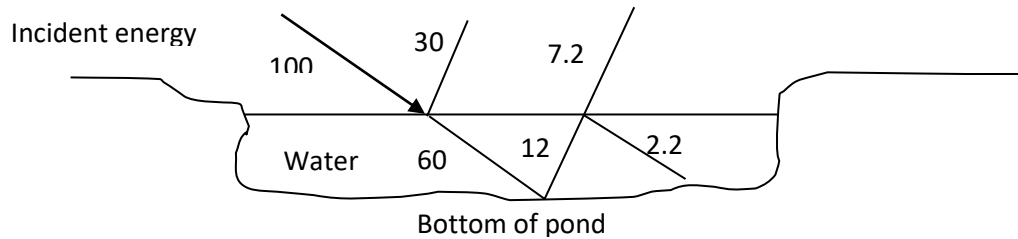
The figure of reflectance curves below shows the spectral response patterns of deciduous and coniferous trees.

- What is the electromagnetic spectrum? [3]
- Which range of the wavelength is the visible portion and the near-infrared (NIR) of the electromagnetic spectrum? [2]
- State why it would be difficult to distinguish the two types of trees in the visible portion and easier in the NIR portion [3]



Question 8

- a) Compute the total amount of energy reflected from the pond shown below if 30% of the energy incident on the water surface is reflected, 10% is absorbed, 60% is transmitted, and 20% of what hits the bottom of the pond is reflected. [3]



- b) Remote Sensing systems can be broadly categorised as Active or Passive. Explain an Active Remote Sensing systems. [6]
- c) Why do most of the environmental objects radiate some energy form? As such mention the energy propagation principal concerning all the environmental components. [4]

Question 9

- a) 3,000 x 3,000 pixel image comprised of 3 spectral channels. Each pixel is 8-bits per channel. How many bytes of computing memory are required? If transfer rate over computer network is 100,000 bytes/s, how long will it take to transfer image?
- b) Explain the theory that 'The object point and image point of a lens system are said to be conjugate points'.
- c) Discuss three types of lens aberrations and further mention two types of geometrical lens distortions.

Question 10

- a. A distance ab on a vertical photograph is 65.0 mm, and the corresponding ground distance AB is 1153 m. if the camera focal length is 153.19 mm, what is the flying height above the terrain upon which line AB is located?
- b. From 9(a), assume that the values given for focal length, photo distance and ground length contain random errors of ± 0.005 mm, ± 0.50 mm, and ± 0.30 m respectively. What is the expected error in the computed flying height?

Question 11

- a) Illustrate by using ray diagrams the formation of real and virtual images for convex and concave type of lenses
- b) With the help of sketches, draw ray diagrams showing the following lens types:
 1. Double concave negative
 2. Plano concave negative
 3. Meniscus concave negative
 4. Double convex positive
 5. Plano convex positive
 6. Meniscus convex positive

Question 12

- a) Mention three (3) most common bands of the electromagnetic spectrum used for remote sensing.
- b) When electromagnetic radiation strikes matter, it interacts with it in possibly four main ways; Name the four (4) processes involved?
- c) Three main types of scattering important to remote sensing are: Explain their effects.
 - Rayleigh scattering
 - Mie scattering
 - Nonselective scattering
- d) Discuss and give examples of the terms:
 - i) Active Remote and
 - ii) Passive Remote sensor systems

Question 13

- a) Define briefly, the following photographic terms:
 - F-number
 - Nadir point
 - Principle distance
 - Flying height
 - Fiducial marks
 - Brightness factor

Question 14

The image coordinates of three points A, B, C and of the principal points P and Q on two overlapping vertical aerial photos were as follows

Point	Left photo		Right photo	
	x(mm)	y(mm)	x(mm)	y(mm)
P	0.0	0.0	-89.2	0.0
Q	+89.4	0.0	0.0	0.0
A	+12.8	+44.6	-76.6	+44.2
B	+16.4	+6.3	-72.8	+5.9
C	+20.2	-30.7	-69.6	-31.2

Given that the ground coordinates of A and C were 60,000mE, 72000mN and 61260mE, 71200m N respectively, estimate those of B.